Leaving Money on the Table

Pennsylvania Exceptionalism in Resisting Energy Severance Taxes

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Nearly all energy-producing states elect to adopt and sustain a tax on the extraction of their oil and gas resources through so-called severance taxes, generating significant revenue for general as well as specialized state funds. Political support for such taxes generally crosses party lines and endures across multiple partisan shifts in the political control of a state. This reflects numerous features that tend to make these taxes quite popular and durable across election cycles. This long-standing pattern, however, faces one major exception: Pennsylvania's enduring reluctance to follow the path of other major energy-producing states and adopt such a tax. This article explores what it deems "Pennsylvania exceptionalism," as it seeks to address the issue of why one leading energy-producing state would refrain from tax adoption in contrast to every other such state. It places particular emphasis on the past decade, in which natural gas in shale deposits has triggered a dramatic expansion of production in Pennsylvania and ongoing political controversy over whether or not a severance tax should be adopted.

Energy production in the United States is not a new phenomenon. Large-scale oil drilling formally began before the Civil War in Pennsylvania and expanded to many other states by the turn of the twentieth century, alongside extensive extraction of coal and natural gas. By 1902, one oil well in Spindletop, Texas, had produced over 17 million barrels of oil

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ISSN 2469-7672 (online). http://dx.doi.org/10.15367/com.v19i1.131. All rights reserved.

and the state has since remained a leading producer of both oil and natural gas. Texas and many other producing states moved fairly rapidly to establish some tax on output, in some cases relying upon this as a major revenue source. By the 1990s, though, many states assumed that their oil and gas production would plummet as supplies declined, likely leading to reduced reliance on severance tax revenue in the future.

The mid-2000s, however, saw the development of hydraulic fracturing and horizontal drilling techniques that allowed many states to tap into previously unavailable resources, such as oil and natural gas found in shale deposits. In some cases, states with long energy extraction histories got a new lease on life as a major energy producer. North Dakota, for instance, experienced a boom of oil extraction starting around 2006. Such development created significant growth in the state's economy as its gross domestic product rose and unemployment rates dropped. The state's population grew for the first time in decades (Rabe and Hampton 2016), with particularly significant growth in localities near shale development. Other states, such as Colorado, Oklahoma, and Texas, also fit this pattern. But perhaps no state has stood out as has Pennsylvania in this new era of energy production. The state assumed a prominent role in the debate over hydraulic fracturing as it pursued its substantial natural gas deposits embedded in the Marcellus Shale. The state also experienced a significant economic boom related to expanded fracking, while it gained national notoriety over controversies related to the practice, including possible risks to water, land, air, and public health. In many respects, Pennsylvania emerged as a leading face of hydraulic fracturing, reflected in popular films and considerable media attention.

But despite changes in energy production throughout the United States, many states that engaged in the industry preserved the status quo, especially regarding their fiscal regimes (Rabe and Hampton 2015). More specifically, states mostly maintained existing taxes on the extraction of their oil and gas resources. These taxes, known as severance taxes, are not a foreign concept to production states; in fact, they are the norm for nearly all petro-states in the United States, except Pennsylvania. Such broad acceptance of these taxes makes it arguably more intriguing that a poster child of the hydraulic fracturing movement does not have one.

This article explores the status of severance taxation in the United States. It describes these taxes and considers why most states—including all other major oil and gas producers—employ them. It further focuses briefly on their structure and use, while also touching on any perceived benefits and consequences, before turning to the question of why only one state has not enacted such a tax.

In particular, this article responds to the question of why Pennsylvania, a major player in the U.S. energy sphere, has failed to go where virtually every other oil- and gas-producing state has gone before in neglecting to enact a severance tax. It notes that the state's exceptionalism—its failure to implement a severance tax—spans the three governorships that have existed during the time of increased natural gas production in the state starting in the mid-2000s. This article also addresses the consequences of such a decision, including direct defiance of public support for a severance tax and a loss of realizing potential revenues from it during difficult fiscal times in Pennsylvania.

Severance Taxes

At its core, a severance tax is a tax on the extraction of a nonrenewable natural resource like timber, uranium, or coal. But most significant in terms of total revenue, severance taxes are levied on the extraction of oil and natural gas. Such taxes are levied in some form in 38 states, and of the top 15 oil- and gas-producing states, all employ a severance tax except Pennsylvania (see Table 1). As a result, at least in the state energy realm, severance taxes are nearly universally adopted.

Severance taxes are also levied in states regardless of partisan control of state government, and the taxes have survived through the exchanging of party control. Alaska has had a long-standing severance tax amid numerous Republican governors and legislatures as well as occasional Democratic leaders. North Dakota political leanings have similarly been relatively conservative with Republican domination of both executive and legislative branches during much of recent decades. The state has two overlapping taxes, adopted in 1953 by the legislature and another adopted in 1980 via ballot proposition and constitutional amendment. During Republican administrations, both states also pursued constitutionally backed trust funds that allow each state to set aside tax revenues for permanent protection. Texas has maintained its severance taxes across eras of Republican, Democratic, and split-party government control, as has been the case in states such as Arkansas, Colorado, Louisiana, New Mexico, and West Virginia, among others.

As far as state oil and gas severance taxes go, they are actually quite diverse in scope and form. They are referred to not only as severance taxes but also as production or conservation taxes, based either on the market value of the resource or the volume produced. These taxes range from rates that may be considered lower, like 1.3% of value, as is the case in Mississippi,[1] to rates as great as 10% of production value of oil, as in North Dakota. Of course it is

Table 1. Top Oil- and Gas-Producing States

Top Oil-Producing States	Severance Tax?	Top Natural Gas–Producing States	Severance Tax?
Texas	Yes	Texas	Yes
North Dakota	Yes	Pennsylvania	No
California	Yes	Oklahoma	Yes
Alaska	Yes	Louisiana	Yes
Oklahoma	Yes	Wyoming	Yes
New Mexico	Yes	Colorado	Yes
Colorado	Yes	New Mexico	Yes
Wyoming	Yes	Arkansas	Yes
Louisiana	Yes	West Virginia	Yes
Kansas	Yes	Ohio	Yes
Utah	Yes	Utah	Yes
Ohio	Yes	Alaska	Yes
Montana	Yes	North Dakota	Yes
Mississippi	Yes	Kansas	Yes
Illinois	Yes	California	Yes

Sources: U.S. Energy Information Administration, Rankings: Crude Oil Production, June 2016 (thousand barrels), available at www.eia.gov/state/rankings/#/series/46, accessed January 4, 2017. U.S. Energy Information Administration, Rankings: Natural Gas Marketed Production, 2014 (million cubic feet), available at www.eia.gov/state/rankings/#/series/47, accessed January 4, 2017. National Conference of State Legislatures, State Severance Taxes, 2012, available at http://www.ncsl.org/research/fiscal-policy/2011-state-severance-tax-collections.aspx, accessed January 4, 2017.

misleading to consider only the rate of value or volume taxed because states also employ certain tax structures that include incentives and deductions that may lower the effective tax rate. Thus, for example, the Alaskan severance tax appears high in its net rate (35%), but this is deceptive, given the way it actually applies the tax (on net as opposed to gross value) and given its generous program of tax credits, which in recent years has exceeded total tax revenue.

