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Abstract

States producing gas and oil have long levied severance taxes at the point of extraction, commonly placing most revenues into general funds. These taxes have assumed new meaning in many states amid the expansion of gas and oil production accompanying the advent of hydraulic fracturing. We reviewed all major statutes and constitutional amendments related to severance taxes that were enacted at the state level during the first decade of the "shale era" (2005-2014). There have been only modest adjustments in statutory tax rates and some evidence that states have attempted to reduce these rates, possibly in response to growing national production. In turn, there is also evidence that states have begun to pursue more targeted strategies for revenue use, including some expanded focus on responding to the negative externalities linked to drilling, expanded revenue sharing with localities, and increased long-term protection of resources through state trust funds.

Taxing Fracking: The Politics of State Severance Taxes in the Shale Era

Two distinct options for taxing energy from fossil fuels have dominated scholarly and media analysis in the American federal system in recent decades. Perhaps the most familiar option involves excise taxes on gasoline or diesel fuel. Such a tax is operational in every state and matched by a federal counterpart that, when combined, are intended to cover much of the cost of maintaining and expanding American highways. This tax has proven highly sensitive to proposed increases in recent decades, producing considerable controversy amid revenue shortfall as vehicular fuel economy has increased and overall mileage has declined. In turn, direct taxation or related pricing of the carbon content of fossil fuels via cap-and-trade have dominated state and federal debate over policy development to mitigate greenhouse gas emissions for more than a decade. This is widely thought to be the most cost-effective approach to climate mitigation, backed by a diverse range of economists and policy analysts. Yet neither a single state nor the federal government has ever adopted a carbon tax and two or the three regional carbon cap-and-trade programs operational in 2010 have either fully or partially collapsed.

Thus, energy taxation is generally perceived as extremely difficult politically in the American federal system, reflecting considerable sensitivity to direct cost imposition on highly visible energy sources such as gasoline, diesel, oil, and natural gas (Rabe and Borick 2012). States and the federal government have increasingly turned to general revenues to cover transportation system costs. And both have turned to a range of

regulatory provisions rather than any form of carbon pricing to address greenhouse gases. Nonetheless, there is at least one form of energy taxation operational in approximately 35 American states that appears to have a much broader and more durable base of political support. Many of these taxes were established generations ago and yet are now beginning to produce new revenues as shale gas and oil production has grown rapidly in the United States. Two states have added entirely new taxes of this sort during the past three years and dozens of states have either passed amending legislation or constitutional amendments to determine such issues as tax rates and revenue use during the past decade (See Table 1). One state has refused to adopt this type of tax, instead enacting a fee, although this decision remains highly controversial and was a central 2014 gubernatorial campaign issue.

Indeed, the evolving world of state severance taxes on gas and oil has become a dominant consideration in many state capitals during that same period. Severance taxes impose a cost on the extraction of natural resources as they are being severed from beneath the surface of the earth. States have long applied severance taxes to mining for coal, iron ore, and other minerals, but early in the 20th century states with significant deposits of oil or natural gas also began to develop such taxes, most commonly taking a set percentage of the gross value of the resource. Texas, for example, established a 4.6 percent rate on oil in 1907 and followed with a 7.5 percent rate on natural gas in 1931; neither statutory rate has ever changed despite dramatic expansion of production and price per unit of energy, although a series of tax incentives were developed in the 1990s to encourage expanded drilling (Mieszkowski and Soligo 2012, 333). Other states have

made significant adjustments in these taxes over time, with common points of variation between states including rates and incentives to expand drilling, differential treatment of oil and gas, measures such as volume rather than value in applying tax rates, and revenue utilization.

These state taxes largely disappeared from scholarly and media attention until recent years, when the development of hydraulic fracturing and horizontal drilling (or so-called "fracking") techniques made possible dramatic expansion in natural gas and oil yields. Instead of phasing out oil and gas development under anticipated "peak oil," established production states such as Oklahoma and Texas registered major output increases. With the emergence of fracking, states with more limited drilling history such as North Dakota, Mississippi, and Illinois began to prepare for the prospect of expansion far beyond anything ever envisioned within their boundaries. As a result, severance taxes have begun to receive intensive political scrutiny in many state capitals, as states consider what to do with massive revenue bounties that account for significant portions of state tax revenue (see Table 2) and how to position themselves as emerging petro-states amid growing inter-state competition.

Any federal government role in this area remains quite limited, largely confined to oversight of drilling on federal lands given a series of exemptions for oil and gas in many potentially applicable federal statutes (Warner and Shapiro 2013). As a result, states have enormous latitude to design their own regulatory systems and consider what sorts of taxes and related fees, if any, that they would want to collect. Evidence of this

action is found in the fact that fourteen states enacted twenty-seven pieces of significant new legislation or amendments on severance taxes in the first decade of the so-called "shale era" (2005-2014), determined through a database created from the legislative archives of the National Conference of State Legislatures (See Table 1). Still, severance taxes are but one snapshot of oil and gas-related funding available to state legislatures. Property taxes and state leases, as well as state income taxes, local government leases and federal government leases, also play a significant role in oil and gas revenue generation. This paper, however, will examine key lessons on state strategy related to severance taxes specifically and, more broadly, what these lessons tell us about state approaches to shale governance (Rabe 2014). Of particular focus will also be the relationship of states with their localities (Davis 2014). Recent shifts in revenue allocation raise significant questions, including whether revenues are shared with local governments that host drilling to assist them in addressing environmental and social issues that emerge from production activity.

This paper will review the pattern of the development of severance taxes in the shale era. It will begin with further discussion of the political history and economy in which these taxes were originally established. This will be followed by a discussion of severance taxes that places them into the emerging context of the most recent decade: a shale era that expands the total supply of energy, the number of potential competing state suppliers, and the more decentralized nature of energy development given proliferation of individual drilling operations. We will review how state capitals have reacted to the shale era through their actions regarding severance tax rates and revenue allocations.

This review will link directly to the question of negative externalities produced by shale-type development and whether revenue generated by severance taxes is being applied to these or is instead allocated in other ways. Our findings generally suggest that state officials have become more cautious in setting statutory rates for severance taxes, with some pursuing rate reduction strategies in an effort to gain a competitive advantage over other states. There is little empirical evidence to suggest statutory rates are significant drivers behind investment decisions related to drilling in recent years but many state legislators and governors have raised these questions in exploring possible rate reductions or opposing increases. In turn, we find that a traditional pattern of using funds for general revenues remains prevalent, with some notable exceptions that appear designed to either target negative externalities, increase allocations to localities, or revisit an earlier approach of establishing trust funds that preserve at least some revenues for longer-term investment.

The Evolution of Energy Severance Taxes in the Pre-Shale Era

In theory, many factors may compel a state to establish a severance tax, including several directly linked to the recognition that an exhaustible and non-renewable resource is being permanently withdrawn and consumed. As economist Lowell Harriss has noted, "When used, they are used up" (Harriss 2006). A severance tax enables a state to extract value in exchange for that permanent withdrawal. In turn, states may look to severance taxes to cover the costs of environmental damages and negative community impacts related to the drilling process (Tietenberg 2004). This type of action may even be driven by constitutional mandates that require, as in the case of Alaska, "management of the

public resources for the maximum benefit of its people" (Goldsmith, 2012, 55). There is considerable literature in various subfields of economics that expounds upon these general principles (Costanza and Daly 1992; Saha and Gamkhar 2005; Tietenberg 2004).

