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Drill Baby Drill?
Political and Market Influences on Federal Onshore Oil and Gas Leasing in the Western United States

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Abstract:
This paper examines the role of federal elected political influence and market factors in determining the acres of oil and natural gas leases issued on Bureau of Management (BLM) lands in the western United States between 1978 and 2008. This paper seeks to determine if a political party and ideology of the federal political environment influence the number of acres that are leased and if there is disparate federal political influence in states that have a large amount of federal lands. Using a random effects Tobit model for a 17-state sample of the westernmost states in the contiguous United States, the findings indicate that more conservative Congressional and Presidential influence lead to additional leasing. The results are consistent across Senate committee leaders, Senate majority leadership, and the President's office. The influence of politics on leasing is not found to be stronger in states with more federal lands, however.

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Purpose

In this paper, I analyze the political and market determinants of federal onshore oil and natural gas leasing in the western United States. Previous research on this topic has focused on examining either oil and natural gas markets or federal bureaucratic outcomes generally. I synthesize both the market and political determinants of federal lease issuance and provide a theoretical and empirical framework for analyzing the determinants of oil and gas leasing on BLM lands in the contiguous western United States. Using a supply and demand framework, I move away from the existing research that analyzes either oil and gas market factors or the role of the federal political and bureaucratic structure. By focusing on both simultaneously it is possible to ascertain whether the influence of politics or resource prices are the main determinants of leasing on federal lands in the western United States. Also, given the potentially important influence of both market and political factors, the inclusion of both sets of measures in this analysis mitigates issues of omitted variables bias, which is a concern when either set of factors is analyzed separately.

The existing market literature provides both theoretical and empirical analyses, but the empirical work focuses on offshore rather than onshore leasing. In addition, this literature does not focus directly on the political determinants of lease issuance. The existing literature on federal leasing has instead largely focused either on auction price theory to analyze the process for issuing competitive leases (Moody and Kruvant, 1988; Hendricks, Porter, and Tan, 1993; Hendricks, Pinske, and Porter, 2003), or on the determinants of oil and gas supply and production using a market supply and demand framework. (Walls, 1992; Iledare and Pulsipher, 1999)

The federal political environment in the United States and its influence on bureaucratic outcomes has been extensively studied in the literature. This literature has focused on two areas:

the influence of political parties, and the influence of politicians on bureaucratic outcomes. The findings regarding political party vary. There is a significant literature arguing that political parties matter in a variety of political outcomes (Levy, 2004; Levitt and Snyder, 1995; Rohde 1991; Cox and McCubbins, 1993), but there is also a literature that argues that the role of political parties is dominated by other political factors including individual ideology and the legislative committee system. (Poole and Rosenthal, 1991; Shepsle and Weingast, 1987) This paper delves into the debate by including measures of political party and ideology for various salient political actors, including the federal legislative and executive leadership as well as relevant committee leaders.

Several papers have examined the degree of influence that a political leader has on Congressional and bureaucratic outcomes. One set of literature argues that bureaucrats have significant discretion in terms of bureaucratic outcomes (Niskanen 1975) while another body of literature argues that elected officials have a dominant role in dictating the bureaucratic environment and legislative outcomes. (Cropper, 1992; Moe, 2006; Ringquist, 1995; Shipan, 2004; Weingast and Moran, 1983; Wood, 1988; and Wood and Waterman, 1991) This literature has provided analyses of the role of various federal bureaucracies, but has not provided an evaluation of the roles of political and bureaucratic influence in BLM leasing. My paper does not directly measure the relationship between bureaucrats and elected political leaders and instead focuses on the role of federal political leadership and the influence that changes in political party and ideology have on the overall political environment. A subsequent extension of this research question will focus more directly on the role of the bureaucratic leadership at the BLM.

Background

State Oil and Gas Resources

The western states were chosen because they contain approximately 81 percent of the proved natural gas reserves and 90 percent of the proved oil reserves in the contiguous United States over this time frame.[1,2] Also, these states compose 31 percent of the leases issued by the BLM over this time period. The remaining eight percent is dispersed across an additional 31 states in the eastern United States.[3]

Table 1 shows the states included in the analysis and gives information on the oil and gas resources in each state. Figures A1 and A2 show the amount of natural gas and oil proved reserves for each state and year.[4] The table and two figures demonstrate the significant contribution that several of the sample states make towards United States oil and gas production. They also show the variation in resource endowments across states in this panel.