Political Attractiveness of Severance Taxes

As discussed, almost every major producing state employs a severance tax. But why would so many states adopt such a tax, given the general controversy surrounding taxation and tremendous variation in how states establish taxes to address their fiscal needs? While many other taxes face almost guaranteed opposition, as demonstrated by the divisive state debates over proposed gasoline excise tax increases and carbon tax adoption, the severance tax is almost universally accepted. There seems to be a political agreement across

the American states—with few exceptions—that if you extract oil or gas, you put a tax on what is removed from below the surface of the ground. In subsequent sections, we begin to explain the political appeal of these taxes.

Early Precedents

A number of states have had severance taxes for some time. In many instances, this began before multiple states and nations produced much oil and gas, thereby giving them considerable latitude in imposing a tax on a commodity that was in great demand amid uncertain supply options. In Texas, for instance, the severance tax on oil was adopted in 1907, and it established an early and visible model that could be replicated as neighboring states or states in other regions tapped their own fossil fuel deposits in subsequent decades. Indeed, the Texas precedent demonstrated that a severance tax was politically feasible and quite popular. It also established a precedent to set aside some revenues for specific programs and build a constituency through trust funds for elementary, secondary, and higher education, setting the stage for diffusion of these ideas across many states.

Easy Money and Tax Displacement

The most obvious reason a state might levy a tax on the extraction of oil and gas is for the considerable revenue that it might generate. Severance taxes are generally straightforward to adopt and implement, concentrated on points of production from drilling. So they can be fairly simple in their design and operation and do not require creation of a major staff to implement. Moreover, they offer the possibility of generating significant funds for a state that could substitute these revenues for other taxes, perhaps allowing maintenance of lower rates for highly unpopular taxes on income or sales. States have several options in setting up these taxes, whereby they can tax either the market value of the oil and gas that is extracted, the volume that is produced, or some combination of these two (Brown 2013).

Revenues from severance taxes can be quite large in the states that produce significant amounts of oil and gas (see Table 2). For North Dakota, severance tax collections amounted to over $3 billion for the state in 2014. That same year, severance tax collections generated over $2 billion for Alaska and $6 billion for Texas. Standing alone, these revenues are significant, but they are also important in context; many oil- and gas-producing states rely on severance taxes to make up a significant portion of their total state tax revenue. In North Dakota, that $3 billion accounted for over 50% of the state's total tax collection. In Alaska, its severance tax made up over 70% of the state's total tax collection, while the percentage share in Texas was only 10%.

Table 2. State Severance Collections by Year, 2005–2015 (Current Dollars, 000s)

State	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Alabama	144,813	182,778	144,306	197,581	115,374	90,538	115,975	116,467	119,424	115,437	79,235
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	2,456,212	105,233
Arizona	26,338	40,494	43,560	43,757	19,481	33,372	40,237	40,578	29,829	26,190	24,862
Arkansas	18,565	22,225	21,579	27,820	33,547	65,147	79,656	82,770	80,862	108,511	104,383
California	14,251	16,048	31,526	31,599	27,105	24,409	31,879	37,112	37,732	38,686	69,960
Colorado	145,114	212,753	136,888	151,474	285,015	71,436	146,690	175,090	147,732	245,087	292,683
Idaho	2,488	2,897	6,649	6,758	4,952	6,730	7,787	8,309	6,224	6,004	6,143
Kansas	117,424	149,676	132,281	168,696	142,658	102,878	122,152	132,907	73,806	124,883	148,077
Kentucky	228,848	281,581	275,313	293,334	355,985	317,146	342,320	346,050	269,786	241,989	220,613
Louisiana	711,766	716,396	904,164	1,035,695	911,433	758,469	729,260	885,982	834,116	862,150	731,330
Michigan	68,055	90,956	81,874	113,506	59,343	57,424	80,423	64,285	70,087	73,488	36,883
Minnesota	32,348	28,022	34,591	31,821	45,820	23,290	27,618	46,370	54,343	42,062	58,931
Mississippi	66,275	89,910	81,814	135,248	113,762	90,832	112,326	116,378	104,692	91,059	78,726
Montana	181,201	247,385	264,740	347,221	349,714	253,649	278,372	305,617	282,356	305,614	269,287
Nebraska	2,560	2,820	2,499	4,968	4,718	3,473	4,440	5,355	4,064	6,762	5,282
Nevada	39,691	44,526	62,178	74,130	145,450	182,752	272,240	303,038	290,448	111,395	121,604
New Mexico	712,539	923,304	942,354	625,938	931,832	654,752	804,586	768,106	713,998	1,066,343	1,001,741

North Dakota	262,339	346,672	391,337	791,692	827,417	1,136,553	1,883,816	3,187,112	2,457,530	3,293,053	2,849,324
Ohio	7,920	7,675	7,015	9,420	11,052	10,550	11,197	10,182	12,308	10,194	22,981
Oklahoma	762,506	1,059,919	942,148	1,184,765	1,067,182	743,686	830,662	848,947	515,981	679,406	556,546
Oregon	12,148	12,032	12,513	11,815	13,038	12,742	13,199	14,119	23,305	23,424	24,149
Pennsylvania	—	—	—	—	—	—	—	—	—	—	—
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	6,014,350	4,005,371
Utah	73,434	99,517	101,539	106,060	102,121	89,162	101,665	107,075	112,050	155,743	130,212
Washington	43,034	48,446	48,727	44,038	29,681	20,905	26,706	36,302	38,656	41,950	43,893
West Virginia	307,265	336,387	328,320	347,592	376,677	417,230	585,992	626,203	608,371	681,824	668,880
Wyoming	805,613	1,043,160	803,632	883,786	1,197,540	721,002	1,044,150	968,525	867,933	883,025	883,913
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	17,780,808	12,603,072

Sources: National Conference of State Legislatures, State Severance Taxes, 2012, available at www.ncsl.org/research/fiscal-policy/2011-state-severance-tax-collections.aspx, accessed January 4, 2017. James A. Richardson, "Severance Tax, State," in *The Encyclopedia of Taxation and Tax Policy,* 2nd ed. (Washington, DC: Urban Institute Press, 2005), 357–360. U.S. Census Bureau, Governments Division, "State Government Tax Collections," available at www.census.gov/govs/statetax, accessed January 4, 2017.