Alongside these theoretical considerations, states may also be eager to extract as much revenue as possible from a non-mobile source of capital that is in high demand domestically and internationally. For much of the last century, retrievable oil and gas deposits were concentrated in only a relatively small number of states. As oil and gas appeared to become increasingly scarce and as international supply disruptions continued to bid up the value of domestic supplies, major petro-states among the American states had considerable latitude to set rates as high as possible. "When as governor I was asked how much I would tax oil, my response was: For every cent we can possibly get," wrote former Alaska Republican Governor Jay Hammond (Hammond 2012, 46), who launched a process of dramatic increases in state severance tax rates and revenues during the 1970s. When determining appropriate rates, Hammond argued that any effort to begin with modest rates and only consider gradual future increases was "precisely backward. Instead, we should have started out with, say, a 99 percent severance tax and worked our way slowly down until we started to get vibrations. At that point, we would have a far better idea of what the appropriate level of taxation might be to encourage development that met the constitutional mandate to maximize benefits" (Hammond 2012, 29).

Other states would not go as far as Alaska, but a general pattern remains that many of the traditional oil and gas production states have retained high statutory

severance tax rates. This includes a number of states otherwise seen as averse to most forms of taxation and intensely competitive about sustaining other tax rates that are lower than other states and regions. In turn, severance taxes may be particularly attractive politically when a considerable portion of the overall tax burden can be exported ultimately to consumers outside the generating state in the form of higher commodity costs (Rabe and Borick 2012; Mieszkowski and Soligo 2012, 326). States such as Alaska, Montana, Nebraska, Oklahoma, and Wyoming, for example, consume less than one percent of the oil and gas that they produce, and retain high statutory rates. This may parallel, to some degree, tourism-intensive states that are inclined to set steep sales tax rates for purchases most likely to be made by out-of-state visitors.

There has been little indication that states set their severance tax rates so as to produce the amount of revenue needed to "effectively internalize the environmental and social costs of resource extraction" (VanDeveer 2013, 33). Instead, states have overwhelmingly used these funds as a source of general revenue that allows them to keep other taxes lower than they would be otherwise. In the case of Wyoming, for example, there is no corporate or personal income tax because of oil and gas revenues (Pless 2012; Brown 2013). In some cases, a particular allocation has been designated, such as Arkansas's use of 95 percent of its natural gas severance tax revenues according to the Arkansas Highway Distribution Law, with the remaining 5 percent to the general fund. In turn, this statute designates 75 percent of oil excise tax revenues for the State Treasury Fund and the remaining 25 percent to the County Aid Fund (Brown 2013). Other states have also established modest set-asides linked to specific environmental concerns. In

Michigan, for example, 98 percent of state severance tax revenues are allocated to the general fund, with the remaining two percent devoted to an orphan-well fund when its balance falls below a certain level. In the 1970s, five states (Alaska, Colorado, Montana, New Mexico, and Wyoming) established trust funds as a way to protect a portion of the revenues for the longer term and guard against boom-and-bust cycles so common in resource-based economies. This involved investment of funds into an endowment-type structure, whereby only interest or dividends could be spent. These funds generally maintained the emphasis on general revenue expenditures but differed from rainy-day funds in that they were designed to remain permanent legacies from the resource extraction process.

Enter the Shale Era

This legacy of state severance taxes was established under a common understanding that oil and gas resources in the United States were declining, drilling would be confined to traditional vertical operations that tended to involve a relatively small number of large operations in remote locations, and any major new deposit discoveries were highly unlikely. These assumptions have been challenged dramatically over the past decade, as many states began to enter into the shale era of hydraulic fracturing and horizontal drilling (Levi 2013). States have begun to address this new reality, reflected in very recent legislation and Constitutional Amendments that consider a wide range of regulatory and public disclosure provisions on fracking as well as issues related to severance taxation (see Table 1). Far more states and local governments find

themselves atop some fossil-fuel deposits that might realistically be tapped than in previous energy production eras. But the development process may involve far more drilling operations and ancillary services than under conventional drilling approaches, particularly in parts of the country without a long history of oil and gas development. So-called "unconventional drilling" involves considerably more wells, many located in urban or suburban areas given greater developer mobility in search of oil and gas.

Unconventional drilling can be quite extended and unpredictable, requiring massive quantities of water (up to five million gallons per fracking operation) and supplemental chemicals for each attempt to secure oil or gas. Potential negative externalities also multiply over conventional drilling, including "flowback" wastewater contamination and disposal, seismic activity associated with increased volumes of wastewater injection, chemical releases and spills, compressor station noise, road damage, and transportation hazards given the vast number of truck trips on and off each individual site. Beyond the impacts at individual sites, there is also a growing literature on extended social, public health, and transportation risks, especially in communities that experience intensive short-term growth but uncertainty over long-term prospects (Adgate et al. 2014; Jacquet 2014). As Susan Christopherson and Ned Rightor have noted, "the risks of shale development extend outward," beginning at each site but connecting to numerous other communities and states in complex ways that transcend the impacts of conventional oil and gas development (Christopherson and Rightor 2014; Haggerty 2012).

The arrival of the shale boom also promises potentially significant growth in existing state severance tax revenue to address these issues or fill budget gaps. This increased revenue would certainly be a welcome development, particularly after the Great Recession took a severe toll on budgets and many states turned to increases in excise and other specialized taxes for some fiscal relief (Dinan and Gamkhar 2009, 392). At the same time, more states became involved in the industry than ever before and the number of impacted communities likely grew exponentially. This posed many challenges for state governments as they began to revisit shale legislation and severance taxation programs in the late 2000s and early 2010s that seemed headed for phase-out just a decade earlier.

There is little empirical evidence that this expansion of drilling has fueled a race-to-the-bottom between states in setting tax rates nor evidence that effective tax rates markedly influence investment decisions (Spence 2013). But statehouse discussions in recent years in multiple regions clearly indicate that a considerable number of state legislators and governors perceive that they need to suppress rates or expand exemptions in order to sustain investment. This is often fueled by the position of industry groups, such as the aggressive efforts by the Marcellus Shale Coalition in three recent governorships to block creation of a Pennsylvania severance tax with the argument that such a tax would deter drilling. In 2014, the Coalition pursued a multi-media campaign against a five percent tax being proposed by Democratic gubernatorial candidate (and now Governor) Tom Wolf and contended that a "job-crushing energy tax on shale development would harm Pennsylvania's economy, cost jobs and shortchange the

potential benefits for the long-term success of our state" (Marcellus Shale Coalition, 2014). Then-Governor Tom Corbett repeatedly embraced this interpretation, both on the campaign trail and in debates with Wolf, suggesting that his opposition to a severance tax had helped fuel the expanded development of shale gas in Pennsylvania.

Severance Tax Changes in the Shale Era: 2005-2014

Shale gas and oil development began to expand in the middle of the previous decade and many state governments started to review relevant regulatory and taxation provisions at this time. The number of shale-related bills introduced into state legislatures grew steadily during the decade between 2005 and 2014, with the number of new legislative enactments climbing markedly after 2010 (Pless 2012, 2013). In 2013, for example, 41 new statutes were enacted out of 225 bills that were introduced in 37 states, exceeding any prior year and suggesting an accelerating pace of state policy development.