Leasing Process

To understand the potential avenues of political and market influence in oil and gas leasing, it is important to understand the history and process of leasing. Oil and natural gas leasing on federal lands in the United States is a divisive issue that has pitted environmental groups against energy producers. The federal government is embroiled in this controversy due to its management of federal mineral resources and its authority over lease sales and use. Specifically, the Bureau of Land Management (BLM), under the direction of the Department of

[1] In this paper, the western states include Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, Wyoming.
[2] The time frame for these statistics is from 1978 through 2007.
[3] Alaska is also has significant oil and natural gas reserves, however, given the unique political and resource environment the state is excluded from this analysis. Also, the LR2000 leasing database maintained by the BLM does not contain information for Alaska.
[4] Proved reserves are a measure of the economically feasible reserves and are therefore strongly influenced by price. Due to the correlation of reserves and the economic measures, other measures will be used in the analysis as indicators of state resources. See the data and empirical sections for a full discussion.

the Interior (DOI), is responsible for almost 700 million acres of federal mineral estate lands, mostly in the western United States. This includes 258 million surface acres of BLM lands and the federal mineral estate that lies under federal lands managed by other federal agencies.[5] In addition, the federal mineral estate includes federal minerals under surface land that is privately owned, but for which the federal government administers the subsurface mineral rights.[6] In the federal mineral estate, approximately 12 million acres contain oil and natural gas and of these acres approximately 470,000 acres have oil and gas activities. According to the BLM, the "domestic production from over 63,000 Federal onshore oil and gas wells accounts for 11 percent of the Nation's natural gas supply and five percent of its oil." (BLM, Oil and Gas) Onshore oil and gas resources thus compose an important part of the nation's energy supply.

The BLM's responsibility for managing these resources derives primarily from two historic acts: The Mineral Leasing Act of 1920 and the Mineral Leasing Act for Acquired Lands of 1947, which give the BLM responsibility for oil and natural gas leasing. (MacDonald 6-7, 15-16). While the BLM has been existed since 1946 and has issued mineral leases since its inception, it was not given its official mission until Congress enacted the Federal Land Policy and Management Act of 1976 (FLPMA). (Muhn and Stuart, 1988, p.158) Prior to 1976, the BLM inherited its mission from the two organizations that preceded it, the General Land Office and the Grazing Service. Oil and natural gas leasing at the BLM was and continues to be dictated largely by the two historic acts of 1920 and 1947, but the FLMPA in 1976 underscored the overall mission of the BLM as an agency dedicated to "the principles of multiple use and

[5] In addition to leasing on BLM lands, the BLM also issues leases on lands managed by other federal agencies, primarily the U.S. Forest Service. For the purpose of this analysis, all leases issued on Forest Service lands have been excluded. Future analysis will focus on analyzing potential leasing differences between BLM and Forest Service lands.

[6] Private land leases are not tracked by all states in the sample. For this sample, some leases on private lands have been included where the data did not allow for their exclusion. Future work will focus on the role of mineral leasing on private surface lands.

sustained yield." (Muhn and Stuart, 1988, p.158) In addition, the 1970's began with the passage of the National Environmental Policy Act of 1969 (NEPA), which profoundly influenced the way that the BLM manages its public resources. Consideration of environmental impacts from oil and gas leasing and other activities became a legally dictated process requiring environmental impact statements and additional public influence in the overall land use planning process. (Muhn and Stuart, 1988, p.158)

After the 1970's, the mission of the BLM continued to evolve and was shaped by three other major regulatory changes. The Federal Onshore Oil and Gas Leasing Reform Act of 1987 (FOOGLRA) and the Energy Policy Acts of 1992 and 2005. Of these, the influence of the 1987 Act was by far the strongest. This act amended the leasing act of 1920, which led to changes in the definition of leasing types and gave the Forest Service the authority to dictate leasing on their lands, among other changes. In addition to the executive management of these agencies, the legislative environment has also significantly influenced the DOI and BLM through major legislative changes such as the FLPMA and the National Environmental Policy Act of 1969 (NEPA). Also, appointees to the Secretary of Interior and BLM director posts are approved by the federal legislature. Thus, executive management and Congressional influence have shaped the mission of both the DOI and BLM and altered the course of federal lands management.

The goal and definition of responsible drilling on public lands became a contentious issue in the 1960s and early 1970s with the rise of the conservation movement. (Muhn and Stuart, 1988, p. 104) During this time the BLM "began to transform itself from an agency primarily processing land and mineral applications into an agency actively planning for the nation's future needs." (Muhn and Stuart, 1988, p. 106) This transformation led to more thorough land management planning.

Currently, drilling on federal lands begins with the formation of a land management plan. Under NEPA, there are five phases of land use planning for oil and gas development on federal lands. The first is the creation of a Resource Management Plan (RMP), which designates the areas of land that are available for oil and gas leasing. For areas that are designated as open for development, "the RMP analyzes impacts of reasonably foreseeable development and spells out any stipulations needed to provide extra protection for sensitive resources in the plan area." (BLM, Land Use) The resources requiring protection range from sensitive ecosystem areas to specific wildlife. After a parcel of land is designated as available for leasing in an RMP, the land can be leased.