Notes: Revenues include all types of severance taxes, not just oil and gas exclusively. U.S. Census Bureau data reflect the fact that severance taxes are taxes on the extraction of natural resources. Severance taxes may be applied to, among other resources, fisheries, coal, timber, uranium, and iron ore, 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.

While Pennsylvania does not levy a severance tax on natural gas, oil, or coal, it does have what is called an "impact fee," as discussed later in this article. The impact fee collections in 2011–2015 were 204,210; 202,472; 225,752; 223,500; 187,712 (000s), far below what most other high-production states generate through severance taxes. See Act 13 Public Utility Commission, Disbursement and Impact Fees. Available at www.act13-reporting.puc.pa.gov/Modules/PublicReporting/Overview.aspx. Accessed January 4, 2017.

These revenues can fluctuate, given boom-and-bust cycles in production and commodity prices, as is further reflected in Table 2. However, severance taxes have allowed some states to not only suppress rates of other taxes but also avoid adoption of contentious taxes in some cases as long as they provide some ongoing revenue. Neither Alaska nor Wyoming, for example, have an income tax and have generally produced sufficient revenue from energy extraction taxes to keep an income tax off their state agendas.

Opportunity to Earmark Revenue and Build a Constituency

Beyond generating substantial revenues for a state, severance taxes enable states to create and maintain funds directed to specific purposes such as education, or addressing environmental concerns tied to production. Most prominently, several oil- and gas-producing states allocate severance tax revenues to what are known as trust—or permanent—funds, following on the pioneering effort in Texas from the early twentieth century. These funds are traditionally protected by state constitutions and thus are designed to feature greater longevity than other state funds created only through statute (Rabe and Hampton 2016). States that use trusts funds include Texas, New Mexico, Wyoming, Montana, Alaska, and most recently, North Dakota, Utah, and West Virginia. As a result of these funds, oil- and gas-producing states may be able to better protect themselves against any boom-or-bust cycles that traditionally plague petro-states (Ross 2012).

This type of earmarking revenue from a specific tax can also create the opportunity for a state government to build a supportive political constituency through the targeted allocation of those funds. This linkage may foster considerable durability of the tax, given the recognition that its reduction or elimination could endanger a popular public benefit connected to the tax.[2] Alaska stands out as a prime example. After realizing how quickly any windfall from oil production would be depleted, Alaskan governor Jay Hammond pushed for a trust fund that was ultimately adopted through constitutional amendment in 1976 (Groh and Erickson 2012). To further protect the fund, Hammond created the Alaskan dividend system whereby citizens of Alaska are sent a check—sometimes in amounts as high as $2,000—from the Permanent Fund earnings each year (Moss 2012). Because of this allocation, citizens of Alaska have kept their eyes riveted on both the fund and the severance tax revenues that are allocated toward the fund, as evinced in recent debates that emerged starting in the mid-2000s. For decades, any suggestion of reduced tax rates has been linked in the public mind with a possible loss of dividend revenue and proves extremely controversial. Other states have earmarked severance tax funds for popular programs, such as Wyoming's linkage with a

significant scholarship program named after a popular former governor for students pursuing higher education at public institutions within the state.

Burden Shifting

Severance taxes are also attractive to energy-producing states because the burden of the tax is often passed along the production chain to out-of-state consumers (Mieszkowski and Soligo 2012). Many top producing states—such as Alaska, Louisiana, Montana, Oklahoma, Wyoming, and North Dakota—are relatively low consuming states, meaning that more than 95% of their production is ultimately exported. Even major consuming states such as Texas and Pennsylvania export large amounts of the energy that they produce (U.S. Energy Information Administration 2014b). Severance taxes may thus be a relatively easy sell to constituents who might otherwise worry about the possible impact of a tax that is primarily applied to their consumption of energy.

This enables legislative supporters of a severance tax to claim political credit for imposing a cost on the removal of a natural resource that cannot be restored after use while knowing that most of the burden of any cost on consumption will be borne in other states or nations. Producing states thus face few political consequences from constituents about imposing price increases and also gain a possible political benefit by creating ways to spend the revenues for popular programs that they can sustain over time. There may well be parallels between the political attractiveness of severance taxes and other taxes that essentially export the costs, such as taxes imposed on vacations or business travel through hotel bills or rental cars. Dick Cheney recognized this as he defended high severance taxes while serving as Wyoming's representative in Congress during the 1970s (Powers 1982).

Political Constraints on Severance Taxes

The nearly unanimous rate of severance tax adoption among oil- and gas-producing states underscores the multiple factors that make them politically attractive despite their partisan control or geographic region. Their high political feasibility also translates into durability across various stages of implementation and multiple shifts of political leadership. No state has ever repealed an oil or gas severance tax that has been adopted and relatively few have undertaken major rate reductions after initial adoption (Rabe and Hampton 2015). This has even endured into the shale era, when overall production has soared and states might be expected to consider repeal or rate reduction to lure or retain drilling within their boundaries, given increasing interstate competition to sustain and expand production.

Nonetheless, the shale era does underscore some of the challenges to sustaining or expanding severance taxes, given the possibility that such a tax might discourage industry from seeking further production in the state that employs the tax (Harrison 2006). This has led to some speculation that drilling firms might play one state against others in search of the lowest possible tax rates, along with the easiest paths to regulatory compliance, in making their location and investment decisions. Such arguments appeared, for example, in the Alaskan debates over its severance taxes during the last decade. State political leaders, including Republican governor Sean Parnell, expressed concern that Alaska would be outcompeted by states, like North Dakota, if its tax remained high, particularly given the relatively high cost of launching and sustaining drilling operations in remote Alaska and then moving its products to market. This resulted in significant tax reductions in 2013, though these proved highly controversial and contributed to Parnell's re-election defeat in 2014. But in fact, there is little evidence that states have pursued less aggressive taxes in the shale era (Rabe and Hampton 2015), and some studies suggest that arguments that reducing severance taxes will result in increased industry investment and production have little empirical foundation (Kunce 2003).

