A Research Paper by

HEADWATERS ECONOMICS

How States Return Revenue to Local Governments from Unconventional Oil Extraction

Windfall or Missed Opportunity?

States Examined:

Colorado, Montana, New Mexico, North Dakota, Oklahoma, Texas, and Wyoming

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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.

CONTACT INFORMATION

Mark Haggerty
mark@headwaterseconomics.org
(406) 570-5626

P.O. Box 7059
Bozeman, MT 59771
http://headwaterseconomics.org

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1. Introduction

This report compares how local governments receive production tax revenue from unconventional oil extraction across seven major oil-producing states. It includes fiscal data and analysis for Colorado, Montana, New Mexico, North Dakota, Oklahoma, Texas, and Wyoming.

Unconventional oil is extracted from tight shale formations using horizontal drilling and hydraulic fracturing technologies. The focus on unconventional oil is important as horizontal drilling and hydraulic fracturing technologies have led a resurgence in oil production in the U.S. Unconventional oil plays require more wells to be drilled on a continuous basis to maintain production than comparable conventional oil fields. This expands potential employment, income, and tax benefits, but also heightens and extends impacts on communities and public costs.

State and local governments levy different types of production taxes, at different rates, and offer a complex array of exemptions, deductions, and incentives. The various approaches to taxing oil and natural gas make comparisons between states difficult, although not impossible. This report applies each state's fiscal policy, including production taxes and revenue distributions, to a typical new unconventional oil well over ten years of production. This allows for a comparison of how states tax oil extracted using unconventional technologies, and how this revenue is distributed to communities over time.

To provide a simple framework for the comparison, we assess state production tax policies on four criteria: the amount, time, location, and predictability of revenue distributions to local governments where extraction and associated impacts occur. We also provide a summary of the methods and data used to compare state fiscal policies. Detailed state profiles are available at: http://headwaterseconomics.org/energy/state-energy-policies.

We hope these data and resources will be useful to states and communities with unconventional oil development that are trying to mitigate the short-term impacts of oil extraction while making investments in long-term economic development opportunities.

2. Summary Findings

The summary points below describe key differences in how states return revenue from unconventional oil production to local governments. Fiscal policy is important for local communities for several reasons. Mitigating the acute impacts associated with drilling activity and related population growth requires that revenue is available in the amount, time, and location necessary to build and maintain infrastructure and to provide services. In addition, managing volatility over time and making long-term investments in communities requires different fiscal strategies, including setting aside a portion of oil revenue in permanent funds.[1]

Balancing these seemingly conflicting pressures is difficult, and will vary over time and between communities. The relative differences presented here are intended to inform more detailed policy discussions taking place in many states. The bullet points below and the two figures on the following page present the main findings of the state comparisons.

- **Tax structures and effective tax rates are highly variable between states.**
  States levy different taxes at different rates, and offer a range of exemptions, deductions, and incentives. Effective tax rates on new unconventional oil wells vary between states from a low of 3.3 percent in Oklahoma to a high of 11.7 percent in Wyoming.

- **Returns to local governments are not consistent with the size of total tax collections.**
  Local governments in states with higher tax rates do not necessarily receive more money. Local returns vary from a low of $178,782 per well in New Mexico to a high of $1,234,658 per well in Wyoming—14 percent and 55 percent of total revenue, respectively.

- **The lag between when drilling occurs and when revenue is received is longer for local governments than states.**
  Tax policies can increase the inherent lag between the impacts that occur during the drilling process and the revenue that accrues only after production begins. Local government property taxes, for example, extend time lags between development impacts and revenue collections to between one and three years. On the other hand, state production taxes are most often levied monthly and return revenue more quickly.

- **Few states use fiscal policy to resolve uneven revenue distribution to cities and counties.**
  Local taxes and direct distributions primarily accrue to jurisdictions based on the location of production. Adjacent cities, counties, schools, and special districts, which often absorb significant demographic and other impacts, can be left without sufficient revenue. Only North Dakota and Colorado allocate revenue based on a broader distribution of impacts.

- **Most states do little to manage volatility or allocate revenue to long-term savings.**
  Western states typically do not distribute revenue to a permanent trust fund. North Dakota and Wyoming save substantial amounts of production revenue (43% and 19%, respectively) while others save little (New Mexico 5%, Colorado 5%) to none (Montana, Oklahoma, and Texas), choosing instead to spend revenue as it comes in. In states that do save, local governments do not share in the investment income, leaving them reliant on annual revenue and exposed to volatility.

Figure 1 compares each state's revenue collections in time, amount, and effective tax rate. Figure 2 compares each states's revenue allocations between state government, local governments, permanent savings (trust funds), and tax expenditures. Tax expenditure refers to the value of production tax incentives and tax relief funded with production tax revenue.

Figure1: Comparison of Production Tax Revenue Collected from a Typical Unconventional Oil Well