Since the passage of FOOGLRA in 1987, the leasing process begins with a request from an individual or corporation interested in leasing the land. Then the BLM reviews the request and if the land is not restricted from leasing, opens up the requested parcel of land for a lease sale, abiding by any stipulations for environmental protection. (BLM, Competitive) The leases are sold at competitive auctions that are held quarterly. (BLM, Competitive) The successful bidder gains "the right to explore and drill for, extract, remove, and dispose of deposits of oil and gas found on the lease." (BLM, Competitive) In addition to competitive leases, the BLM also issues noncompetitive leases. Since 1987, noncompetitive leases "may be issued only for parcels that have been offered competitively and failed to receive a bid." (BLM, Noncompetitive) Prior to 1987, there was no requirement that leases be offered at competitive auction prior to noncompetitive purchase. Leases could be requested by producers and sold without entering the competitive auction process. This significant change in leasing type had a strong influence on

the number of competitive leases issued as is shown in Figure 5. The empirical analysis includes an indicator to capture the effects of this significant regulatory change.[7]

The energy policy acts also led to policy changes. Since the energy policy act passed in 1992, both competitive and noncompetitive leases are valid for a minimum of 10 years, and remain valid as long the lease is producing. Prior to the 1992 Act, competitive leases were valid for only five years if not producing. The leases do require that a nominal yearly rental payment is made in addition to the auction price. Currently, the "annual fee is $1.50 per acre for the first five years and $2.00 per acre each year thereafter." (BLM, Competitive) In addition to a rental fee, if oil and gas is produced, royalties are gathered based on production amounts.[8] While leasing is a key step in the oil and natural gas production process, it is important to note that leasing a parcel of land doesn't lead directly to production, because in addition to a lease, a producer is required to have a permit for each well drilled.

The permitting process follows the issuance of a lease. Once a leaseholder applies for a permit the BLM does a site review to determine what if any environmental impacts must be considered. For drilling operations that are expected to have significant environmental impacts, an Environmental Impact Statement (EIS) is required, while for less significant expected impacts a less stringent environmental assessment (EA) is required. The BLM will approve or deny a permit based on whether if meets the requirements of existing environmental regulations. If approved the permit is valid for two years or until the lease expires. (BLM , Environmental) Although permitting is an important land management issue, this project focuses on leasing. The

[7] For this preliminary analysis, the focus is on competitive leases only. After 1987, the influence of politics on leasing is expected to be strongest with competitive leases. These leases represent the point where the BLM determined that the lands would be made available for leasing. After 1987 all noncompetitive leases issued had already been offered for competitive lease by the BLM. Future analyses will focus on the role of both competitive and noncompetitive leasing.

[8] Royalties are collected by the Minerals Management Service.

lease provides the producer with the right to develop the resource, after obtaining a valid permit, and is therefore a critical step in producing oil and gas. Future work will extend this analysis beyond federal leasing to well permitting issues.

Political Influence

> "For the rural areas of the West, where federal lands dominate the landscape, it is not farfetched to say that these lands have a unique political system seen nowhere else in the United States." (Nelson, 2000, p. 143)

For the 11 westernmost states in the contiguous United States approximately 25% of the land is under the management of the BLM (See Table 2).[9] This varies significantly, from 68% in Nevada to only 1% in Washington. Nelson argues that due to this federal ownership, the federal government exerts stronger political influence in these 11 western states than in the United States generally. Specifically he states that there "is a de facto legislature for much of the rural West and a de facto executive branch, both located in Washington." (Nelson, p. 144)

This paper uses separate data sets to examine the role of political influence in the 11 westernmost states.[10] To investigate the potentially disparate role of political influence in these westernmost states, the BLM states, I analyzed them separately. First, I analyzed two sets of states, the BLM states sample and the full sample to determine if the BLM states received relatively more political influence. Second, I analyzed the full sample including an analysis of the interaction between the BLM states and politics. The BLM states in the sample are quite distinct from the remaining states in terms of BLM lands, the additional states generally have

[9] The 11 westernmost states geographically make up a subset of the larger 17-state sample. This 11-state sample includes Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

[10] In this paper, the 11 westernmost states or 11 western states refers to the 11 westernmost states in the contiguous United States.

less than 1% of their lands owned by the BLM.[11] The additional states are geographically adjacent to the first sample and contain a mixture of oil and natural gas producing states such as Texas and Oklahoma and states such as Nebraska that do not have significant resources. This variation also occurs in the 11 state sample, which includes Wyoming and Colorado, both important oil and natural gas producers and states such as Washington and Oregon that have much lower levels of oil and natural gas resources. See Table 1 for information on oil and natural gas resources in each state.

To analyze the political influence on oil and natural gas leasing, I examine several measures of the political environment. Specifically, I analyze the influence of the federal legislature, the party and ideology of the Senate Majority Leader and House Speaker, as well as the party and ideology of relevant committee chairs in the House and Senate. Due to the fact that Congress provides the regulatory framework that the DOI and BLM operate in, I expect that the legislature will influence leasing. In particular, the role of relevant committees is expected to be particularly important given their role in setting the agenda of the Congress since potential legislation must pass out of committee prior to consideration by the full Congress. Also, committees can use their influence to hold agencies and corporations publicly accountable through hearings. I expect committee ideology to have a stronger influence than the legislative leadership.

In addition to legislative influence, I analyze the party and ideology of the President. The President appoints the leadership of the DOI and sets the tone for the political climate in the United States generally. Due to their appointment by the President, there is not a party difference between Presidents and Secretaries of the Interior. For this reason, the President's

[11] To verify the definition of BLM states based on Nelson's argument, I used a Probit model to predict the BLM states based on BLM acres and compared the predicted values with the BLM state categorization. The results indicate a clear distinction between BLM states and the other states in the sample.

party and also ideology are expected to also represent the leadership at the DOI. For each elected official, I expect both party and ideology to be important in influencing leasing.