Severance taxes also threaten possible support to political officials from the oil and gas industry and their employees. States with a dominant energy-producing culture may compel politicians to curry favor with industry in search of possible campaign support or even employment after elected careers have ended or continue for part-time legislators. The questions of possible capture of state officials by local energy industries endure, albeit without much empirical evidence that this can block initial severance tax adoption, reverse such policies once created, or lead to significant statutory rate reductions over time. Instead, industry influence may be subtler, reflected in expanded state efforts to provide tax credits and economic development incentives or more flexible approaches to regulatory compliance. Overall, the political upside of severance taxes continues to outweigh the negatives, at least in the vast majority of state cases to date.

Pennsylvania Exceptionalism

This overall pattern of high political feasibility for severance taxes makes the Pennsylvania case unique and worthy of extended consideration, given its unique standing among oil- and gas-producing states as averse to such taxes. Since the Drake Well was first drilled in Pennsylvania in 1859 (Wile 2012; Yergin 2011), the state has been a major energy producer, including coal, oil, and natural gas, across many decades, with operations in many of the

state's 67 counties. While the state has also long extracted natural gas, and has used horizontal drilling techniques since 2003, it generally assumed that it was phasing out fossil fuel production in the late 1990s and early 2000s and increasingly turned toward development of renewables through regulatory mandates and tax incentives (Rabe 2007). It was not until around 2009 that drilling activity accelerated markedly (U.S. Energy Information Administration 2016a, 2016b), allowing the state to tap into the bountiful Marcellus Shale.

Since that time, the landscape and economic geography of Pennsylvania have shifted considerably, given the advent of the shale era and Pennsylvania's emergence as the second-largest natural gas–producing state, surpassed only by Texas. The number of producing gas wells in the state increased from 57,346 in 2009 to over 70,000 in 2014, and total volume of natural gas production soared during these years (see Table 3). The oil and gas industry in Pennsylvania also saw substantial growth in both employment and wages. Employment in the oil and gas industry went from 5,829 in 2007 to 20,943 in 2012. The average annual pay in that same industry went from $60,870 in

Table 3. Pennsylvania Natural Gas Gross Withdrawals

Year	Natural Gas Gross Withdrawal (Million Cubic Feet)
2000	150,000
2001	130,853
2002	157,800
2003	159,827
2004	197,217
2005	168,501
2006	175,950
2007	182,227
2008	198,295
2009	273,869
2010	572,902
2011	1,310,592
2012	2,256,696
2013	3,258,042
2014	4,214,643
2015	4,768,848

Source: U.S. Energy Information Administration, Pennsylvania Natural Gas Gross Withdrawals, 2016, available at http://www.eia.gov/dnav/ng/hist/n9010pa2a.htm, accessed January 4, 2017.

2007 to $82,974 in 2012 (U.S. Bureau of Labor Statistics 2014). Pittsburgh was increasingly declared as the hub of industrial leadership of this expanding industry and large industry-wide advocacy groups began to form in this shale play, such as the Marcellus Shale Coalition. Such regional organizations also included participation by Ohio and West Virginia firms, although Pennsylvania continued to dominate this activity, particularly after New York imposed an extended moratorium on fracking in 2015 after years of temporary halts due to environmental opposition. Industry and state government officials have likened Pennsylvania to a burgeoning natural gas superpower, potentially luring refineries and manufacturing firms eager to have proximity to abundant natural gas supplies.

The dramatic increase in production of natural gas in the state tied to hydraulic fracturing has entailed more gas production and jobs, but also increased environmental risks to air quality and groundwater. Additionally, the state may face impacts from the use of diesel, forest disruption from pipeline construction, and methane leakage. A Penn State University study in 2016, for instance, found that the cost of environmental impacts would range from $162 to $755 thousand per well, although it ultimately concluded that the economic benefits to the state from drilling in the Marcellus Shale would exceed any known environmental impacts (Considine, Considine, and Watson 2016).

Amid all of this production and growth—and environmental impact—however, the state has sustained its unique status as the only state that produces oil and gas but applies no severance tax to that extraction. This decision cannot be explained by any historic aversion to taxation, reflected in relatively high rates of sales and personal income taxes over an extended time. The state has shifted back and forth between various forms of Republican and Democratic Party control, although it routinely voted for Democratic presidential candidates between 1988 and 2012. It has not adopted any constitutional amendments, contrary to other states, to ban or restrict various forms of taxation and has generally ranked toward the middle of the pack among states according to their commitment to environmental protection (Rabe 2016b).

The uniqueness of the Pennsylvania system and its sustained opposition to a severance tax cannot be overemphasized. A quick comparison to the state's shale neighbors who are both heavily involved in energy production—West Virginia and Ohio—bolsters this idea that Pennsylvania has truly deviated from the American state norm on this issue: West Virginia and Ohio both levy severance taxes. West Virginia overcame aggressive coal industry opposition to a severance tax in the 1950s and subsequently established such taxes for oil and natural gas; it has also most recently created a trust fund called the

West Virginia Fund, although it receives a far smaller portion of state tax proceeds than most other trust funds, including those in Alaska, North Dakota, and Texas (Rabe and Hampton 2016). Ohio adopted a Resource Severance Tax on oil, natural gas, salt, and a variety of minerals in 1972. Consequently, Pennsylvania presumably has political and economic space to adopt some version of a tax without triggering huge losses of development to neighboring jurisdictions. Nonetheless, it remains the exceptional American case throughout the shale era. To understand this costly decision requires exploration into the political arena from which these decisions were made.