Severance taxation and related revenue use was one frequent topic within this flurry of legislation, although the majority of proposed and enacted bills during this decade-long period did not address severance taxes at all. We reviewed all cases during this period in which severance taxes were either being created or amended in states with established or emerging shale gas or oil development. We discovered two cases in which new statutes established severance taxes, one case in which a fee was enacted instead of a tax, and 35 revisions of existing taxes through new legislation or constitutional

amendments. After review of the official text of these provisions and related government documents, we narrowed the focus of cases slightly, excluding those that only involved minor technical changes, such as extending an existing tax without change when it faced a phase-out deadline in Oklahoma, limited reallocation of funds within different accounts with the same intended goal in Kansas, or those that had no reference to shale (such as off-shore drilling in Alabama). This brought our final sample of cases to a total of 27 significant statutes or amendments in fourteen states, as summarized in Table 1. The intensified pace of severance tax policy development in very recent years is reflected in the fact that only nine of these provisions were approved before 2012.

We use this set of cases to explore two questions. First, we examine what states have done with their tax rates in the shale era. As we have noted, there are considerable incentives for states to set high tax rates, given the prospect of exporting a good deal of the costs out-of-state and capturing increased revenues associated with expanding oil and gas production. At the same time, states might respond to increasing domestic energy production and perceived inter-jurisdictional competition to keep rates low (or even reduce them) to maximize within-state development in an increasingly competitive domestic and continental market. This reflects a long-standing literature in political economy that emphasizes sub-federal willingness to reduce tax rates or add exemptions if there is a political perception of development risk from out-state competition, however limited that risk may be in actual practice (Peterson 1995; Harrison 2006). Statehouse debates over taxes frequently take note of these perceived risks to development, often fueled by strong industry opposition to taxation and assertions of high-responsiveness to

tax rates (Cocklin 2014). Within this discussion it is important to note that direct comparison of statutory rates can be quite misleading, in part because states offer a range of complex incentives that likely influence effective rates, though studies that have begun to control for these factors continue to find some significant cross-state variation (Independent Fiscal Office 2010).

Second, we review how states have used revenues from either new or revised severance taxes in the shale era. In particular, our focus concerns whether states were sustaining traditional patterns whereby the vast majority of funds were blended directly into state general funds or rather, were they making adjustments to begin to address some of the negative externalities related to shale development? Such alterations might entail targeted expenditures for environmental protection and remediation along with direct reallocation of funds to local jurisdictions facing pressures for expanded social, public health, and transportation services. In turn, we asked whether there were any efforts to attempt to preserve some of the revenue from these non-renewable resources for longer-term considerations rather than immediate expenditure? Such steps might build on the experience of trust fund development in four Western states during the 1970s, a previous period of surging revenues from markedly expanded energy production. Subsequent sections examine our findings concerning both of these questions.

Setting Tax Rates in the Shale Era

There is no evidence to suggest that the Alaskan model of Governor Hammond to "soak" drilling operations with high tax rates has extended into the shale era. The most

common development in severance tax rates during the last decade has been preserving the status quo from the pre-shale era, as only two states (Illinois and North Carolina) without a tax (or a significant tax) have adopted a severance tax, while Pennsylvania has actively chosen to instead eschew a tax in favor of a fee. Additionally, only five states with severance taxes have made significant adjustments in their statutory rates. In the latter case, Oklahoma and Mississippi have attempted to reduce statutory rates to encourage expanded drilling, Idaho has streamlined its tax code by combining its severance taxes and updating tax code language but made no net rate changes, and Alaska has experienced both a major increase and subsequent decrease in its statutory rate that was sustained in a 2014 ballot proposition. Arkansas increased its statutory natural gas tax rate, but reduced its statutory rate for "high-cost" (or horizontal) wells. No state has repealed an existing tax, although Louisiana Governor Bobby Jindahl considered outright elimination in 2013 as a part of a major proposal to overhaul the state tax code. Overall, this suggests a very cautious approach to severance tax creation and reform.

Two states did decide to establish new severance taxes or equivalents since 2012, both setting statutory rates below those of neighboring states while also maintaining incentives that reduced effective rates. But, perhaps most significantly, Pennsylvania, which has emerged as the nation's second-leading producer of natural gas (behind only Texas), did not establish a severance tax. The absence of a Pennsylvania severance tax emerged in legislative debates in the late 2000s, including periodic proposals for a five percent tax on gross value that would be comparable to neighboring West Virginia. But

the 2010 election produced executive and legislative branch leaders who preferred to eschew any such tax in favor of an "impact fee" that has been warmly embraced by industry (Rabe and Borick 2013). Under this model, the state would not establish the fee itself but rather collect the revenues for any localities that opted to establish the fee and then share proceeds. This fee system imposed an initial rate per well between $40,000 to $60,000 per year during its first year of operation but then declined steadily in subsequent years of operation, phasing out entirely after 15 years even if production continued.

Republican Governor Tom Corbett championed this approach and secured his party's support within both chambers to enact this impact fee as part of a major 2012 shale legislative reform known as Act 13. The Pennsylvania Supreme Court overturned many provisions of this law in 2014, finding excessive encroachment on local authority, but the fee system remains operational. Corbett has routinely argued that this legislative approach, including a comparatively low impact fee as opposed to a severance tax, has been essential in promoting expanded drilling activity in Pennsylvania; he adamantly opposed any consideration of a severance tax substitution for the fee despite pressures from many legislators from districts outside the Marcellus Shale deposits. However, Corbett was decisively defeated in his 2014 re-election bid and his successor, Tom Wolf, campaigned in large part on a promise to revisit the severance tax issue.

Illinois was not as reluctant as Pennsylvania to refer to its cost-imposition strategy for shale oil and gas as a tax, and established a new severance tax in 2013 (Rabe 2014, 8374). Illinois established differential rates on gross value of oil and gas for new

shale discoveries in the southern tip of the state, with rates remaining competitive with energy-producing neighbors such as Kentucky. In 2014, North Carolina also established a severance tax, despite there currently being no oil and gas development in the state. The Energy Modernization Act created this North Carolina severance tax, setting the statutory gas rate even lower than states like West Virginia and Kentucky, at 0.9 percent of market value, though above the very low rate set by an earlier tax. Additional rates are to be phased in between 2015 and 2021, so that the statutory rate is set to increase if the value of gas increases. This act follows a number of policy changes in North Carolina designed to reduce regulatory pressures on industry, including those focused on energy development (E&E Publishing 2014; Kardish 2014).

A few states have also demonstrated increased sensitivity to perceived interstate competition by pursuing dramatic severance tax rate reductions during years of shale production. Oklahoma has long retained a statutory seven percent tax on the gross value of oil and gas and has been one of the nation's leading producers of both energy sources. It has experimented with various tax incentives but moved aggressively into the shale era with 2010 legislation that reduced the tax for horizontal wells using fracking procedures to one percent for the first 48 months of operation. This reduction was scheduled to phase out in 2015 but the legislature extended it in 2014 with a slight structural change, increasing the lower rate to two percent and only offering it for 36 months. This followed an extended period of debate in the legislature over whether the reduction was overly generous in comparison to other states amid support from select industry leaders for a restoration of the full seven percent rate. In response, Republican Governor Mary

Fallin heralded the 2014 agreement as a step that would slightly modify the earlier rate reduction but serve to "send a clear message to energy producers worldwide: Oklahoma is the place for energy production and investment."