The conventional wisdom is that in politics, party matters. It is a signal of a politician's stance on a variety of social and economic issues. The notion of pro-business Republicans resisting regulation and pro-regulation Democrats pushing for it is common across policy arenas. Republicans generally have pushed for increased domestic energy development while Democrats have been more reticent to lease, noting the environmental impacts of development. Prior to elections, these divergent party stances on oil and gas leasing are incorporated into each candidate's platform. After election, commitment to a particular party tends to constrain a politician's choices. (Levy, 2004; Cox and McCubbins 1994) For these reasons, party differences among politicians are expected to lead to a clear delineation in leasing outcomes along party lines. Given the platforms of the Republican and Democratic parties, one would expect pro-oil and gas development policies under a Republican administration and reduced oil and gas development under a Democratic administration.

Individual ideology is also expected to play an important role. The ideology measure captures the degree of conservatism of each individual politician based on their voting history. This measure provides a unique measure for each individual and Congress and therefore provides a more detailed measure for each politician than the overall political party measures. Given the variance of this measure over individuals and across time, I expect ideology to be a more accurate measure of the political environment than political party. Prior to a discussion of the data and presentation of the empirical results, the theoretical framework is presented below.

Theoretical Framework

The focus of the theoretical framework is to incorporate political indicators and market measures to determine their influence on leasing. The theoretical framework is based on the standard economic supply and demand model. In this case, however, the supply side is determined primarily by elected officials who establish the amount of land that will be available for leasing based on ideology and party affiliation, while the demand side is determined by profit-maximizing oil and gas producers who base their demand for leases on relevant market factors.

Politics and Federal Leasing: Supply

The federal political actors have three possible avenues of influence on the supply of leases: direct influence on the acres of leases offered, X_i, indirect influence on leasing through regulations on leasing, R_L, and indirect influence on leasing through regulations on resource development post-leasing, R_y.

$$X_i = f(Z, l_i) \quad (1)$$

The acres of leases offered, X_i, is a function of the political affiliation of a set of relevant political actors Z, and the available land area for leasing, l_i.[12] The allocation varies by state, i, and depends on the amount of BLM lands available for leasing in each state. Specifically, l_i is a continuous measure from 0 to L_i of the acres of BLM land available for leasing in each state.

In addition to the direct influence of Z on X_i, Z influences leasing through regulations such that

$$h(Z) = (R_L, R_y) \quad (2)$$

[12] Z is not indexed by state in this model because the political actors are elected at the federal level. Future extensions will focus on the role of the state delegations in the legislature.

Specifically, for both leasing and development regulations it is expected that decreases in *Z* will lead to additional regulations. A more liberal ideology is expected to lead to additional regulation.[13] (h'(Z) < 0 over $-1 \leq Z \leq 1$)

Z, political affiliation, takes one of two forms.

$$-1 \leq Z \leq 1$$

OR (3)

Z = 0 if Democrat and 1 if Republican

The first form of *Z* is a variable distributed between -1 and 1 where -1 is liberal and 1 is conservative.[14] The second measurement of *Z* is a binary variable indicating political party affiliation. The continuous variable indicates a politician's ideology based on the voting record in each session of Congress and therefore can shift over time for each individual. Party affiliation is not time dependent.

Further, based on the theory of political influence proposed by Nelson (2000), I expect that the 11 westernmost states, BLM states, will experience a disparately large influence from the elected political leadership as compared with the full 16-state sample due to the relatively large allotment of BLM lands in those states.

Oil and Gas Producers: Demand

Firms use the existing level of technology to produce the profit maximizing level of oil and natural gas. For the *j-th* producer:

$$q_j = g(x_j, y_j) \quad (4)$$

[13] In the theoretical model, regulations are defined to include environmental, health, and safety regulations that add to operating costs and therefore lead to decreases in leasing. The converse of these types of regulations are regulations that are designed to lead to increased competitive leasing, such as FOOGLRA. I expect regulations that are designed to increase leasing will do so and will be more prominent in Republican regimes.

[14] See Carroll et al, 2010, for a complete description of the construction of the ideology scores.