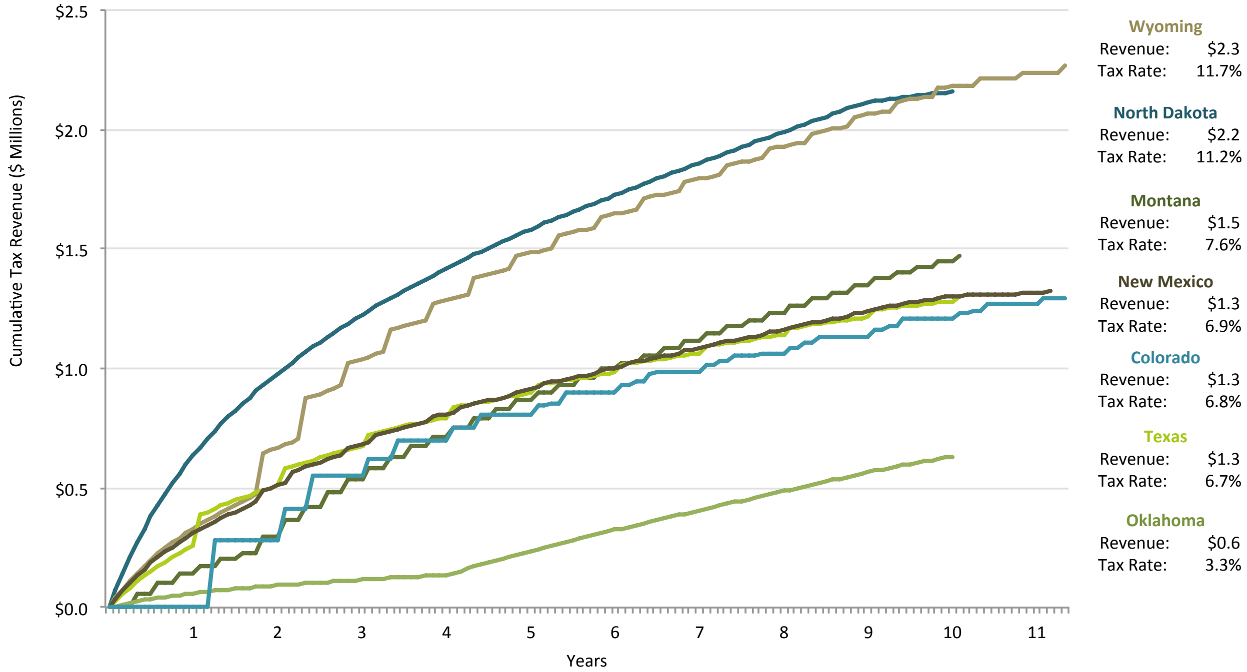
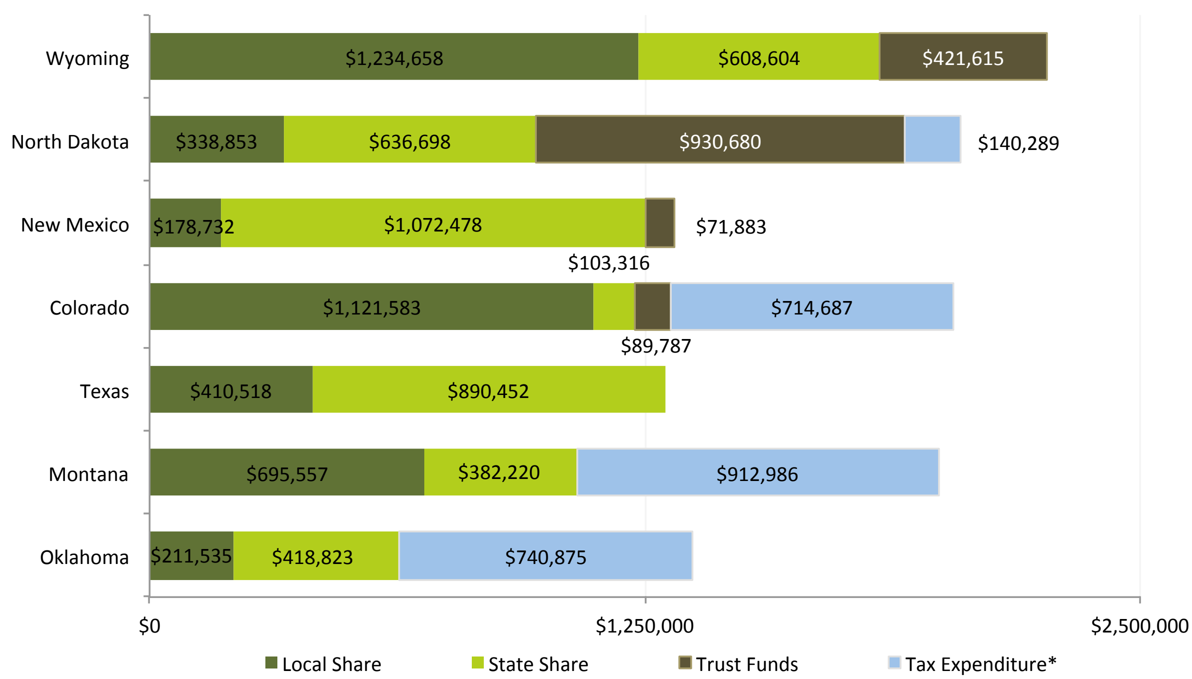


Figure 2: Comparison of Distribution of Production Tax Revenue from a Typical Unconventional Oil Well



*Tax Expenditure refers to the value of production tax incentives and tax relief funded with production tax revenue.

3. Why Energy Fiscal Policies Matter to Communities

The advent of horizontal drilling and high-volume hydraulic fracturing technologies is renewing interest in the socioeconomic outcomes of oil and natural gas production in energy "boomtowns."[2] These "unconventional" production techniques are high-impact economic activities requiring continuous drilling activity across extensive areas to bring oil and natural gas to the surface. The greater effort and cost required to extract unconventional fossil fuels brings more employment and income opportunities along with larger and more lasting impacts associated with industrial activity and related population growth.

These changing production dynamics place a greater emphasis on the ability of fiscal policy to deliver revenue in the amount, time, and location necessary to facilitate development and mitigate impacts. Communities also often experience greater volatility in response to the changing pace and scale of development across the long time horizons predicted to complete drilling and production.

This report does not offer specific revenue goals—for example, how much revenue is sufficient to manage impacts, or what share should be invested. Balancing these seemingly competing needs will vary from place to place. It does provide a comparison of how state policies return revenue to local governments from unconventional oil. The purpose is to inform ongoing policy debates and research about the role of energy fiscal policy in community economic development. The dramatic differences between the seven states examined in this report in taxation and distribution of production tax revenue from unconventional oil may be affecting the ability of communities to benefit from this activity.

Much of the previous work on energy boomtowns has demonstrated a set of impacts related to social disruptions;[3] public safety and infrastructure challenges including impacts to roads, water systems, and housing supply;[4] increasing disparity in wealth;[5] public health risks;[6] and uncertain environmental outcomes, including water quality and quantity concerns, and wildlife and habitat loss.[7] These short-term and acute impacts can be mitigated to some extent by ensuring communities have resources in the amount, time, and place necessary to facilitate development and growth.[8]

The literature shows mixed results on the question of whether communities are better off as a result of oil extraction. A large portion of the research focuses on national experiences in countries that may have weaker political institutions and fiscal structures than the U.S. However, there is evidence that dependence on natural resources can lead to lower incomes over time at the U.S. county scale. For example, Headwaters Economics recently completed a longitudinal study of U.S. county governments in oil and natural gas-producing states. Oil and gas activity can have a strong immediate positive impact on employment and income, but the analysis finds that when fossil fuel development plays a role in a local economy for a long period of time there are negative effects on per capita income, crime rates, and educational attainment.[9]

The role of oil and natural gas fiscal policy in determining long-term economic performance is not well understood, but it is generally accepted that mitigating short-term impacts and managing revenue volatility over time is good policy and may be directly related to positive outcomes.[10] Yet, as we show here, few states invest substantial portions of production tax revenue into long-term funds. Fewer still allocate a share of the investment income toward local economic development goals (most investment income is directed to state general funds or other statewide priorities).