Mississippi Republican Governor Phil Bryant echoed this sentiment in supporting 2013 legislation to pursue a similar strategy to encourage horizontal drilling and fracking. Under Mississippi's "Energy Works" legislation, the established six percent statutory severance tax rate would drop to 1.3 percent for the first 30 months of operation or until a well paid out. Industry estimates suggested that this reduction would save between $700,000 and $800,000 per well in the Tuscaloosa Marine Shale. Bryant heralded this approach as part of a Mississippi "energy road map" to make the state more competitive in attracting and expanding shale oil and gas development.

Oklahoma and Mississippi were not the only states to alter tax rates in a manner competitive with neighboring states. In the Idaho case, for example, their severance tax, at 2.5 percent of market value, translates to a level that is several percentage points below the statutory rates of such established energy-development neighbors as Wyoming and Utah. This new tax rate is the product of HB 379, which combines Idaho's two former severance taxes by amending the existing oil and gas production tax of five mills per barrel of oil and per 50,000 cubic feet of gas, and repealing the additional oil and gas production tax set at two percent of market value. These two taxes were combined to update the tax language and remove redundancies, while keeping the new rate consistent

with prior rates and low in comparison to other states, in anticipation of new production (Peiserich and Christian 2013; Smith 2014).

Two states enacted a consequential increase in its severance tax rate during the past decade, but the 2007 Alaska Clear and Equitable Share Act (ACES) survived no more than six years before a fundamental scaling back in 2013. Much of Sarah Palin's political rise was linked to proposed reforms of oil and gas regulation following influence-peddling scandals involving legislators in the preceding Frank Murkowski administration. Palin took a populist stance and proposed a major increase in severance tax rates that were already the highest in the nation. ACES established a 25 percent tax rate but also featured rate increases for each dollar increase in the price of oil and gas above $30 per barrel, a progressive sliding scale borrowed from Norway that approached a maximum rate of 75 percent once oil prices surpassed $90 per barrel. The state retained many incentives that served to reduce the effective rate, including credits for energy company contributions to public education, higher education, and civic organizations. Nonetheless, this type of tax structure was unprecedented for an American state and produced a huge and immediate infusion of funding into the Alaska general fund after enactment (see Tables 2 and 3).

However, as the shale era began to unfold in the Lower 48, Palin's former lieutenant governor and successor, Governor Sean Parnell, agreed to a higher base tax rate but a dramatic flattening of the rate structure along with extended incentives to expand drilling and use public funds to support energy transmission, resulting in an

overall lowered effective tax rate. This reflected growing interest in Alaska in unconventional drilling as well as the views of some political leaders and industry officials that the 2007 reforms would dramatically deter further development. "Alaska can now compete with states like North Dakota and Texas for investment capital and jobs," announced Parnell in signing the 2013 More Alaska Production Act. "The Alaska Legislature has sent a strong message to the world: Alaska is back, ready to compete, and ready to supply energy to America" (Parnell 2013). Not all Alaskans responded favorably to this message, including Parnell's gubernatorial predecessor. One vocal critic of the 2013 legislation was Republican State Senator Bert Stedman who felt that the changes reflected a "race to the basement" that could greatly impact Alaska's ability to sustain core services given its lack of an income or sales tax (Forgey 2013). This divide led to an August 2014 ballot proposition that, if approved, would have restored Palin's progressive rate structure from the 2007 legislation. However, the ballot proposition was narrowly rejected after a bitter campaign that featured substantial energy industry financial support for the opposition campaign. Shortly after this vote, Republican Parnell lost the Alaskan governor race to Independent Bill Walker, who was endorsed by Palin during his election.

In Arkansas, the state legislature held a special session in 2008 to address the severance tax on natural gas extraction. While the bill passed during this session increased the statutory severance tax rate from $0.003 per MCF to 5 percent of sale price, it also created a reduced rate for shale wells, known as "high-cost" wells in the Arkansas

state code. This rate is 1.5 percent for the first three years of shale production and is imposed to help offset development costs.

The generally cautious approach to state severance tax rates did not reduce total state revenue from this tax, reflecting a massive increase in domestic oil and gas production during the past decade. Many states continued to experience steady revenue growth during this period, even though there was some slippage in most states in fiscal year 2013 as gas and oil prices declined amid a surge in production (see Table 3). Total revenues more than doubled during this period, even when adjusted for inflation. North Dakota, for example, increased its severance tax yield from $138,244 in 2002 to $3,187,112 a decade later. Total severance tax revenue in the United States peaked at $18.2 billion in fiscal year 2012; eight states secured at least nine percent of their total revenue from severance taxes and Texas came very close to this level in the following year (see Table 2). Whereas many states likely thought that they were phasing out severance tax revenues early in the last decade, the revenue outcomes were entirely different, raising the question of how states would use this unanticipated bounty.

Allocating Revenues in the Shale Era

States were more active in changing their allocations of severance tax revenues than adjusting their tax rates. Between 2005 and 2014, 19 significant bills or constitutional amendments on revenue use were adopted in eight states, with the majority of these established since 2010 (see Table 1). To ensure that these revenue allocations

were significant, we narrowed our original review of legislation to exclude legislation changes that reflected reallocation of revenues within existing funds, as was the case with Idaho and Kansas. We also excluded cases where new funds were created, but with the same intended goal as grants and loans authorized for before the shale era, as was the case of Montana. Once we narrowed our focus, we discovered that states have overall continued to place the clear majority of their funds into the pot for general revenues. Indeed, the new severance tax that Illinois adopted in 2013 follows this tradition by placing all new revenue into the state general fund. In turn, we further found that the majority of states with severance taxes have made no significant adjustments in their allocation formula during the past decade (Pless 2013; Brown 2013).

However, review of these recent state changes on the whole suggests a growing attempt to break from traditional practice and instead allocate revenues in one or more of three ways. In this section, we introduce these three options and then explore them through the consideration of prominent state cases, particularly focusing upon North Dakota as it is the only state to move into all three areas at the same time. First, some states have increased the amount of revenue designated to funds specified for purposes linked to negative externalities likely generated by expanded shale drilling operations. In some instances, this has involved multiple bills or amendments that serve to earmark a portion of severance tax dollars to specific environmental concerns with some connection to energy extraction. These include targeted expenditures on water quality protection and conservation, wildlife and habitat protection, support for alternative energy development and energy conservation, and fire and emergency response capacity, among other areas.

States that have chosen to shift some portion of their severance tax bounty in these directions include Colorado, North Dakota, Louisiana, and Pennsylvania.

Second, some state reforms have increased allocations for local governments likely impacted by shale development. General revenue funds, of course, can also feature considerable reallocation to localities and some states have traditionally allocated significant severance tax funds back to localities for core functions. However, many state severance tax programs lack statutorily designated amounts of funds that are intended for intergovernmental transfer. In some cases, these are linked directly to the kinds of negative externalities noted in the above paragraph, transferring funds to various municipalities, counties, and townships to address infrastructure and other issues related to oil and gas development. Indeed, the same states that have pursued some shift toward negative externalities have also pursued some form of specified intergovernmental revenue transfer through recent legislation or constitutional changes.