The production of oil and natural gas, $q_{j,}$ is determined by a uniform production function that varies across firms by the acres of leases that it has, x_j, and its input choice for the second composite input, y_j.[15] For the j-th profit maximizing producer:

$$\pi_j = pg(x_j, y_j) - (w_L + R_L)x_j + \ +(w_y + R_y)y_j \qquad (5)$$

Input costs for leasing and development, w_L and w_y, are increasing with increasing regulation. The leases are allocated in such a way that producer j acquires some acres of leases $J \leq N$, where N is the total acres of leases supplied. Solving the standard profit maximizing model leads to some important implications regarding the role of input costs and prices. It can be shown that:

Leasing: $\frac{\partial x_j}{\partial w_L} < 0, while\ \frac{\partial x_j}{\partial w_y} <> 0,\ \frac{\partial x_j}{\partial R_L} < 0, while\ \frac{\partial x_j}{\partial R_y} <> 0$

Composite development good: $\frac{\partial y_j}{\partial w_y} < 0, while\ \frac{\partial y_j}{\partial w_L} <> 0,\quad \frac{\partial y_j}{\partial R_y} < 0, while\ \frac{\partial y_j}{\partial R_L} <> 0$

Leasing volume will decrease as leasing costs increase and as regulations for leasing increase. The influence of development costs and development regulations is not clear in this case. A similar case is found for the composite development good. In addition, it can be shown that in terms of prices, an increase in oil and/or natural gas price will lead to either an increase in leasing or an increase in development or both, but the specific influence is not known given the standard profit maximization assumptions. The next section presents the data set that I constructed to test these theoretical implications, followed by the empirical results.

Data

To analyze this research question, I collected data from a variety of sources and constructed a matrix of market and political variables to determine what factors were influencing oil and natural gas leasing across a 17-state sample over a 31 year time frame from 1978 through

[15] The second composite good represents all other inputs into production including development inputs such as drilling capital and labor.

2008.[16,17] The states in the sample and the percentage of BLM lands in each state are included in Table 2. Lease information was collected from the BLM LR2000 database which contains all leasing activity tracked by the BLM. Specifically, the "LR2000 provides reports on BLM land and mineral use authorizations for oil, gas, and geothermal leasing, rights-of-ways, coal and other mineral development, land and mineral title, mining claims, withdrawals, classifications, and more on federal lands or on federal mineral estate." (BLM, LR2000)

For this analysis, I focus only on acres of competitive oil and natural gas leases that were issued by the BLM on BLM land. Since the 1987 regulatory change, all leases must first be issued competitively and are only available for noncompetitive lease if they are not leased at the competitive auction. Since the initial leasing decision is made by the BLM in the competitive leasing stage, I expect the political influence to be most dominant when competitive leases are issued as opposed to noncompetitive lease issuance.[18]

Figures 3 and 4 present the numbers and acres of competitive leases issued by each state over the sample time frame. The figures demonstrate the wide variation in both leasing volume and timing. Figure 5 shows the total number of competitive leases and acres of competitive leases issued by the BLM for these 17 states by year. There is a marked increase in 1988 due to the regulatory change in the definition of competitive and noncompetitive leases in 1987. I include a post-1987 indicator to address this trend in the leasing data.[19]

Along with the measure of the acres of competitive leases issued, I also use the acres of BLM lands contained in each of the Western states to construct the dependent variable. I use this

[16] The initial sample included the 17 western states, but Kansas is excluded because there are no BLM lands in Kansas according to the 2008 public land statistics. The 2008 public land statistics are based on information collected in 1999 and 2007.
[17] The time frame is dependent on the control variables that are included. Oil futures prices are available only back to 1983, natural gas futures prices are available only back to 1994. Well costs are available only through 2007.
[18] See Table 8 for an analysis and using both competitive and non-competitive leases
[19] I also include indicators for post-1992 and post-2005 to capture the influence of the Energy Policy Acts.

information to construct a measure of the acres of competitive leases issued per acre of BLM lands. As I discussed in the theoretical framework, I expect the available land for leasing in each state to influence the number and acres of available leases. By including a measure for leasing potential, the disparate influence of available land for leasing is included as a direct control.[20]

In addition to the dependent variable, I constructed several market variables. The market data include information on prices and futures prices for both oil and natural gas, that I collected from the Energy Information Association (EIA).[21] For oil price I use real first purchase oil price, which is defined by the EIA as the price paid during the initial transaction involving an equity transfer of the crude oil at the lease site. (EIA, Oil Price) For natural gas, I use natural gas real commercial price, which is available for all sample states over this time frame.[22] For both sets of prices I construct a three-year moving average of price rather than current or lagged prices to provide a more inclusive measure of the influence of previous prices on leasing. In addition to current prices, I also use futures prices as an indicator of expected prices for producers.[23] Futures prices are reported by the EIA weekly, from this information I constructed an annual average for both oil and natural gas.[24] Lastly, I constructed a measure of the annual real well costs for the United States based on information provided by the EIA.[25] Well costs, measured in thousands of dollars per well drilled, provide a measure of the direct costs that producers face in extracting resources.

[20] The acres of BLM lands is a coarse measure of leasing potential since there are areas of BLM which are not available for leasing due to wilderness protection areas, etc. Also, this is not a measure of the geologic potential of each state for oil and natural gas production, to control for within state differences, I use a random effects model. A complete discussion of the empirical strategy is included in the next section.
[21] All prices and well costs are real prices, in chained (2000) U.S. dollars, calculated by using gross domestic product price deflators from the EIA.
[22] The EIA also tracks a measure of the NG wellhead price, but data is not available for all states so I used commercial price.
[23] I have data on oil futures prices back to 1983, while I have natural gas futures prices only back to 1994. Given that the two prices are correlated at 0.87, I use only oil futures prices in the results presented.
[24] There are four futures contracts reported for delivery one, two, three, and four months in the future. The futures prices are highly correlated and only contract one is used in the analysis.
[25] See Figure 7 which shows the variation in futures prices and well costs over time.