In the next section, we describe the changing dynamics of unconventional oil production and why fiscal policies largely crafted before the current boom need revisiting. Next we review existing studies to demonstrate some of the difficulties involved in comparing state fiscal policies, and to situate the methods we use in the broader literature.

3.1 Unconventional Oil Poses New Challenges

We define unconventional oil as oil extracted from tight shale formations using horizontal drilling and hydraulic fracturing technologies. Applying these technologies to shale plays, including the Bakken in North Dakota and the Eagle Ford in Texas, has led to a resurgence of domestic oil production, reversing a decades-long decline in U.S. production by compensating for declining conventional fields in Alaska, California, and Texas.[11] Nearly two-thirds of all drilling rigs active in North America in 2013 were drilling horizontal wells—up from only eight percent of all drilling rigs at the start of 2004.[12]

Past conventional extraction pumped oil from reservoirs where it had migrated from the source rock and was trapped by geology. Unconventional drilling targets oil and natural gas still trapped inside the source rock or in tight shales, often expansive but thin layers of rock buried thousands of feet underground. As a result, dramatically greater effort is required to bring unconventional oil to the surface, requiring continuous drilling across expansive areas, often spanning several states.[13]

Unconventional drilling activity also is likely to be punctuated over time as companies ramp up and ramp down activity in response to changing price, extraction costs, leasing conditions, and financing dynamics. There is evidence that today's unconventional drilling activity follows a "semi-bust and re-boom" pattern of development, rather than a steady and uniform development process over the extent of each individual play.[14] The punctuated process can occur across an entire play, for example in the dry-gas fields of Colorado's West Slope. Rapid drilling activity quickly ended when the relative price of natural gas compared to oil plummeted and drove a move in rigs and workers from Colorado to liquids-rich gas and oil plays in North Dakota, Texas, and elsewhere.

Within plays, uneven development also is likely at the community or even the lease scale. In response to the extensive nature of unconventional plays, the industry has developed a "land grab" strategy, moving quickly to lock up acreage and secure leases by drilling an initial well before moving on to the next location. Companies will return to these areas to complete infill development after the first wave of drilling is complete.[15] Technology continues to evolve as well, and many unconventional plays are likely to experience subsequent rounds of activity as companies use secondary production techniques to extract a larger share of the oil in place (existing technology extracts only 2% to 10% of the total oil in place).[16]

Greater drilling intensity, longer development timeframes, and more uncertainty place a greater emphasis on fiscal policy's ability to deliver adequate revenue in a timely manner to help mitigate impacts, and to manage volatility over time.

Most states crafted their fiscal policies before the current boom in unconventional drilling. For example, Montana's last major overhaul of taxation policy occurred in 1999, with important incentives for horizontal drilling adopted earlier, in 1993.[17] Many states introduced new incentives in the 1990s when new production and prices were low. The result is that most state policies were written without an understanding of the higher costs, impacts, or level of activity brought on by new technology. Drilling incentives, once justified on the basis that wells would produce at high levels for decades after their completion, are now delaying and lowering tax rates at a time when the pace and scale of drilling impacts are increasing.

Most state and local taxes, when they do direct revenue to local governments, allocate revenue based on the location of production, while adjacent cities or counties that experience increased demands on infrastructure and services do not benefit directly. Many states also do little to manage volatility at the local level, investing little to nothing in permanent trusts, or failing to dedicate a share of the investment income to local purposes. As a result, communities that do receive revenue from oil and gas production are exposed to the annual volatility of production tax collections.

How unconventional oil extraction will play out in communities over time is still unclear. Some important questions include: How long will oil extraction last? Will development, production, and depletion take place in a predictable fashion? Will communities retain the families, jobs, and tax revenue that oil brings to the region after the oil is gone? To help state and local leaders meet their current needs and achieve their future goals, an improved understanding of how fiscal policy applies to new unconventional plays is critical.

The next section describes how research has compared fiscal policies across states to date.

3.2 Different Approaches to Comparing State Energy Fiscal Policies

States levy a wide array of production taxes, including local property taxes and a variety of state taxes. Within and across states, the various taxes applied define the tax base differently, levy different base tax rates, and offer various exemptions, deductions, and incentives. Taken together, the differences in policies between states return different amounts of revenue to local governments from an equivalent amount of oil produced. Finding agreement on the best method and approach to compare differences between states is difficult, leading to conflicting results and policy recommendations.

The most common approach to comparing state tax policies is a simple listing of nominal or statutory tax rates for each state.[18] Nominal tax rate studies provide poor comparisons of state fiscal policies because they do not attempt to account for incentives and deductions that result in effective tax rates that can fall well below the statutory rate.

Effective tax rate comparisons offer significant improvements over nominal tax rate studies as they take into account all incentives and deductions. Kunce et al. write that "rather than itemize tax code details, effective tax rates are used to translate dynamic tax policy into a tractable form. Effective rates can be expressed as the ratio of taxes (or royalties) collected from a particular tax to the value of production. Thus, the calculation of specific effective tax rates fully account for exemptions, incentives, different tax bases, and frequent changes in tax law."[19]

While effective tax rate comparisons provide a good assessment of the taxes industry pays, they still have several limitations. First, they do not focus exclusively on unconventional production. Horizontal wells in some states receive specific incentives that lower the effective tax rate paid on new unconventional production relative to ongoing production from conventional fields. Assuming that new unconventional production will pay a rate equivalent to the average tax rate paid by all production of all types averaged across a state in a given year can overestimate returns from unconventional plays. Second, effective tax rate studies are generally static, providing a snapshot of rates for a single year. As a result, they do not assess the timing of revenue collections and distributions, or consider volatility in tax rates over time.[20]

Comparing the taxes paid by individual wells offers the ability to focus specifically on unconventional production, and to provide longitudinal assessments. The Montana Department of Revenue (2012) compared Montana's state tax regime to North Dakota's over the lifespan of a typical unconventional oil well using data provided by the North Dakota Industrial Commission.[21] Ernst and Young (2012) compared tax burdens between Ohio, North Dakota, and Texas based on constructed financial statements, both balance sheet and income statements, for a representative horizontally completed shale well.[22] Rodgers (2012) uses decline curves for unconventional oil plays to apply state tax policies across U.S. states and Canadian provinces.[23] Kaiser (2012) provides an important analysis of how a single state's tax policy applies to wells of varying performance across a single play.[24] Each of these studies looks at revenue generated over time specifically from unconventional oil or natural gas wells.