Third, some states have revisited a method for protecting the long-term value of their one-time bounty from the extraction of non-renewable natural resources by creating trust funds. Such funds follow a pattern that became popular in a small set of Western states in the mid-1970s but had otherwise not emerged in the use of energy tax revenues until recent developments in North Dakota (2010), Utah (2012), and West Virginia (2014). These trust funds involve some formal allocation of revenue into a permanent fund that invests resources and places tight constraints on expenditures.[i] Part of the rationale for such trust funds is to sustain long-lasting revenue from resource development in order to hedge against the downside of subsequent boom-and-bust cycles

and also allow time for prudent consideration of alternative expenditures. Alaska is likely the state best known for this approach through its Permanent Fund, which allocates funds from interest on its substantial holdings in annual dividend checks to every resident of the state (Widerquist and Howard 2012). However, allowance for this fund comes from royalties from extensive drilling on state-held lands, whereas the state's severance tax revenues are poured exclusively into general funds that cover the bulk of annual state expenditures. International parallels for this approach include the Norwegian Government Pension Fund and the Alberta Heritage Savings Trust Fund,[ii] both of which draw from oil and gas taxes and royalties (Goldsmith 2012).

Negative Externalities, Local Reallocation and Trust Funds: The Case of North Dakota. Not long before the advent of shale development, North Dakota suffered the embarrassment of being dropped from the Rand McNally atlas of American states. This reflected a perception that its steady decline of population and economic activity meant that it no longer merited inclusion of its own map. But that tale seems hard to square with the past decade in North Dakota, reflected in a surge of population and economic growth as well as the lowest unemployment rate in the nation. Indeed, by 2012, North Dakota had four of the American counties in the top ten nationally for per capita income, with Williams County right behind New York City at the very top of the list (Farmer 2014).

This transition, however, has hardly been seamless and North Dakota has in many respects become a national poster child for the challenges of confronting a wide range of

negative externalities across a vast landscape that appeared to be emptying out just a decade ago. Expanded drilling operations impose substantial direct impacts on roads and increase demand for fire protection and other emergency services. In turn, counties with significant drilling also report major population expansion and demographic changes that trigger steep increases in demand for social services, with particularly severe issues related to expanded crime and violence, drug and alcohol abuse, prostitution, housing shortages, and rapid transmission of some communicable diseases (Christopherson and Rightor 2014; Shafroth 2014; Small, et al. 2014; Jacquet 2014; Healy 2013). Major challenges for basic infrastructure include not only declining highway and bridge quality but escalating rates of vehicular accidents, serious injury, and mortality. Reliance on rail transportation has led to several disastrous accidents outside the Bakken region, reflecting concerns about risks posed by the distinct chemical composition of oil produced in the Bakken Shale that led to an extended state review of safety practices in 2014.

In all, North Dakota has become a focal point for a wide range of anthropologists, archeologists, sociologists, public health experts, and journalists, all comparing North Dakota to other states and nations that have attempted to navigate a massive, short-term expansion linked to development of a non-renewable natural resource while trying to avoid a "resource curse" experience. As agricultural economist Nancy Hodur has noted, "The dynamic in North Dakota has changed so dramatically and so quickly that the systems in place for addressing them haven't caught up" (Bolstad 2014). These shifts are placing unprecedented burdens on local governments in the Bakken region where energy production occurs (Farmer 2014; Raimi and Newell 2014). Many of these governmental

units are quite small in terms of population and professional staff and thought until recently that they were gradually winding down core functions due to steady population decline in prior decades.

North Dakota suddenly finds itself awash in new financial resources that could potentially mitigate these transitional challenges. The state has long maintained a pair of overlapping severance taxes including both an oil and gas gross production tax and an oil extraction tax that collectively set a higher tax rate on oil than gas.[iii] There have been no changes in the rate of these taxes during the past decade but their revenue yield has grown exponentially over the past decade (see Table 3). In recent years, they have generated more than half of the total state government revenue each year.

But the combination of growing social strains and abundant revenue intake have made Bismarck a place for near-constant debate over revenue use, which peaks during biennial sessions of the state legislature. Three separate statutes were enacted in 2013, collectively reallocating some portion of severance tax funds either by creating new funds focused on such purposes as protection of North Dakota's "outdoor heritage," including its water quality and natural resources (HB 1278) and energy conservation (SB 2014) or to increase the share of state revenue allocated to so-called "hub" cities that are facing the biggest impacts of energy development (HB 1358). Reallocation of these revenues to local governments, including these hub jurisdiction shifts, was the largest single item in the 2013-15 biennium budget distribution of energy tax revenues after designation of funds for the state's new legacy fund that is discussed below.

Nonetheless, the political debate over the level of support states should provide for strained local governments, particularly in cases that directly involve locally experienced negative externalities from shale development, remains a dominant topic in the state. Indeed, Republican Governor Jack Dalrymple rejected a proposed special session of the legislature in 2014 that was sought by local government leaders concentrated heavily in areas with significant shale development. But Dalrymple did sign into law $1.1 billion in "surge funding," a one-time infusion of funding for infrastructure repair and development in oil-producing areas. This legislation passed with overwhelming support from both parties in both legislative chambers, although it was not designed to provide a long-term remedy. Pressure also continued for additional ballot propositions to expand ongoing expenditure for targeted purposes, such as a 2014 proposal to set aside five percent of all severance tax revenues for the outdoor heritage fund, which was ultimately rejected by approximately 80 percent of North Dakotan voters.

Despite increases in local government allocation of revenue, these revenues have, in many ways, been insufficient to deal with local needs tied to the effects of increased production (Raimi and Newell 2014). Thus, the most consequential alteration in North Dakota use of revenues from its oil and gas extraction was not concentrated on immediate expenditures, but rather the creation of a mechanism to protect some resources for longer-term use. The state's referendum process led to a 2010 constitutional amendment (Section 26, Article X) to create the North Dakota Legacy Fund that sets aside 30 percent

of annual severance tax revenues into a designated fund overseen by the elected State Treasurer. For the 2013-15 biennium, $1.71 billion was transferred into the Legacy Fund, more than double the funding allocation from the state's severance taxes for any other specific purpose. The accumulating revenues are invested in a combination of stocks and bonds and no interest from the fund can be allocated for any purpose until 2017. Only earnings are available at that time unless there is a two-thirds vote by the legislature to spend any principal, which is capped at 15 percent of the fund per biennium.

The fund was established without any clear plan for expenditure, reflecting instead a broad political desire to set aside substantial portions of revenue for longer term needs, including those that might be tied to the impacts of shale development or consequences of any future decline in production (Gold 2012). The extended delay until any expenditure would be permitted was designed to allow considerable time to assess the nature of the transitions under way in North Dakota and to consider options while also sustaining it for future use. "I'm a firm believer that when you harvest a one-time, finite resource, you have to put away some of that wealth for future generations," noted Republican State Senator Dwight Cook. When considering how to use the fund, North Dakota officials frequently note options including Alaska (which returns proceeds through dividend checks) and Norway (which allocates revenues for pensions and social services). The latter case emerges with particular frequency in North Dakota, reflecting in part the state's large Norwegian-American base in its population and elected leadership.[iv] This includes Governor Dalrymple, who has noted ongoing debates in

Norway over allocation options. “If you have a state endowment fund, how do you manage it?” he asked in a 2013 interview. “We’re not really far along either. We’re really just beginning to talk about what we’re going to do with it” (Fehr and Maynard 2013).[v]

Targeting Externalities and Assisting Local Governments: Colorado, Pennsylvania, Louisiana, North Carolina and Texas. North Dakota is not alone in attempting to use severance tax revenues to respond to negative externalities and local government needs linked to drilling operations in the shale era. In the case of Colorado, severance tax revenues have long been split equally between a Local Impact Fund and the State Trust Fund (Haggerty 2012). In the former case, statutory language requires that seventy percent of the revenue goes to local government grant projects distributed by the Department of Local Affairs and the remaining thirty percent is returned directly to local governments. The state has, however, halted grants in some fiscal years in order to use funds to plug state deficits. In the latter case, the Trust Fund is managed by the Colorado Department of Natural Resources, divided between a perpetual base account used to provide loans for state water projects under the auspices of the state Water Conservation Board and an operational account for DNR programs. Since 2010, eight separate bills have been enacted that modify the distribution formula (see Table 1), including funding for various water conservation initiatives, support for a new alternative energy fund, wildlife protection, and also assistance for state programs linked to drilling such as the Colorado Geological Survey and the Division of Reclamation, Mining, and Safety. These represent an ongoing series of incremental changes that build on prior efforts in

Colorado to allocate considerable amounts of its severance tax funds to specific environmental concerns with some link to energy development at the local level.