In addition to market factors, the key variables of interest in this analysis are the political indicators. The political party indicators are constructed as binary measures for the chair of the Senate Natural Resource Committee (SNRC), chair of the Senate Environment and Public Works Committee (SEPW), chair of the Senate Appropriations Committee (SAC), the Senate Majority Leader, and the President of the United States.[26] Additional House measures will be included subsequently. Due to a high degree of correlation between and within the House and Senate, the measures are analyzed separately. The continuous ideology measure provides a liberal-conservative measure based on voting history for each legislator and the president.[27] (Carroll et al, 2010) The indicators change at most every two years, by Congress, across individuals for the sample time frame.[28] In addition, the political party for the committee chairs, Senate Majority Leader, and U.S. President are analyzed. These measures do not change for individuals in this sample and therefore vary over time only. The empirical results are presented below.

Methodology - Empirical Framework

Based on the theoretical framework, the empirical analysis is focused on measuring the federal legislative and executive influence on the acres of natural gas and oil leases issued in each state and year by the BLM on BLM lands after controlling for market factors. The empirical specification is a state-year panel from 1978 through 2008 for a 16-state sample. In addition, I analyzed the 11 westernmost states, the BLM states, separately. These panels allow for the identification of significant changes in the political variables, which change at most biannually with each Congress. Given the distribution of the dependent variable, which is censored at zero with approximately 30 percent of the observations at zero, a random effects

[26] These committees were listed as a subset of the relevant committees with influence over the DOI by the Office of Congressional and Legislative Affairs. (DOI, Committees)
[27] The ideology scores that I used are the DW-Nominate scores. These scores estimate the conservative-liberal position of each legislator using roll call voting records. The scores are scaled to range generally between -1, liberal and 1, conservative.
[28] Figure 8 shows the variation in the ideology scores over time.

Tobit model was used.[29,30,31] (See Figure 6 for graphs of the dependent variable by state.) The specification of the model is:

$$Y_{it} = \alpha + \beta_1 Z_t + \beta_2 p_{it} + \beta_4 Wy_t + \beta_5 Time\ Trend_{it} + \beta_6 R_t + \beta_7 Post1987\ Indicator + \beta_7 Post1992\ Indicator + \beta_7 Post2005\ Indicator + \varepsilon_{it}$$

$$\text{where } Y \sim (0, \mathbf{¥})$$
$$\text{and } \varepsilon_{it} = \gamma_i + \mu_{it}$$

where i = state and t = year. Y_{it} represents the annual state acres of oil and natural gas competitive leases issued on BLM lands by the BLM per BLM acres in each state. Also, it should be noted that the acres of BLM lands in each state is not a precise measure of available land for leasing, which is not tracked by the BLM. Instead, the measure provides an upper bound on the number of acres that can potentially be leased by the BLM. Z_t represents a set of federal executive and legislative political party and ideology indicators. Resource Price, p_{it}, represents either a three year moving average of annual real state natural gas or oil prices, or futures prices for oil or natural gas[32]. Well costs contains direct well costs that change over time only. Finally, Time Trend is a state-year indicator to control for overall trends in leasing.

The analysis presented below begins with a discussion of the role of legislative committees, followed by an analysis of the influence of the Senate Majority Leader, and then the effect of the President's office on leasing outcomes.

[29] The Tobit model provides measures of both the probability that leasing will occur and the expected number of acres leased per acre of BLM land given that leasing has occurred.
[30] I include a linear random effects regression model in Table 10 for comparison.
[31] The random effects Tobit model was tested against a pooled Tobit regression specification and was found to provide a better fit. Fixed effects Tobit was also considered, however, the fixed effects Tobit specification is known to be biased. For robustness, a Tobit was run with state indicator variables, the results were consistent, generally leading to an increase in statistical significance for the political indicators. In addition, I ran linear fixed effects and random effects regressions and used a Hausman test to determine if the more efficient random effects model was consistent with the fixed effects model. The results indicate that the linear random effects model is consistent.
[32] Futures prices for natural gas are available from 1994 through 2008, while futures prices for oil are available back to 1983. Given the high degree of correlation between these variables. .9. Oil prices are used as an the indicator of future resource prices.