An issue complicating assessment of all studies is that they often consider different sets of taxes. Many production tax comparisons only consider production taxes imposed by states, excluding production taxes imposed by local governments. Others include additional aspects of each state's general tax structure, including corporate income taxes, sales taxes, and property taxes on land and equipment, among others.

The purpose of studies also varies, contributing to confusion over how to interpret often-conflicting findings. To date, most comparisons of state fiscal policies outside the academic literature focus on the tax rate faced by industry in different states. The hypothesis is that tax competition between states is a powerful driver of industry activity. Many studies assert this point, and states are encouraged to lower the tax burden faced by industry.[25] However, the academic literature generally disagrees that tax competition is important to oil production.[26]

Energy Tax Primer

Energy revenue accrues to state and local governments from a variety of sources. Production taxes and royalties are specific levies on the value of the resource produced and make up the lion's share of revenue from oil production. They also are the most flexible in addressing community needs relative to other general taxes that are broadly applied to all economic activity and whose allocations are less able to address specific needs.

Production Taxes: In general, a "production tax" is any tax levied against the production value or volume of oil and natural gas extracted or "severed" from the earth. Production value equals price times volume. Wyoming's severance tax, North Dakota's gross production and oil extraction taxes, and New Mexico's emergency school tax are all examples of production taxes. In Colorado and Wyoming, local governments also levy ad valorem (property) taxes on the production value of oil and natural gas at the local level.

Royalties: Royalties are production taxes paid to the owner of the resource, including federal, tribal, state, and private landowners. Federal royalties are paid to the U.S. Treasury, and roughly half are returned to the states where drilling takes place. Federal onshore royalties are 12.5 percent. Most states charge royalties of 16.67 to 18.5 percent. Royalties paid to private landowners fall in a similar range, but can be higher in particularly active plays. 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.

Corporate Income Taxes: Production taxes and royalties are distinct from corporate income taxes levied on net profits. Corporate income tax rates vary widely at the state level, ranging from zero (in Wyoming) up to about ten percent for the highest tax brackets in several states. Corporate income taxes are relatively unimportant to communities: compared to production taxes and royalties, corporate income taxes have generally lower rates, a smaller tax base (net profit compared to gross production value), and almost always accrue to the state general fund, not local jurisdictions.

General Taxes and Fees on Drilling Activity: State and local governments also levy taxes and fees on the value of labor, purchases, land, and equipment associated with drilling activities. The general tax structure can be important to local governments, but the role they play varies from state to state. Sales taxes generate revenue in jurisdictions where activity takes place, and concurrent with activity. In some states, however, sales taxes accrue to the state government and distributions are made on a formula unrelated to local impacts. Property taxes on land and equipment value are levied at the local level, but respond slowly to rapid changes in activity.

Impact Fees and Special Assessments: Communities and states can impose impact fees that are directly related to identifiable energy development costs. Local governments have enacted impact fees sparingly. For example, Rio Blanco County, CO imposes fees for road costs associated with drilling traffic. Communities can also levy local option taxes to address specific needs and capture revenue from increased activity. Rock Springs, WY used a variety of local option taxes to fund infrastructure and services related to energy impacts over the last decade. States can also impose fees, but do so sparingly. Wyoming's Industrial Siting Act is a good example of how states could help address impacts, though oil and natural gas are exempt. Pennsylvania levies a state impact fee per well, but the fee is more properly characterized as a form of production tax. The fee is collected annually only after production begins, and is not calibrated to specific service or infrastructure costs.

Energy Revenue Distribution Primer

In general, state distribution policies share revenue between state and local government purposes in fixed proportions (e.g., every dollar of revenue is allocated in exactly the same way), or distributions change based on the total amount of revenue generated during each tax year (e.g., additional dollars of revenue are allocated in new ways). Within these basic structures, production taxes and other forms of revenue reach local governments in a variety of ways.

Local Taxation, Charges for Services, and Special Assessments: Local governments collect revenue directly through various taxes, charges, and fees. The largest source of revenue is local property taxes on production value (Wyoming and Colorado rely heavily on local production taxes). Local governments also benefit from increases in the general tax structure, including property taxes on land and equipment, sales taxes, and charges for services. The local benefit from an increase in the general tax structure varies. For example, sales taxes often accrue to the state government, not to local jurisdictions, and returns are equalized across the state without regard to energy-related revenue or impacts. Local option taxes, impact fees, and other forms of special assessments do retain revenue directly in the jurisdiction where it is generated.

Direct Distributions: States make direct distributions to local governments from state production tax revenue based on the location of production and/or other impact-related criteria. Montana's gross production tax is in lieu of local property taxes, and distributions are made to county governments and local school districts where production occurs, but not to cities that experience growth-related impacts. Colorado and North Dakota incorporate criteria related to impacts in distribution criteria, for example, directing revenue to cities where oil and gas employees live.

Impact Grants: Several states have established community impact grant funds from production taxes or other sources of revenue. For example, Colorado's Department of Local Affairs (DOLA) allocates 35 percent of the state severance tax to an impact grants fund (and DOLA also distributes 25% of federal royalties distributed to the state). North Dakota has allocated up to $240 million in the current biennium to a community impact grant fund.

Other Assistance: State governments provide additional forms of assistance to local governments that are struggling to adapt to booms in several ways, including direct monetary assistance, technical assistance, and service partnerships. North Dakota has directed billions of dollars to local governments in the current and previous biennium to address impacts beyond what direct distributions and impact grants covered. The Montana Department of Commerce provides technical assistance and training on local land use and capital improvements planning, lowering local costs and extending local capacity. States can also prioritize state funding to target oil-impacted regions. For example, Montana is spending state highway funding in the Eastern part of the state to alleviate the pressure on communities.