Many of the severance tax bills introduced into the Pennsylvania legislature before the 2012 adoption of Act 13 were designed to deposit most funds into general revenues. That approach has resurfaced in subsequent proposals to reconsider a severance tax option. Act 13 requires the vast majority of impact fee revenues to be reallocated to local governments, with some linkage to negative externalities related to drilling. Once localities approve collection of an impact fee on drilling within their boundaries, the state collects that revenue and gives the first cut to designated units of state government. Eight state agencies with some role in environmental and public safety protection related to drilling received approximately 10 percent of total funds during the first two years of impact fee implementation, including units such as the Department of Environmental Protection, the State Conservation Commission, and the Pennsylvania Emergency Management Agency.

Sixty percent of the remaining funds are distributed directly to counties, municipalities, and townships in proportion to the amount of shale drilling operational within their borders. The remainder is placed in the Marcellus Legacy Fund, which does not operate as a trust fund but rather manages competitive grant programs. Under this model, local communities involved in shale development compete for funds for purposes such as parks and recreation, bridge and trail improvements, and other environmental projects. All of these provisions were included in the 2012 legislation and have not been

altered by the 2014 Supreme Court decision that overturned regulatory provisions that stripped local government of many traditional powers over land-use controls. In 2014, the Pennsylvania Auditor General released a report that alleged widespread shortcomings in the rigor of state regulatory oversight of shale development, noting significant shortages of funding, staff, and information technology and advancing 29 reform recommendations (Department of the Auditor General 2014). State agency officials challenged these interpretations, though agreed with many of the recommendations. The future of state-local governance on shale in Pennsylvania remained somewhat uncertain after the court decision removed the tight restraints on local regulation (Rabe and Borick 2013).

Louisiana has also authorized some shift in its allocation of severance tax revenue that is linked with more localized environmental concerns related to drilling, with a particular focus on one highly sensitive ecological area. In this instance, the state amended its constitution in 2009 with a ballot proposition that increased the amount of revenue remitted to parishes where production occurs and required that half of the revenue and royalties produced within the Atchafalaya Basin be deposited into a conservation fund to promote protection in the nation's largest wetland and swamp area. Seventy-five percent of the Atchafalaya Basin Conservation Fund funding has been used specifically for water quality and management projects, while 25 percent has been used to complete ongoing projects as well as projects in accordance with the mission statement of the Atchafalaya Basin Master Plan.

North Carolina has also followed an approach that allocates severance tax revenues to environmental purposes. The text of the Energy Modernization Act states, "The purpose of the tax is to provide revenue to administer and enforce the provisions of this Article, to administer the State's natural gas and oil reclamation regulatory program, to meet the environmental and resource management needs of this State, and to reclaim land affected by exploration for, drilling for, and production of natural gas and oil." In Texas, a ballot proposition called for revenue allocations targeting infrastructure needs. Ballot Proposition 1 was approved in November, 2014. This measure called for diverting half of oil and gas tax revenue from Texas' Rainy Day Fund to the State Highway Fund. These revenues are to be specifically directed at the purpose of funding repairs, construction and maintenance of public roads.

Return of the Trust Fund. The idea of permanently setting aside some severance tax revenues to assure ongoing investment of interest has precedent in other areas of energy and natural resources policy in the United States (Patashnik 2000). Several Western states established trust funds linked to a portion of severance taxes within a short period during the 1970s, although these were never enlarged and the idea did not diffuse to other states through 2010. But the expanded revenues made available via shale deposits may give the trust fund idea connected to severance tax funds a second act, even emerging east of the Mississippi River for the first time. West Virginia established a Future Fund in 2014, allocating three percent of annual severance tax revenues into the fund, although earlier proposals specified a 25 percent transfer after collection of the first $175 million each year. The fund is intended to generally address future expenditures in

the area of economic development, education, infrastructure, and tax relief, but no immediate decisions were made on allocation plans from interest revenues and no funds can be tapped until 2020 (Boettner, et al. 2012; Osnos 2014, 48-49). In this case, West Virginia closely examined the North Dakota experience and sent a delegation of 17 legislators from both parties to Bismarck in 2013 to study the Legacy Fund model. "The concept of such a future fund holds tremendous potential, as well as other successes that North Dakota has experienced in managing their energy resources," said West Virginia State Senate President Jeffrey Kessler. "I am very interested in what the state's experience can teach us."

Utah moved in a similar direction with a 2008 constitutional amendment, which allowed the legislature to direct "money or other assets given to the fund under any provision of law," into the Utah Permanent State Trust Fund. The permanent fund, which was created in 2001, originally collected revenues received solely from the tobacco settlement of 1998 and funds and assets received by private donations. Because the 2008 constitutional amendment allowed for new sources of revenue, the legislature could appropriate severance tax revenue to be placed in the permanent fund each year. In 2012, however, a new constitutional amendment found its way to the ballot once it became evident that little severance tax revenue was actually being transferred to the permanent fund as opposed to the general fund. This 2012 amendment was passed and created constitutional language that required the placement of specific levels of severance tax revenues into the permanent fund through a complex formula.[vi]

Conclusion

The first decade of extended development of oil and natural gas from shale deposits presents an intriguing test of how states respond in an area of policy where federal involvement is extremely limited. This raises many questions about the design of regulatory provisions involving all environmental media through an extraction process that is quite decentralized and involves tens of thousands of separate drilling operations scattered across dozens of local jurisdictions in individual states. It also raises the issue of how states approach the possibility of taxing a non-renewable resource that may frequently be processed and consumed in another state or nation. This paper reviews some of the lengthy history of developing state energy severance taxes that are now applicable to shale gas and oil. These have re-emerged in the shale era after an extended period in which domestic oil and gas production, along with related tax revenues were projected to decline.

The shale rush has created a new energy reality in many states, posing a significant set of economic development opportunities but also environmental challenges and potential strains for local governments experiencing a boom in development while mindful of potential busts associated with mineral-intensive economies. Our findings suggest that states have generally been cautious in adjusting statutory tax rates to date, with little evidence of rate increases while a few states have reduced rates in attempting to secure a competitive edge over others and increase production. There is also evidence that some states are beginning to explore ways in which they might allocate increasing portions of severance tax revenues to respond to negative externalities linked to shale

development, expand demand for local services, and protect funds for longer-term considerations that include any bust in a post-shale period.