BLM States – The role of the U.S. Senate and Ideology

The regressions in Table 4 highlight the differences between the two sample groups using the ideology score for the Senate Natural Resources Committee Chair (SNRC) as the political variable of interest. Column 1 presents results for the full 16-state sample, Column 2 for the BLM states. The positive sign of the coefficient indicates that a more conservative committee chair leads to additional leasing, which confirms my hypotheses. Specifically, the results in Table 4a show that, for the full sample, a one standard deviation increase in the ideology score, from more moderate to more conservative results in an approximately six percentage point increase in the probability of leasing. In addition, given that leasing has occurred, a one standard deviation increase in the ideology score indicator, moving from a more moderate to a more conservative ideology, increases the expected number of acres leased per BLM lands by 0.3 percentage points, a small impact given that the mean acres leased per acre of BLM lands is .011. These findings support the hypothesis that increases in conservatism in relevant political actors increase the probability of leasing.[33] However, once leasing has occurred, political ideology has only a small influence on acres leased. This margin of influence indicates that the dominant method of influence of the elected federal political actors is in determining whether or not a state leases, however, after leasing has occurred, the federal political framework does not have an economically significant influence on the amount of BLM land that is leased.[34] This indicates that in years in which a state is consistently leasing the elected federal influence is diminished

[33] As a robustness check, given that the margin of influence for the political actors is largely on the probability of leasing, I excluded states with minimal resources from the analysis to determine if the significance of the coefficients on the political indicators was due to these states. The states excluded are Idaho, Nebraska, Oregon, and Washington. The results excluding these states were consistent, but the influence was diminished somewhat. The ideology coefficient on the SNRC was positive and statistically significant at almost the ten percent level for the twelve state sample. The coefficient on the political party of the legislative leadership measure was consistently positive and statistically significant at the ten percent level. The magnitude of both coefficients was smaller. The coefficient on the party of the legislative leadership decreased from 0.019 to approximately 0.012.

compared with years in which the state is on the margin, making a leasing decision.[35] This lesser influence on the number of acres leased leaves a large role for bureaucrats to use their discretion to dictate leasing outcomes.

Counter to the BLM states hypothesis, the findings in Tables 4 and 4a indicate that the coefficient on SNRC is statistically significant and positive for the full sample, but is not significant if the sample is restricted to the BLM states.[36,37] According to this hypothesis, the unique political environment in the west as defined by Nelson (2000) should lead to stronger federal influence in states that have a higher percentage of federal ownership. Instead, in the case of the SNRC chair the federal political influence is mitigated if only the BLM states are analyzed.[38] For the SNRC chair in the BLM states sample, the political influence is diminished to ten percentage points and the statistical significance of the coefficient is lost. These results are not supported by the analysis of the interaction of politics and BLM states presented in Table 9. The comparison of BLM and non-BLM states indicates that the two groups are not statistically significantly different, which also does not support the BLM states hypothesis. The findings in Table 9 do support the previous conclusions regarding the statistically significant influence of politics and the affect of conservative leadership, which leads to increased leasing.

Elected political influence on leasing outcomes is demonstrated across several political measures and sample specifications. This finding supports the existing literature (i.e. Weingast

[35] This margin of influence may also indicate that states that have significant resources and are consistently leasing have diminished political influence. As a robustness check, I analyzed the influence of the interaction of political indicators and high resource states. The results indicated that high resource states did receive diminished political influence in some cases, for the SAC and SEPW committees, but the finding was not consistent across the other political indicators.

[36] This pattern is matched by the Senate Majority Leader as is shown in Table 7.

[37] As a robustness check, in Table 9, I analyzed the full 16-state sample and included an interaction term to determine if there was a statistically significant difference in the influence of politics between the BLM and non-BLM states. The findings indicate that the interaction variable is not statistically significant indicating that the influence of politics is the same across both sample groups. The effect of politics remains positive and statistically significant.

[38] This is supported by an analysis of the interactions between the political indicator and BLM lands presented in column 1 of Table 9.

and Moran, 1983) that finds that despite the discretion that bureaucrats enjoy and the potential for principal-agent issues in managing bureaucracies, the elected political framework that the BLM and DOI operate in does influence leasing outcomes.[39] In addition, the statistically significant role of the committee chair is confirmed for the SNRC and two additional committees, supporting the work of Shepsle and Weingast (1987) who argue for a strong role for committees in determining legislative outcomes. The unexpected result regarding BLM states is consistent across all legislative political variables, as I discuss below.

To further investigate political influence in Tables 5a and 5b, I analyzed the influence of the Senate Appropriations Committee Chair (SAC). The coefficient on SAC remains consistently positive and statistically significant across both the full sample and the BLM states sample. For the full 16-state sample the marginal effect indicates that for a one standard deviation increase in the SAC chair ideology score indicator, a move from a more moderate to a more conservative ideology, the probability of leasing increases by four percentage points. For the 11-state sample the increase is approximately five percentage points.[40] The findings in Table 9 support these findings regarding the statistically significant influence of politics and the positive affect of conservative leadership, leading to increased leasing. The results regarding the BLM states hypothesis, however, are once again not supported by the analysis of the interaction of politics and BLM states presented in Table 9. The comparison of BLM and non-BLM states indicates that the two groups are not statistically significantly different.

[39] To examine the separate influence of environmental special interest groups, the percentage of the state population that is a member of the Sierra Club was also analyzed. The variable was not consistently statistically significant. Interestingly, it was positive which is counter to my expectation that increasing influence from environmental groups would lead to decreases in leasing. The coefficients on political and market variables remained consistent with the results presented. Future work will focus on examining the role of environmental special interest groups in influencing leasing outcomes.