Severance Tax Aversion across Three Shale Era Governorships

Pennsylvania's decision to refrain from a severance tax illustrates one state government option in the politics of economic development, whereby a state attempts to foster economic growth in a particular sector by either reducing or eliminating specific costs imposed on an industry through some form of taxation. The state has long struggled politically with boom-and-bust cycles that reflect its long-standing role as a major producer of fossil fuel energy alongside major development of manufacturing steel and other energy-intensive industries. During periods of decline in these areas, Pennsylvania has actively explored a wide range of development strategies that either would reverse these patterns of contractions or promote alternative forms of economic development, as has been the case in many other states (Brace 1993; Eisinger 1989; Hansen 1989). This has occurred across multiple decades amid various patterns of partisan control of state government.

One cornerstone across these various Pennsylvania economic development efforts has been attempting to promote as much fossil fuel development as possible by rejecting proposals to tax extraction. Some severance tax opponents contend that relatively high rates of corporate income and other taxes that cut across various industries may already impose significant tax burdens on energy-producing industries. This reflects a desire to use broader-based taxes in the state but also to use a nonseverance tax strategy to signal to the energy sector a strong desire to sustain legacy production as long as possible. This then pivoted toward a desire to sustain an antitax approach to promote expanded production once the shale era opened a possible path toward a return to national leadership in natural gas output and related use. In either instance, the absence of a severance tax has been seen as maximizing potential development of the resource.

However, the continuation of this policy during the past decade coincided with a growing partisan divide on the question of whether Pennsylvania

should join the ranks of all other gas- and oil-producing states and adopt a severance tax. Throughout the last decade, the governorships of Edward Rendell (Democrat, 2003–2011), Tom Corbett (Republican, 2011–2015), and Tom Wolf (Democrat, 2015–2019) have featured high-decibel and near-constant state political debate over the severance tax question, usually reflecting major partisan divides between antitax Republicans and protax Democrats. This alignment varied somewhat, linked in part to whether or not drilling was occurring in a particular legislative district. But this was quite limited and leaves partisan affiliation as the best predictor of political response to numerous proposals to adopt some form of a severance tax.

Divided Partisan Control in the Rendell Era

This section reviews the Pennsylvanian odyssey of debating but rejecting severance taxes during this period, beginning with the Rendell era. First elected in 2003, Rendell was the first Pennsylvania governor to see the reemergence of a surge in shale gas production in the state. Rendell supported drilling but also endorsed a severance tax. He embraced legislation that would create a 5% tax on the extraction of natural gas and oil, though most Pennsylvania fossil fuel production involved only the former. This proposal was generally supported by Democrats in the legislature while it was strongly opposed by most Republicans. The GOP retained control of the Senate throughout Rendell's entire governorship, a pattern that continued through the Corbett and Wolf administrations. In turn, the House was held by Republicans in 2005–2006 and then later between 2011 and 2016.

The highly partisan divide over a severance tax proposal was also linked to controversy over how to develop a regulatory system to oversee this new and expanding form of energy extraction (Rabe and Borick 2013). Rendell argued that other states had successfully adopted and maintained such a tax without harming production and that such a tax in Pennsylvania could help diversify the state's base of resources, which had been severely strained by the Great Recession. But by 2010, the governor pronounced the severance tax plan dead after protracted legislative debate. "It is irresponsible for Senate and House Republicans to refuse to compromise and simply turn their backs on these negotiations after days and weeks and months of work," he said. "Their clear unwillingness to change their previous proposal or to resolve differences with the House Democrats and with my administration makes it obvious that they have killed the severance tax in this legislative session" (Swift 2010). In response, Republican officials countered that any tax adopted during the formative period of shale development and expansion could drive energy extraction investment to other jurisdictions, particularly given the expanding set of

drilling options as shale supply discoveries continued to expand around the nation and beyond. Some Republicans opposed a tax under any circumstances whereas others argued that it should be tabled during this period of rapid expansion but possibly be revisited in the future after development matured.

Unified Republican Control in the Corbett Era and the Emergence of the Impact Fee

Term-limited Rendell did not get the chance to further pursue his severance tax vision; Republican Tom Corbett was elected as his successor in 2010, with unified Republican control of the governorship and both legislative chambers during his single term. Having aligned himself heavily with the gas industry during his election and in earlier stages of his political career as attorney general, including substantial campaign donations, Corbett pushed aggressively for shale gas development as a centerpiece of a way to transform the Pennsylvania economy. In his first budget message as governor, in 2011, he said: “Let’s make Pennsylvania the hub of this (drilling) boom. Just as the oil companies decided to headquarter in one of a dozen states with oil, let’s make Pennsylvania the Texas of the natural gas boom. I’m determined that Pennsylvania not lose this moment. We have the chance to get it right the first time, the chance to grow our way out of hard days” (Bauers 2011). Corbett made no bones about his view that severance tax adoption was “un-American” and could destroy any prospect of Pennsylvania realizing its potential as a natural gas powerhouse (Rabe and Borick 2013, 329).

Corbett’s plan to transform Pennsylvania into a natural gas superpower involved a multipart strategy that emerged in part from an advisory commission he convened early in his governorship. This would ultimately lead to legislation known as the Unconventional Gas Well Impact Fee Act (or Act 13), signed into law by Corbett in February 2012 after legislative votes that fell largely along partisan lines. The legislation would represent one of the first efforts by any state to address numerous aspects of shale governance through one comprehensive statute, as many states had been relying primarily on earlier regulatory and tax policies applied to conventional drilling or piecemeal reforms of earlier policies (Rabe and Borick 2013). It included many new regulatory provisions, although it received national attention primarily for two reasons.

First, it formally expanded state government authority over numerous aspects of hydraulic fracturing, including many types of land-use decisions that might otherwise fall under local government control. This included such issues as restricting well site operating hours, limiting noise around drilling operations, and establishing conditions for screening and fencing around

sites, even in cases where drilling took place near residential areas or small businesses. Pennsylvania had a long-standing tradition of substantial state deference to local authorities in most areas of zoning and land-use planning, including many issues linked to expansion of drilling. But Act 13 formally shifted that control to state authorities, with various responsibilities allocated to the Pennsylvania Department of Environmental Protection and related state agencies that generally did not regulate local land use. This represented a form of preemption designed to limit local resistance to expanded drilling, an issue that has also emerged in many other states where local and state views have clashed (Rice 2016). This was intended to make it as straightforward as possible for gas extraction proposals to secure needed permits and approvals to move ahead with new drilling operations. Act 13 would, however, ultimately produce prolonged litigation that led to a historic reversal in a 2013 State Supreme Court case, *Robinson Township v. Commonwealth of Pennsylvania* (52 A.3d 463 [Pa. Cmwlth. 2012]), that would produce much subsequent uncertainty about the boundary of state and local roles that continued through 2016.