Limitations: Local governments themselves are often limited in important ways from raising and retaining revenue. A number of states have imposed constitutional revenue and expenditure limitations on local governments that can restrict the ability of cities and counties to realize windfall revenue from energy development. For example, the Taxpayer Bill of Rights (TABOR) in Colorado limits budget growth to a fixed annual percent. As a result, Mesa County, CO, was forced to return severance tax distributions from the state during the natural gas boom in the early 2000s that would have exceeded their budget limits. State legislators can also act to steer revenue away from local governments: Montana's legislature recently adopted legislation to limit the size of direct distributions to school districts in oil-impacted counties, regardless of the amount of revenue generated locally and otherwise required to be distributed by law.

4. Methods

This report examines how different tax policies return unconventional oil production revenue to communities. We assume that changes in tax rates, tax incentives, and distribution policies have an impact on the amount, timing, location, and predictability of returns to communities. This work contributes a method for comparing fiscal returns to local governments from unconventional oil that can inform more detailed studies related to community outcomes.

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.[27] This makes it possible to construct a typical well profile—in this case using data from Montana's Elm Coulee field in the Bakken formation. We use this well profile to determine how a state's taxation and distribution policies combine to deliver revenue to local governments over ten years in terms of amount, timing, location, and predictability.[28]

More detail is provided in profiles of all seven oil-producing states, available online at: http://headwaterseconomics.org/energy/state-energy-policies.

4.1 Unconventional Oil Well Performance

There were 789 horizontal oil wells drilled in the Elm Coulee between 2000 and 2012.[29] Average oil production peaked at 246 barrels per day in the first month, declining to 122 barrels per day after one year—a 51 percent decline in the first year. Cumulatively, the average Elm Coulee well produces 227,365 barrels of oil over ten years (Figure 3 and Table 1). At a fixed price of $85 per barrel, the typical well generates $19.3 million in cumulative production value over ten years (Figure 4).

Figure 3: Typical Unconventional Oil Well Production Profile, Montana Elm Coulee (Bakken)

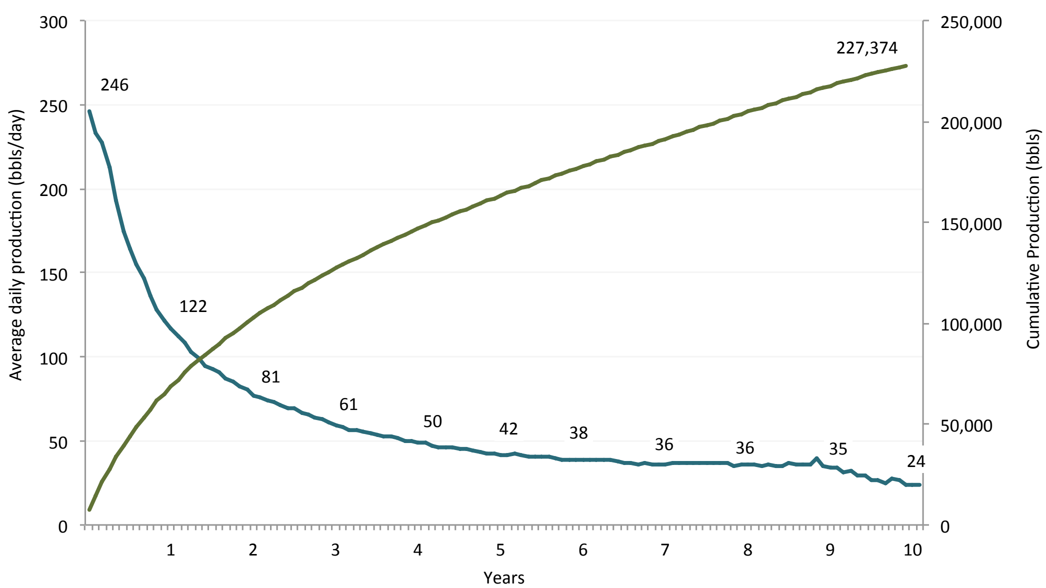
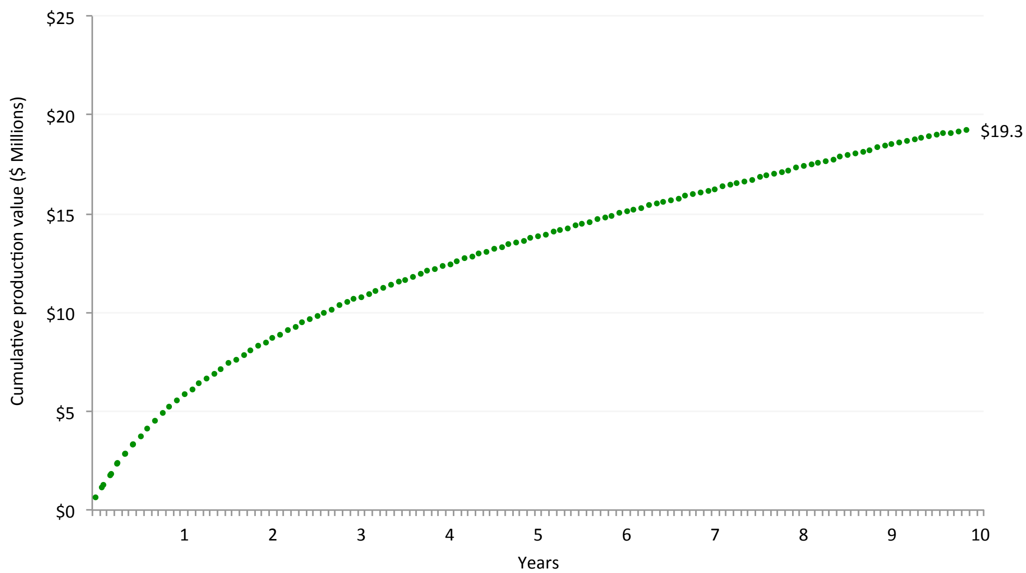


Table 1: Typical Unconventional Oil Well Production Profile, Montana Elm Coulee (Bakken)

Production month	Producing well count	Average daily production (bbls/day)	Decline in average daily production from prior year	Cumulative production (bbls)	Average price ($/bbl)	Cumulative gross production value
1	789	246			$85.00	$637,222
12	729	122	51%	65,063	$85.00	$5,530,321
24	700	81	34%	100,176	$85.00	$8,514,943
36	658	61	25%	125,423	$85.00	$10,660,958
48	637	50	18%	145,270	$85.00	$12,347,921
60	574	42	15%	161,890	$85.00	$13,760,677
72	449	38	10%	176,600	$85.00	$15,011,042
84	305	36	6%	190,253	$85.00	$16,171,470
96	159	36	1%	203,624	$85.00	$17,308,067
108	65	35	1%	216,815	$85.00	$18,429,233
120	23	24	32%	227,374	$85.00	$19,326,749