One emerging development toward the very end of our period of study in this paper reflects a plunge in global and domestic oil prices in late 2014 and early 2015 and the possibility of major declines in natural gas prices. This raised the spectra of a reversal of the recent pattern of dramatic growth in severance tax revenues, generating numerous questions about how this might influence future tax policy and revenue allocation. In Texas, for example, state officials announced in January 2015 that they projected a 14.3 percent drop in anticipated severance tax revenue from oil and an eight percent decline in revenue from natural gas during fiscal years 2016-17. Other states launched post-election legislative sessions with agendas that included possible revenue losses and the related question of how to respond (Campoy, Peters, and Phillips 2015).

It is far too soon to suggest that this could evolve into a a "boom-and-bust" cycle for which there is ample precedent in energy-intensive economies, particularly in those states where severance tax revenues represent only a small fraction of total state funds. But this rapid shift in pricing did underscore the potential vulnerability of recent forecasts that projected continuing revenue growth and posed related questions for longer-term development of state severance taxes. These issues emerged in a number of states after 2014 elections that generally expanded Republicans control of executive and legislative branches in the majority of states, although the only two Republican gubernatorial

incumbents who were defeated campaigned heavily on their efforts to either reduce severance taxes (Parnell in Alaska) or prevent their creation (Corbett in Pennsylvania).

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Notes

[i] Permanent funds are very different from rainy-day funds that do set aside revenue but can be used in part or full at any time through legislative action.

[ii] The Alberta Heritage Savings Trust Fund was established in 1976 as a way to save non-renewable resource revenues (Pretes 1988). Earnings, and in recent years, the fund's net income, have been used to

support government programs. Handling of the savings trust fund has varied given oil and gas revenues, with the Government of Alberta even terminating revenue flows to the fund in 1987. Although government contributions to the savings trust fund have since resumed, the net value of the fund is considered comparatively low. In 2012, the fund was C$13.8 billion compared to the C$15.5 billion in oil and gas royalties that were collected by Alberta in the year 2008 alone (Plourde 2012). Currently, despite oil and gas revenues, increased production and higher levels of employment in Alberta, increased government spending has resulted in fiscal budget deficits, with the Alberta Government using windfall from resource revenues to pay down the debt as opposed to saving money in the savings fund.

[iii] The production tax is imposed in lieu of property taxes and is set at a rate of five percent of the gross value of oil and four cents times the gas base rate; the extraction tax is set at a base rate of 6.5 percent of the gross value at the well, but is reduced for new wells and other qualifying exemptions.

[iv] More than one-fifth of the state population is of Norwegian ancestry and the overall population is among the least diverse ethnically in the United States.

[v] A recurrent theme in public debates in North Dakota over revenue use is avoiding major missteps. As former state tourism director Jim Fuglie noted in July 2014: "We've been poor so long, then all of a sudden, we won the goddamn lottery. You know what happens to lottery winners who aren't prepared to spend a lot of money. You read about them three years later. They're in court, or they're in bankruptcy, or they're divorced, or their kids committed murder or did drugs. That's the way we are."

[vi] The official constitutional language for Utah's allocation of severance tax funds into the permanent state fund is: (9) Beginning July 1, 2016, the aggregate annual revenue from all severance taxes, as those taxes are defined by statute, except revenue that by statute is used for purposes related to any federally recognized Indian tribe, shall be deposited annually into the permanent State trust fund under Article XXII, Section 4, as follows: (a) 25% of the first $50,000,000 of aggregate annual revenue; (b) 50% of the next $50,000,000 of aggregate annual revenue; and (c) 75% of the aggregate annual revenue that exceeds $100,000,000.

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Table 1. State Severance Tax Legislation Reviewed, 2005-2014

State	Year	Legislation	Description
Alaska	2013	SB 21	Changes tax rate to 35% of the production value of oil and gas, but also adds new incentives and deductions to lower the effective tax rate
Alaska	2007	HB 2001	Increases tax rate to 25%. Known as Alaska's Clear and Equitable Share (ACES).
Alaska	2006	HB 3001	Establishes tax rate at 20% of net profits. Known as Petroleum Profits Tax (PPT).
Arkansas	2006	SB 1	Increases natural gas severance tax rate from $0.003 per MCF to 5% of sales price and puts a three-year rate of 1.5% for "high-cost wells."
Colorado	2014	SB 14-154	Allocates severance tax operational fund revenue to the wildfire preparedness fund.
Colorado	2014	HB 14-1333	Transfers severance tax perpetual base fund to water conservation board construction fund.
Colorado	2013	HB 13-1057	Allocates severance tax trust fund revenue to geological survey and avalanche information center.
Colorado	2012	HB 12-1315	Allocates revenues to innovative energy fund and local government severance tax fund.
Colorado	2012	SB 12S-002	Transfers revenue to the Colorado water conservation board for reservoir projects.
Colorado	2010	HB 10-1250	Allocates perpetual base account revenue to Colorado water conservation board construction fund for Animas-LA Plata Project Water.
Colorado	2009	SB 09-165	Allocates perpetual base account to small communities water and wastewater grant fund.
Colorado	2009	HB 09-1199	Transfers revenue to healthy forests and vibrant communities fund and wildland-urban interface training fund.
Idaho	2012	HB 379	Amends and combines two severance taxes, changing tax rate to 2.5% of market value of oil and gas.
Illinois	2013	SB 1715	Known as the Illinois Hydraulic Fracturing Tax Act: establishes Illinois severance tax.
Louisiana	2009	HB 765	Allocates portion of revenues to the Atchafalaya Basin conservation fund.
Mississippi	2013	HB 1698	Adds tax rate of 1.3% of value of oil and gas produced from horizontally drilled wells.
North Carolina	2014	SB 786	Known as the Energy Modernization Act: establishes North Carolina severance tax.
North Dakota	2013	HB 1278	Allocates portion of production tax revenues to newly created outdoor heritage fund.
North Dakota	2013	HB 1358	Alters revenue allocation to counties and hub cities.
North Dakota	2013	SB 2014	Allocates oil extraction development funds to newly created energy conservation grant fund.
North Dakota	2010	HCR 3054 and Ballot Measure 1	Creates the Legacy Fund and allocates 30% of oil and gas revenues to the Legacy Fund.

Oklahoma	2014	HB 2562	Changes rate of Oklahoma's gross production tax on oil and natural gas.
Pennsylvania	2012	Act 13	Creates Pennsylvania impact fee on oil or gas wells produced within the state.
Texas	2014	Ballot Measure, Proposition 1	Reallocates oil and gas tax revenues from the Rainy Day Fund into transportation funding.
Utah	2012	Ballot Measure, Amendment A	Requires specific allocation formula of severance tax revenues to the permanent state trust fund.
Utah	2008	Ballot Measure, Amendment B	Permits legislature to direct money or other assets given to the permanent state trust fund under any provision under law.
West Virginia	2014	SB 461	Creates West Virginia Future Fund and allocates 3% of the severance tax revenue to fund.

Note: All official documents on file at the Center for Local, State, and Urban Policy.