Second, Corbett attempted to honor his no-severance tax pledge that had been a core part of his campaign with an alternative mechanism of an impact fee. This would represent the imposition of some annual costs on each drilling site during the early years of operation, set as a fixed annual fee rather than as a percentage of gross value of produced natural gas. It would decline over time despite the productivity of the well and all revenue would be allocated through a formula to various state agencies and local governments where drilling would occur. The animating principle was that this was not a tax but rather a fee to help governments mitigate some of the "impacts" of shale development. A further political attraction was that this fee was likely to be set at a very low level when translated into a percentage of produced natural gas value. It thereby set a de facto rate that was far lower than most state severance taxes at its peak and would both decline and then disappear entirely over time, unlike all existing state severance taxes that remained in force over the full lifetime of production.

The impact fee plan also used revenue allocation as a way to build local government support for the fee, potentially serving to create a loyal political constituency that might then oppose any future severance tax. Most severance taxes allocate revenues on a statewide basis rather than concentrate them on jurisdictions where drilling occurred. In the case of the impact fee, the only Pennsylvania counties, municipalities, and townships that were eligible for any potential revenue were those that hosted drilling operations. The portions of impact fee revenue that would be returned to localities would be allocated

on the basis of energy production. Local governments were able to use impact fee funds on a wide range of programs, including road repair and emergency services that were in some way linked to drilling (Weber and Harleman 2016).

Local governments, however, would have to make the political decision to actually authorize such a fee rather than the state, with the legislation simply giving them this option and avoiding any direct state responsibility for the levy. Therefore, proponents framed this as lacking state political fingerprints, with the fee approval decision made locally. If localities went forward with the impact fee, the state would then collect the revenue but make local allocation contingent on full local compliance with state regulatory provisions, including restraint from any local efforts to add regulatory burdens linked to drilling that violated Act 13's state preemption provisions. This clause was applied almost immediately, with seven local jurisdictions in 2012 failing to receive any impact fee revenue due to state interpretation of some form of noncompliance. These jurisdictions alleged heavy-handed state government oversight, but they had no recourse despite having levied the impact fee within their boundaries.

The impact fee adoption did not quash subsequent debate over severance taxation. The fee did sustain Republican support in general, albeit with exceptions in some cases where GOP legislators represented districts without shale activity and thereby received relatively little revenue related to drilling in the state. It did little to deter Democratic support for a tax, most intensively in areas of the southeastern and south-central portions of Pennsylvania that lacked shale and received limited revenue transfer from the fee to localities. Nonetheless, there was never a serious effort to put a severance tax onto the legislative agenda for the balance of Corbett's term in office. This reflected unified Republican political control of state government and the argument of party leadership that a nontax fee was more than sufficient to cover any adverse impacts of natural gas drilling in the state while being sufficiently modest to give Pennsylvania energy producers a financial edge versus alternative state drilling venues.

Return to Divided Control in the Wolf Era

Corbett made Act 13 and his staunch support for expanded natural gas extraction a cornerstone of his 2014 reelection bid. All of the prominent candidates for the Democratic nomination endorsed some form of a severance tax, including eventual nominee Tom Wolf, who promised if elected to support a severance tax that he said could raise up to $1 billion annually (Cocklin 2014a, 2014b, 2015). The severance tax issue figured prominently in campaign advertising and candidate debates. In one exchange, Corbett emphasized that

the impact fee was already bringing in revenue to state and local governments and that higher taxes would deter future energy investment. Wolf argued that "We have a God-given resource lying beneath our feet; we need to do everything in our power to make sure this benefits Pennsylvania. My severance tax is not meant to kill the goose that's laying the golden egg. I'm just saying, let's share some of that gold with the people of Pennsylvania." (Bravender 2014). Wolf won a decisive victory over Corbett by a 55% to 45% margin, which seemed likely to propel pursuit of severance tax adoption. However, Wolf had no measurable electoral coattails as both chambers of the legislature remained in Republican hands and the GOP increased its overall margin in the Senate.

During his first two years in office, Wolf repeatedly championed various versions of a severance tax to replace the impact fee, with significant variations in rates that began at 5% on the value of gas at its wellhead in 2015 but increased to 6.5% the following year. This higher rate would have surpassed that of any state east of the Mississippi River, though it would have remained below many states to the west of that divide. In 2016, Wolf also added a proposed supplement of a volumetric fee that would have also included a 4.7 cent surcharge for every thousand cubic feet and, in effect, assured higher rates when gas prices declined. This suggested some efforts to emulate the tax and fee combination that had long been in place in neighboring West Virginia, with considerable industry opposition despite its political durability. Wolf demonstrated willingness to adjust the technical terms of the proposal, including rates and the related fee, and generally retained solid but not unanimous support from Democratic legislators. He generally favored allocating revenues for education and local governments rather than any longer-term investments through a trust fund. But despite his various adjustments, Wolf gained virtually no traction among Republicans in either the House or Senate, reflecting their steadfast opposition to any extraction tax (Woodall 2016).

This has resulted in protracted partisan battles, with the lack of agreement on the severance tax leading to an extended failure to adopt a state budget. Pennsylvania had considerable precedent for late budget completion but the 2015–2016 delays were unusually long, ultimately lasting for nearly one year. These battles included aggressive use of vetoes by Wolf that prevented any spending for certain state government programs, with the severance tax controversy a primary point of contention. Wolf would ultimately back down and withdraw the tax proposal in order to secure a 2016 budget accord but vowed to return to this issue in future sessions. The state also faced extended partisan divides over a range of new environmental regulations on drilling operations established by the Wolf Administration through interpretation of Act 13 and related statutes by the state Department of Environmental Protection.

Opponents argued that any new severance tax would only compound the added costs imposed by these new regulations.

Severance tax opponents in the Wolf era were particularly emphatic that such a tax could be considered only if natural gas prices eventually rebounded after a period of significant decline during the mid-2010s. As in prior periods, some opponents suggested that a tax would never be acceptable whereas others held out the possibility of some reconsideration in the future. Divides were also evident over the extent to which Pennsylvania should rely on natural gas extraction and related development as a fundamental path for future economic growth or should it pursue economic diversification instead. Some Republicans were adamant that prices would bounce back and that the state could also lure substantial new manufacturing through tax credits and subsidies linked to new investment that made significant use of natural gas harvested in the Keystone State. One such proposal advanced by Republican House Speaker Michael Turzai, the Keystone Energy Enhancement Act, called for creation of Keystone Energy Zones that would offer highly favorable terms for such investment and arguably transform Pennsylvania along the lines of more energy-intensive states such as Texas.