Figure 4: Cumulative Production Value, Typical Montana Elm Coulee Well (Bakken)



The decline curve shown in Figure 3 shares similar characteristics with wells from other unconventional oil plays across the U.S. The U.S. Energy Information Administration provides analysis of decline curves from unconventional plays each year as part of the Annual Energy Outlook, finding that wells in the Bakken in Montana and North Dakota, the Eagle Ford in Texas, and the Wolfcamp in New Mexico and Texas, among others, demonstrate relatively high initial production with subsequent steep declines.[30]

In reality, no two wells are identical. Kaiser (2012) has shown that wells with different production and cost profiles will return different amounts of revenue and effective tax rates within a single state's tax structure. The shape of the production decline curve (how quickly production declines), the rate of initial production, and price affect the expected cumulative production value of each well. The shape of the production decline curve also has bearing on how drilling incentives, stripper well exemptions, and price triggers affect the effective tax rate. However, since we are most interested in differences in tax policy between states, and not in the economics of well performance across varying plays, the typical well profile is suitable for this analysis. When we turn to revenue distributions, we often have to consider cumulative revenue collections because distribution of oil revenue often changes as total revenue collections increase.

In the next section we apply each state's tax policy to the typical well profile described above.

4.2 State Production Tax Structure

Production taxes are the single largest source of revenue from direct production and drilling-related activity, and are the most flexible for use in responding to local government needs and goals. The formula to estimate production taxes based on production from the typical well for each year is:

*Tax Revenue = (Gross production value – (deductions + exemptions)) * (base tax rate – (tax incentives + tax exemptions))*

We estimate the production tax revenue for each state as it applies to the typical well described above. The discussion below provides a general overview of our methods. The state fiscal profiles provide additional detail on the assumptions used to apply each state's tax policy to the typical unconventional oil well profile.

A Note on Natural Gas

Most unconventional oil wells produce a mix of crude oil and natural gas. The amount of natural gas associated with a well, and its production value can be important to the economics of a well, and for the overall return to communities from drilling activity. States tax natural gas quite differently from oil, and the revenue derived from natural gas can also be distributed in different ways. We avoid this complexity by assessing tax policies related to oil and natural gas independently. For a description of natural gas policies as they apply to unconventional natural gas wells, see the report: *Unconventional Oil and Natural Gas Production Tax Rates: How Does Oklahoma Compare to Peers?* http://headwaterseconomics.org/wphw/wp-content/uploads/State_tax_comparison_study.pdf.

Taxable Value:
Taxable value is generally total gross production value (or market value) of oil extracted at the wellhead. Gross production value is simply the volume in barrels of oil extracted multiplied by the price per barrel. In some states, the tax is levied against net production value, equal to gross production value less deductions that most commonly include transportation and processing costs, and royalties paid on wells drilled on state, federal, or tribal lands.

Property taxes in several states define taxable value in exactly the same way: a local mill rate is levied on gross or net production value produced during the tax year. Some states define taxable value of oil as the value of proved reserves. Assessed value is based on the income approach where the expected value of production over the life of the reserve is estimated and discounted.

Base Tax Rate:
Generally, states use 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.

Tax Incentives:
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, while other states ensure incentives are available at all times, without regard to price.

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.

4.3 State Revenue Distribution Policy

In general, state distribution polices share revenue between state and local government purposes in fixed proportions (e.g., every dollar of revenue is allocated in exactly the same way), or distributions change based on the total amount of revenue generated during each tax year (e.g., additional dollars of revenue are allocated in new ways). Allocating revenue in states that have 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 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 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 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 are defined as the value of production tax incentives and tax relief funded with production tax revenue.

5. Results

This section compares state energy taxation and distribution policies in seven oil-producing states. The cumulative revenue curves (Figure 5) provide a graphic illustration of the different timing of revenue collections, cumulative revenue collections, and effective tax rates between Colorado, Montana, New Mexico, North Dakota, Oklahoma, Texas, and Wyoming.

After ten years, if our typical well were drilled in the state, Wyoming would collect the most revenue, at $2.3 million, an effective tax rate of 11.7 percent. North Dakota would follow closely behind with $2.2 million in collections and an effective tax rate of 11.2 percent. Oklahoma would collect the least revenue if a well with the typical profile were drilled in the state, with only $0.6 million in tax revenue and an effective tax rate of 3.3 percent. Oklahoma's low tax revenue is due to a combination of relatively low production tax rates and a large incentive for horizontally completed wells. Oklahoma has a single production tax with a base rate of seven percent. By comparison, North Dakota levies two production taxes at the state level with a combined base tax rate of 11.5 percent. Oklahoma also offers a drilling incentive that lowers the production tax rate from seven to one percent for the first 48 months after a new horizontal well is completed, or until well costs are recovered. North Dakota has a similar drilling incentive, but it is currently not in effect because it is tied to a price trigger.

The slope of the cumulative revenue curve reflects the timing of revenue collections. North Dakota assesses production taxes monthly, represented by the relatively smooth curve with the steepest slope in the first several years when production from the typical well is greatest. By comparison, Colorado levies a state severance tax and local property taxes on an annual basis. As a result, in Colorado no revenue is collected in the first year of production for wells completed and revenue thereafter is stepwise.