Table 2. Percent Share of State Severance Tax Revenue in Total State Tax Revenue by Year, 2005-2013

State	2005	2006	2007	2008	2009	2010	2011	2012	2013
Alabama	1.86	2.14	1.63	2.18	1.39	1.08	1.34	1.30	1.29
Alaska	**49.81**	**51.31**	**66.06**	**79.46**	**77.27**	**74.18**	**76.54**	**82.10**	**78.26**
Arizona	0.24	0.30	0.30	0.33	0.17	0.33	0.33	0.31	0.22
Arkansas	0.28	0.32	0.29	0.37	0.45	0.86	1.00	1.00	0.94
California	0.01	0.01	0.03	0.03	0.03	0.02	0.03	0.03	0.03
Colorado	1.90	2.49	1.49	1.57	3.28	0.83	1.55	1.71	1.31
Idaho	0.08	0.09	0.19	0.19	0.16	0.23	0.24	0.25	0.17
Kansas	2.08	2.39	1.92	2.36	2.13	1.58	1.79	1.79	0.97
Kentucky	2.52	2.90	2.78	2.92	3.65	3.32	3.36	3.30	2.49
Louisiana	8.24	7.35	8.24	9.41	8.93	8.66	8.23	9.85	9.04
Michigan	0.29	0.38	0.34	0.46	0.23	0.25	0.34	0.27	0.28
Minnesota	0.20	0.16	0.19	0.17	0.27	0.14	0.15	0.23	0.26
Mississippi	1.22	1.50	1.26	2.00	1.75	1.45	1.67	1.67	1.41
Montana	9.66	**11.63**	**11.41**	**14.13**	**14.53**	**11.84**	**12.08**	**12.43**	**10.68**
Nebraska	0.07	0.07	0.06	0.12	0.12	0.09	0.11	0.12	0.09
Nevada	0.70	0.72	0.99	1.21	2.59	3.13	4.30	4.50	4.13
New Mexico	**15.91**	**18.07**	**17.05**	**12.01**	**19.34**	**15.13**	**16.16**	**15.10**	**13.73**
North Dakota	**18.69**	**21.37**	**21.95**	**34.24**	**34.27**	**42.96**	**49.28**	**56.70**	**46.38**
Ohio	0.03	0.03	0.03	0.04	0.05	0.04	0.04	0.04	0.05
Oklahoma	**11.12**	**13.56**	**11.57**	**14.22**	**13.03**	**10.51**	**10.70**	**9.62**	5.80
Oregon	0.19	0.16	0.16	0.16	0.18	17.00	0.16	0.16	0.25
Pennsylvania*	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.61	0.66
Texas	7.16	8.79	6.85	9.06	5.49	4.41	6.20	7.50	8.99
Utah	1.56	1.82	1.67	1.74	1.88	1.75	1.86	1.84	1.77

Washington	0.29	0.30	0.28	0.25	0.18	0.13	0.15	0.21	0.21
West Virginia	7.14	7.40	7.07	7.12	7.87	**11.45**	**11.39**	**11.70**	**11.31**
Wyoming	**46.31**	**29.15**	**36.98**	**36.75**	**43.33**	**33.41**	**42.41**	**37.97**	**39.70**

Notes: Based on all severance tax revenues, not just oil and gas exclusively. Census Bureau data reflects that severance taxes are taxes on the extraction of natural resources. Severance taxes may be applied to fisheries, coal, timber, uranium, iron ore, among other resources, in addition to oil and gas. Despite these other severance taxes, however, states that produce oil and gas receive the vast majority of severance tax collections.
*For Pennsylvania, percent share of impact fee is listed.
Sources:
National Conference of State Legislatures. 2012. *State Severance Taxes.* http://www.ncsl.org/research/fiscal-policy/2011-state-severance-tax-collections.aspx.
Richardson, James A. 2005. "Severance tax, state," in *The Encyclopedia of Taxation & Tax Policy*, second edition. Washington, D.C.: The Urban Institute Press: 357- 360.
U.S. Census Bureau, Governments Division. "State Government Tax Collections." htttp://www.census.gov/govs/statetax.

State	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Alabama	144,813	182,778	144,306	197,581	115,374	90,538	115,975	116,467	119,424
Alaska	925,699	1,274,642	2,436,660	6,939,040	3,829,564	3,355,049	4,238,789	5,787,360	4,016,966
Arizona	26,338	40,494	43,560	43,757	19,481	33,372	40,237	40,578	29,829
Arkansas	18,565	22,225	21,579	27,820	33,547	65,147	79,656	82,770	80,862
California	14,251	16,048	31,526	31,599	27,105	24,409	31,879	37,112	37,732
Colorado	145,114	212,753	136,888	151,474	285,015	71,436	146,690	175,090	147,732
Idaho	2,488	2,897	6,649	6,758	4,952	6,730	7,787	8,309	6,224
Kansas	117,424	149,676	132,281	168,696	142,658	102,878	122,152	132,907	73,806
Kentucky	228,848	281,581	275,313	293,334	355,985	317,146	342,320	346,050	269,786
Louisiana	711,766	716,396	904,164	1,035,695	911,433	758,469	729,260	885,982	834,116
Michigan	68,055	90,956	81,874	113,506	59,343	57,424	80,423	64,285	70,087
Minnesota	32,348	28,022	34,591	31,821	45,820	23,290	27,618	46,370	54,343
Mississippi	66,275	89,910	81,814	135,248	113,762	90,832	112,326	116,378	104,692
Montana	181,201	247,385	264,740	347,221	349,714	253,649	278,372	305,617	282,356
Nebraska	2,560	2,820	2,499	4,968	4,718	3,473	4,440	5,355	4,064
Nevada	39,691	44,526	62,178	74,130	145,450	182,752	272,240	303,038	290,448
New Mexico	712,539	923,304	942,354	625,938	931,832	654,752	804,586	768,106	713,998
North Dakota	262,339	346,672	391,337	791,692	827,417	1,136,553	1,883,816	3,187,112	2,457,530
Ohio	7,920	7,675	7,015	9,420	11,052	10,550	11,197	10,182	12,308
Oklahoma	762,506	1,059,919	942,148	1,184,765	1,067,182	743,686	830,662	848,947	515,981
Oregon	12,148	12,032	12,513	11,815	13,038	12,742	13,199	14,119	23,305
Pennsylvania*	---------	---------	---------	---------	---------	---------	204,210	202,472	225,752
Texas	2,347,512	3,216,387	2,762,940	4,124,428	2,338,481	1,737,136	2,677,604	3,655,582	4,647,848
Utah	73,434	99,517	101,539	106,060	102,121	89,162	101,665	107,075	112,050
Washington	43,034	48,446	48,727	44,038	29,681	20,905	26,706	36,302	38,656
West Virginia	307,265	336,387	328,320	347,592	376,677	417,230	585,992	626,203	608,371
Wyoming	805,613	1,043,160	803,632	883,786	1,197,540	721,002	1,044,150	968,525	867,933
USA	8,131,573	10,567,667	11,063,600	17,808,329	13,438,451	11,071,812	14,692,766	18,752,729	16,493,248

Notes: Revenues include all types of severance taxes, not just oil and gas exclusively. Census Bureau data reflects that severance taxes are taxes on the extraction of natural resources. Severance taxes may be applied to fisheries, coal, timber, uranium, iron ore, among other resources, in addition to oil and gas. Despite these other severance taxes, however, states that produce oil and gas receive the vast majority of severance tax collections.
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U.S. Census Bureau, Governments Division. "State Government Tax Collections. htttp://www.census.gov/govs/statetax.

Table 3. State Severance Collections by Year, 2005-2013 (Current Dollars, 000's)