Opponents also contended that Pennsylvania would lose its competitive edge to neighboring Ohio and West Virginia in the Marcellus and Utica shale plays if it followed their precedents and established a severance tax. Marcellus Shale Coalition president David Spigelmyer routinely noted in 2015 and 2016 that any severance tax adoption by Pennsylvania would trigger a major outmigration of drilling operations to other states, even though they all had some form of severance tax in place. In a representative comment, he observed in 2015 that a state severance tax would make the state "uncompetitive with Ohio, Texas, and Louisiana—China. Capital can move like water in Pennsylvania. It can move from Pennsylvania pretty quickly" (Cusick 2015). In particular, he anticipated movement to the immediate west of the state if a tax was adopted, noting that "You can line up at the border and watch rigs move into Ohio" (Lee 2015).

Both West Virginia and Ohio faced severance tax controversies of their own during this period, although neither adopted any changes in established taxes through the end of 2016. In West Virginia, Democratic governor Earl Ray Tomblin in 2016 lamented plunging severance tax revenues from gas, oil and the state's iconic fossil fuel of coal and endorsed the idea of some reduction in these taxes in hopes that it might trigger a rebound for extraction. The State Senate supported a bill to eliminate a volumetric fee similar to the one Wolf proposed for Pennsylvania that complements the severance tax. It also supported a reduction in its 5% severance tax on oil, natural gas, and coal

production to 3% over a two-year period. Both of these failed to gain support in the lower House of Delegates, though this issue reemerged during the 2016 election and figured to resurface in subsequent years.

In Ohio, Republican governor John Kasich argued that Ohio's severance tax, which charges a fixed amount per unit of energy produced regardless of price (20 cents per barrel of oil and three cents per 1,000 square feet of natural gas) and generally ranks among the lowest in the nation, represented a state failure to capture revenue that should be linked to the permanent removal of a natural resource. Much like Wolf, Kasich repeatedly advanced bills with a variation of higher rates between 2011 and 2016, ranging from 1.5% to 6.5%. He proposed that most of the revenue could be used to reduce other taxes, including rates for state personal income taxes. Kasich faced significant but not unanimous opposition from members of his own party in the legislature and a Pennsylvania-like standoff ensued for several years without resolution, although it did not go so far as to delay budget agreements. In a comment representative of his views, Kasich said in 2015 that the current tax system is a "total and complete rip-off to the people of this state" (Krebs 2015). In 2016, he vowed frequently to continue his campaign to increase the severance tax and use revenues to provide personal income tax relief.

Consequently, Pennsylvania remained unique in refraining from severance tax adoption but found itself by 2017 nestled in a shale play where neighboring states continued to debate property tax rates and structure during an energy price decline. The question of severance tax adoption remained prominent on Pennsylvania's political agenda as Wolf entered the second half of his term in 2017; any further political standoff on this issue would likely only keep it prominent in subsequent election cycles. As a result, Pennsylvania and its immediate neighbors posed an important national test of the future political prospects for severance taxes.

Consequences of Pennsylvania Exceptionalism and Future Considerations

Much like other energy-producing states, Pennsylvania has not been immune from boom-and-bust economic cycles either historically or in the shorter time horizon of the shale era. It continues to face questions about the impact of natural gas development on its economy and environment in both the near- and longer-term, with strong parallels to other states and nations that operate energy-centered economies. But Pennsylvania's unique stance on severance taxes creates a number of important considerations for the state, both in the near term and in coming decades, as it further explores development of its natural gas supplies.

General Revenue Foregone

First, the lack of a severance tax is costly to the state of Pennsylvania in terms of lost potential revenue and the need to use other taxes to cover its budgetary outlays. Thus far, the impact fee has generated slightly more than one billion dollars for the state during its first five years of operation, with approximately 40% retained by the state and the remainder allocated to county and local governments. Wolf has projected, however, that a 6.5% severance tax would generate $350.9 million in revenue for the 2016/2017 fiscal year, leading up to $507 million for the general fund by the 2020/2021 fiscal year (Phillips 2016). The Pennsylvania Budget and Policy Center had much higher estimates in 2013, however, reflecting that revenue projections have declined as natural gas prices have dropped markedly (Pennsylvania Budget and Policy Center 2013). There are no reliable published estimates of whether Pennsylvania secures added drilling and related economic stimulus due to its nontax approach.

As in the case of state severance tax revenues, Pennsylvania impact fee revenues have declined in recent years. Revenues peaked at $226 million in fiscal year 2013, slipped to $188 million for fiscal year 2015, and were projected to drop to an estimated $129 million to $171 million for fiscal year 2016. In addition to the fact that total revenues are considerably lower than most other severance tax states, despite the state's massive natural gas production (see Table 2), impact fee revenue is most abundant in years immediately after drilling begins rather than over the entire production life of each well when the fee is phased out and then eliminated even if drilling continues. So it is susceptible to significant fluctuations as the sheer amount of new drilling moves up and down, as it has in recent years. As a result, revenue production will decline markedly over time despite overall output unless there is a constant pace of new drilling (Environmental Law Institute and Washington and Jefferson College Center for Energy Policy and Management 2014).

This consequence is especially considerable in light of Pennsylvania's ongoing budget crisis. Other major energy-producing states with a severance tax, such as Alaska and North Dakota, have also struggled with major deficits, given oil price busts, although these reflect both declining severance tax revenues and the decision to suppress other taxes, given severance tax dependence. In turn, other states that have considerable energy production and a severance tax, such as Texas and California, have had less significant budget problems, given their more diversified statewide economies and tax bases (Saha and Muro 2016). As of 2017, there were no long-term fixes in sight for the Pennsylvania budget after a patchwork of increases in tobacco taxes, partial privatization of liquor sales, a one-time tax amnesty program, a loan from a medical malpractice insurance fund, and anticipated expansion

of gambling and related taxes were used to attempt to close an immediate budget gap.