Figure 5: Comparison of Production Taxes Collected from a Typical Unconventional Oil Well

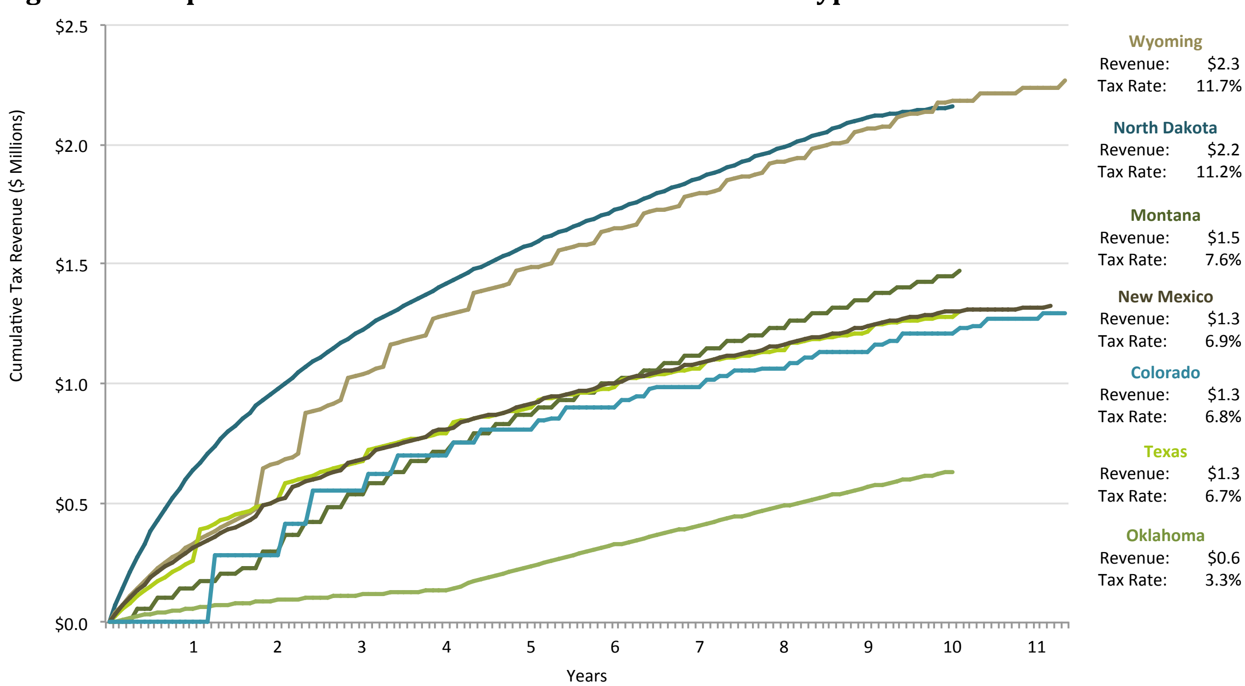
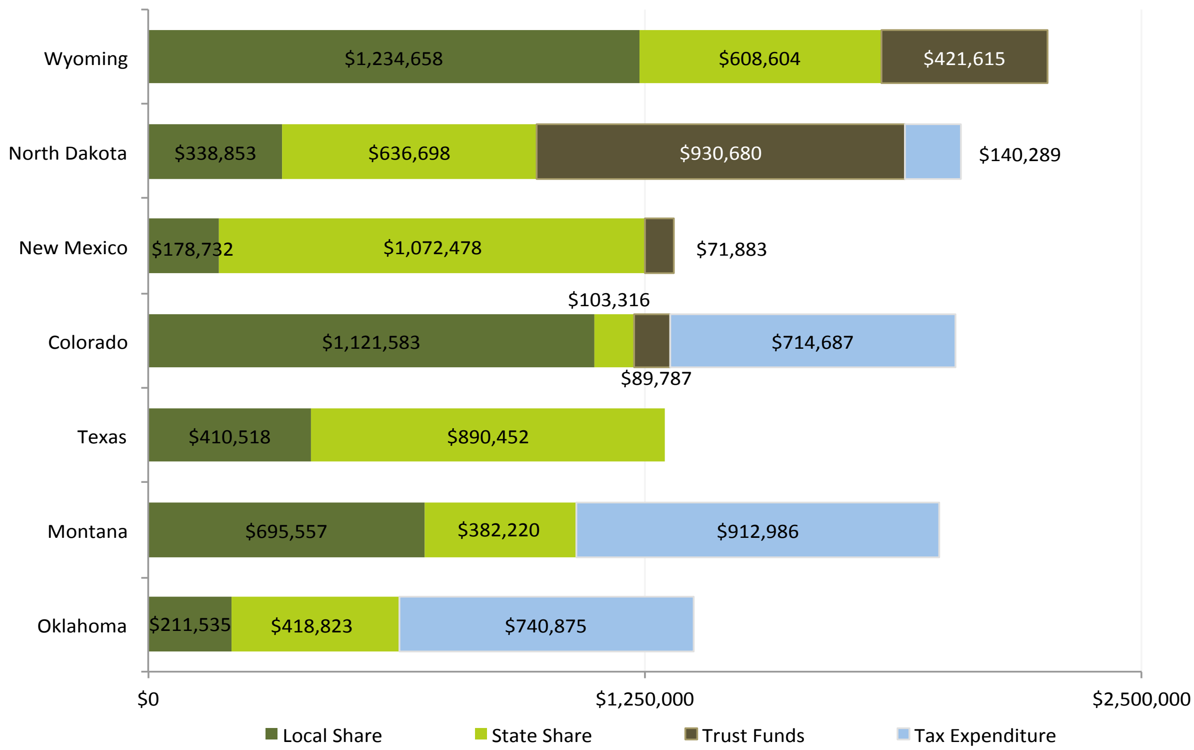


Figure 6 shows the distribution of production tax revenue to state government, local governments, permanent savings (trust funds), and tax expenditures in each state. Texas, Montana, and Oklahoma do not distribute any revenue to trust funds. Wyoming, New Mexico, and Texas do not distribute any revenue to trust funds.

Figure 6: Comparison of Distribution of Production Tax Revenue from a Typical Unconventional Oil Well



6. Discussion: The Amount, Timing, Location, and Predictability of Revenue Distributions

Below we discuss how the production tax results shown above are important to mitigating local extraction impacts and managing volatility over time. We do this by discussing key differences between the seven states in the amount, timing, location, and predictability of revenue collections and distribution to local governments.

Amount

The energy boomtown impact literature and a large body of consultants' reports and newspaper articles are replete with examples of local governments struggling to pay for new demands on infrastructure and services brought on by rapid industrial activity and associated population growth.[31] Measuring the amount of revenue available to communities to mitigate impacts is among the first steps in understanding whether and how communities can facilitate development without suffering undo impacts.

It is no surprise that fiscal policies between states return highly variable amounts of revenue because of different effective tax rates. What is surprising is that local governments in states with higher effective tax rates, and higher revenue collections, do not necessarily receive more money than their peers. Local returns vary from $178,782 per well in New Mexico (14% of total revenue) to $1.2 million in Wyoming (55 % of total revenue). North Dakota stands out as having a relatively high tax rate, second only to Wyoming, but relatively low returns to local governments, below Colorado and Montana which collect fewer total tax dollars but distribute larger shares to communities.