Earmarked Revenue Foregone

Just as Pennsylvania is missing out on the opportunity to collect substantial revenues, it is also foregoing opportunities to use them to address negative consequences from drilling or prepare for longer-term challenges. In Colorado and North Dakota, considerable amounts of severance tax revenue are placed in special funds for related programs such as land reclamation, water conservation, and alternative energy development (Rabe and Hampton 2015). As Pennsylvania Budget and Policy Center officials stated in 2010, "Legislative inaction has left the environment unprotected in the Marcellus Shale region of the state. It has passed the local costs of increased drilling on to state and local taxpayers" (Swift 2010). The absence of a severance tax also precludes the possibility of setting aside some portion of oil- and gas-production revenues for long-term uses through the creation of a trust fund. In North Dakota, 30% of annual severance tax revenues are deposited in a state Legacy Fund for investment and gradual allocation once state oil resources have been depleted; other states have continued to experiment with their own versions of this approach (Rabe and Hampton 2016).

The Resiliency of Severance Taxation as a Pennsylvania Agenda Issue

The sustained rejection of severance tax proposals over the last decade demonstrates the steep political hurdles to adoption. But it also indicates a kind of resilience for this issue, with an enduring base of political support that is unlikely to disappear. Alongside the view that Pennsylvania should refrain from severance taxation and use this unique feature to try to expand extraction and related development is a continuing counterargument that the state should attempt to extract some lasting revenue value from the permanent loss of its fossil fuel-based natural resources. This reflects in part a long Pennsylvania history with the aftermath of energy-production booms, including long-term environmental damage linked to extensive coal mining operations that remain a challenge in many parts of the state and a desire to mitigate any potential risks with supplemental revenue.

This debate is unlikely to disappear at any point in the near future and would likely continue even if Pennsylvania adopted some form of a tax. Indeed, public opinion analysis suggests a significant base of public support for some form of a severance tax in the state, a remarkable finding, given the ongoing state political opposition to such a tax and the general lack of public

enthusiasm for new taxes. Between February 2014 and February 2016, the Muhlenberg Institute of Public Opinion conducted four surveys of Pennsylvania residents and found consistently that 62% to 63% of respondents favored the adoption of a severance tax with 25% to 29% opposed and the remainder not sure (see Table 4). These surveys also found that respondents were far more likely to say that such a tax would not encourage drilling firms to leave the state, including a 48% to 36% margin in February 2016 (see Table 5). This is consistent with earlier survey findings from Muhlenberg on this issue, suggesting a sustained majority of support across the last two governorships and periods of both surging and declining natural gas prices (Brown et al. 2013).

Table 4. Pennsylvania Muhlenberg Institute of Public Opinion Survey Results, Severance Tax Question

Q: Many states have created "severance taxes" in which drillers pay a tax that is based on the value of natural gas and oil that they extract from below the ground. Pennsylvania does not currently have such a tax. Do you think that Pennsylvania should adopt such a tax or not?

Year	Should Adopt	Should Not Adopt	Not Sure/Refused
February 2014	62%	29%	9%
February 2015	63%	25%	13%
October 2015	63%	28%	9%
February 2016	62%	28%	10%

Source: Muhlenberg College Institute of Public Opinion, Fracking Related Questions, Summary 2011–2016 (on file with the authors).

Table 5. Pennsylvania Muhlenberg Institute of Public Opinion Survey Results, Firm Drilling Questions

Q: Please tell me if you strongly agree, somewhat agree, somewhat disagree or strongly disagree: Increasing taxes on natural gas drillers in Pennsylvania will lead drilling firms to leave and so should be avoided

Year	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree	Not Sure
2011	11%	22%	23%	28%	16%
2012	16%	16%	30%	34%	4%
2015	18%	20%	26%	29%	8%
2016	21%	15%	23%	25%	25%

Source: Muhlenberg College Institute of Public Opinion, Fracking Related Questions, Summary 2011–2016 (on file with the authors).

Future Severance Tax Prospects

A prolonged pattern of suppressed prices for natural gas does not necessarily mean reduced production, given the continued industry success of refining extraction technologies and practices that reduce the sales price necessary to allow them to generate a profit. Indeed, Pennsylvania natural gas production set a record in 2015, reflecting continued growth in output despite sustained price reductions (Cocklin 2016b). In turn, possible expansion of natural gas exports, including liquefaction and transport to other continents, converges with growing domestic demand for the fuel as an alternative to coal and suggests that the national appetite for natural gas is not going to disappear at any discernible future point. Moreover, there does not appear to be any political constituency in the state capable of securing a political majority through a campaign to halt or place a New York-like moratorium on drilling and "leave natural gas in the ground."

Consequently, fracking will in all likelihood continue in Pennsylvania alongside ongoing debate over regulatory policy and severance taxes. Other issues such as the fairness of royalty payments to land owners and the levels of bonds that drillers are required to post have also remained contentious in recent years, including protracted litigation against some of the major gas-producing firms (Cocklin 2016a). There has also been periodic discussion in the legislature and among local governments to allow localities to impose property taxes on pipelines that run through their jurisdictions, as is allowed in numerous other states. However, the severance tax question remains a central point of contention not just in Pennsylvania energy policy circles but in state politics more broadly. In all other gas- and oil-producing states, the severance tax issue has long since been resolved, leading to taxes that have proven durable for decades and generations in most state cases. In those settings, the discussion of severance taxes links to issues of rates and revenue use. Only in Pennsylvania does the very question of severance tax adoption remain an open and contentious one.

NOTES

1. California, a top producer of crude oil, also has an unusually low severance tax rate. The state levies what is called an oil- and gas-production assessment that is set each year by the California Department of Conservation, imposed on each barrel of oil and each 10,000 cubic feet of natural gas produced in the state (California Department of Conservation 2016). Individual counties rather than state authorities, however, are responsible for collecting the ad valorem taxes. California might be the state most similar to Pennsylvania in its failure to create a statewide severance tax amid considerable controversy over drilling and simultaneous pursuit of a cap-and-trade system to reduce carbon emissions (Rabe 2017). In fact, severance tax debates have also simmered in California since the 1990s,

including the most recent major effort to create an oil extraction tax that took place in 2014, with a proposal to allocate revenue for higher education. This generated a considerable constituency among University of California students but ultimately was not adopted (Smith and Kovitz 2014).

2. For an application of this approach in the case of carbon pricing, see Rabe 2016a.

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