Timing

Impacts to roads, water and sewer infrastructure, and increased demand for public safety and housing are concurrent with drilling activity and related population growth. But revenue flows to communities only after wells are completed and begin producing. The resulting lag is exacerbated by the time required to plan, design, and construct infrastructure, and the uncertainty about future revenue and demand.[32] Tax polices that further delay revenue make matters worse. Communities may find they are playing catch-up, and can experience impacts that could otherwise be avoided.

Production taxes collect revenue most quickly as they are typically levied monthly. Property taxes, by comparison, are levied annually on production that occurred in the previous year, delaying revenue by two years or more. Drilling incentives that delay tax collections for a specific period of time after well completion also contribute to revenue delays in several states.

Local governments feel the impacts of time lags between drilling impacts and revenue collections most acutely. In Wyoming, for example, the state government receives revenue from a severance tax levied monthly while local governments rely almost entirely on property taxes levied annually to receive revenue from oil extraction.

In Montana, communities receive revenue from taxes on industry 22 months after well completion, the cumulative delay associated with an 18-month "holiday" drilling incentive, and quarterly tax collections and distributions that extend the delay an additional four months.

North Dakota collects the largest share of revenue in the shortest amount of time. The state's two production taxes, the oil extraction tax and the oil and gas gross production tax, are both collected monthly with no significant incentives that delay collections.

Location

A main challenge for communities is the disconnect between where drilling and production take place, generally in rural areas, and where impacts accrue, often in adjacent cities or counties. Counties typically receive the lion's share of production tax collections directly from property taxes or state distributions in lieu of property taxes, while cities that may not have any significant drilling activity within their jurisdictions can be largely left out of production tax collections and distributions. Most state fiscal policies do little to address this inherent challenge.[33]

In Wyoming and Texas, local governments raise revenue directly through property taxes, leaving adjacent cities with little opportunity to benefit directly from production tax revenue. State direct distributions in lieu of property taxes replicate the same problem in Montana and Oklahoma where distributions are made almost entirely back to jurisdictions where production originates, leaving cities without direct revenue from production.

Only Colorado and North Dakota have made significant efforts to direct revenue to local governments based on impact-related criteria in addition to production criteria. Colorado makes direct distributions based on a formula that includes both the location of production, and the location of oil and gas employees, issued drilling permits, population, and transportation needs. In addition, a large share of the state severance tax is distributed to communities through impact grants. North Dakota reworked its distribution policies during the 2013 legislative session to direct revenue to "hub cities" that experience rapid growth and related impacts, and the state increased the funding limit for impact grants from $100 to $240 million.

The revenue distribution systems in these states are still adapting to changing needs and production dynamics. Colorado's direct distributions and impact grants received a major overhaul in 2008 in the midst of the recent natural gas boom,[34] and North Dakota's tax policies may be revisited again in the next biennium. Vision West North Dakota, a consortium of local governments in North Dakota's oil patch is writing a regional plan that will likely include recommendations on fiscal policy and regional governance structures to better address local needs.

Predictability

One of the main policy goals of energy taxation is to manage the revenue volatility from oil extraction.[35] As discussed earlier, the long timeframes and uncertainty associated with unconventional oil production place a larger emphasis on ensuring that communities have revenue in a predictable manner and are not exposed to annual revenue volatility.

The primary mechanism that states use to manage volatility is saving a share of annual production tax revenue into a permanent fund that can provide lasting and stable fiscal returns. In general, few states are saving much from unconventional oil production. North Dakota and Wyoming save substantial amounts (43% and 19%, respectively), but others save little (New Mexico 5%, Colorado 5%) to none (Montana, Oklahoma, and Texas), choosing instead to spend revenue as it comes in.

One important opportunity provided by savings is the ability to utilize the investment income and capital to make loans and direct payments for infrastructure and service needs at the outset of drilling booms, before production revenue becomes available. In other words, money saved from previous booms can mitigate the timing and location challenges inherent to current and future resource booms. Savings are also central to the ability of state and local governments to maintain infrastructure and services after the oil runs out, and to make long-term investments in economic diversification, education, and environmental restoration and conservation that will leverage the depletion of non-renewable resources into lasting benefits.

Other aspects of state fiscal policies can exacerbate revenue volatility, or expose budgets to greater risk of volatility by engendering greater dependence on production tax revenue. Colorado's cyclical property tax deduction from severance tax liability increases annual revenue volatility far beyond what would otherwise be expected from changes in production value.[36] Montana's policy of directing nearly a quarter of all production tax revenue to reducing property taxes replaces a relatively stable source of revenue with a highly volatile one. This policy guarantees a minimum amount of property tax relief annually, even in years when production taxes are not sufficient to cover the revenue reductions, exposing schools to budget shortfalls in some years and forcing the legislature to raise taxes or commit to permanent reductions in school funding after the boom ends.

7. Policy Lessons

This report measures and compares the aspects of energy fiscal policy that are important to communities where unconventional oil extraction is taking place. The state-by-state comparison is intended to inform ongoing discussions about how energy fiscal policies help meet the needs of energy-impacted communities. The results suggest some areas for potential reform and additional research questions.

Placing community needs and long-term goals at the center of fiscal policy formulation would result in reforms in every state we examine here. A larger share of revenue would be directed to communities in most cases. Distribution policies would be updated to ensure revenue is targeted to the correct jurisdictions. And states would review the types of taxes and drilling incentives they apply to ensure revenue is collected in a timely manner.

States tend to save too little and spend too much windfall revenue from natural resources on tax expenditures (reducing property and income taxes, for example), increasing dependence on volatile natural resource taxes. Over the long-term, states and local governments should pursue a dual strategy of allocating money to manage boomtown impacts, and saving a larger share of the surplus revenue into permanent investment funds. The investment income earned from savings provides a more stable and lasting revenue stream to achieve multiple policy goals at the state and local level, including tax relief, investments in education and infrastructure, incentives back to the energy sector, economic development in sectors outside energy, and funding restoration and conservation activities. Finally, a dedicated share of income from permanent investments should be returned to local governments in the oil path to increase revenue certainty and to provide for stable payments after oil production slows or ends.

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