[40] In the full sample, given that leasing has occurred, a one standard deviation increase in the ideology score indicator, moving from a more moderate to a more conservative ideology, increases the expected number of acres leased per acre of BLM land by .2 percentage points, again a small impact.

As a final part of the committee ideology analysis, I analyzed the Senate Environment and Public Works Committee (SEPW). Tables 5a and 5b show that the committee's political influence is strongest for the BLM states and not statistically significant for the full sample. The magnitude of the influence decreases by approximately half if the full sample is analyzed. For the 11-state sample the results indicate that for a one standard deviation increase in the SEPW chair ideology score indicator, moving from a more moderate to a more conservative ideology, there is a approximately six percentage point increase in the probability of leasing.[41] These findings are not robust to the analysis of BLM and non-BLM states that is presented in Table 9, however. The findings in Table 9 indicate that the political influence on the two groups is not statistically significantly different.

Overall, my findings regarding legislative influence support the existing literature that committee influence is important in determining bureaucratic outcomes, in this case oil and natural gas leasing on BLM lands. Secondly, the sign of the coefficient and its consistently positive influence supports my hypothesis that more conservative leadership leads to additional leasing. Also, the significance of the coefficient supports the work of Poole and Rosenthal (1991) etc., who argue that political ideology matters in legislative outcomes. In addition, the margin of influence across all committees is largely focused on increasing the probability of leasing rather than on increasing the number of acres leased. This indicates that the dominant role of the political framework is in increasing the probability that leasing occurs. Lastly, there is a not a clear distinction between the role of politics in BLM states and the other states, indicating the for the Senate Committee Chairs, the BLM states hypothesis does not hold.

[41] In the BLM states sample, given that leasing has occurred, a one standard deviation increase in the ideology score indicator, moving from a more moderate to a more conservative ideology, increases the expected number of acres leased per acre of BLM lands by 0.2 percentage points, again a small impact.

To investigate the role of the federal legislature further, I have also examined the influence of the Senate Majority Leader. For this political variable the findings in Table 7 indicate that the role of politics is mitigated rather than enhanced in BLM states. For the Senate Majority Leader, the magnitude of the influence on the probability of leasing for a one standard deviation increase in the ideology score indicator differs by only one percentage point between the 16-state and BLM states samples. It decreases from approximately five percentage points in the 16-state sample to four statistically insignificant percentage points in the BLM states sample. The influence is diminished in the BLM states in direct contrast with the BLM states hypothesis. These findings are robust to the analysis of BLM and non-BLM states that is presented in Table 9. The results in Table 9 show that BLM states have significantly less political influence than non-BLM states. To further explore the role of the Senate Committees and Senate Majority Leader, I have also analyzed the political party of the relevant actors.

BLM States – The role of the U.S. Senate and Political Party

I expected that the role of ideology would prove to be more significant because the measure describes in more detail the political identity of each individual. This proved to be particularly true when identifying the potentially disparate influence of the Senate Committee Chairs and Senate Majority Leader. Over this time frame, the political party changes were identical so it is not possible to separately identify the influence of the political party of the committee chairs and Senate Majority Leader on leasing. In Table 6, I present the results of the analysis of the influence of the political party of the Senate leaders. The findings indicate that more conservative leadership leads to additional leasing.

The results for the party of the Senate Majority Leader follow the pattern of the Senate Majority Leader's ideology in that for the BLM states sample there is not a statistically

significant influence from the leadership's political party, while there is in the full sample. In the full sample, a one unit increase in the indicator, from Democrat to Republican, leads to an approximately 11 percentage point increase in the probability of leasing. For the BLM states sample, a one unit increase leads to a statistically insignificant eight percentage point increase. While the results are higher for the full sample, in contrast with the BLM states hypothesis, they do demonstrate the continued strength of the three of the previous results; the significant role of committee chairs, the positive influence of more conservative leadership on leasing, and the margin on which the political influence operates, namely in increasing the probability of leasing. Further, these results support the existing literature that argues for the importance of parties in determining political outcomes, in this case not simply Congressional behavior, but bureaucratic outcomes as well. To expand the analysis beyond the federal legislature, I also examined the role of the executive branch.

BLM States – The role of the U.S. President and Ideology

Results for the ideology score of the President are presented in Table 7. The findings indicate that like the SAC and SEPW the role of the President is more dominant in the BLM states. The results for the U.S. President, however, are robust to the analysis presented in Table 9 comparing BLM states and non-BLM states.[42] Table 7 shows once again that more conservative leadership leads to additional leasing. The magnitude of the influence of the President is five percentage points higher in the BLM states sample, a marked increase. In the BLM states sample, a one standard deviation increase in the political indicator, moving from a more moderate to a more conservative ideology, leads to an approximately seven percentage

[42] The initial negative sign on the U.S. President in Table 9 is not due to the inclusion of the interaction terms, but the inclusion of the well cost variable. This negative coefficient is unexpected, but significant at only the 10 percent level. It indicates that for non-BLM states more liberal executive leadership leads to additional leasing. The negative sign is not robust to other specifications.

point increase in the probability of leasing. For the full sample, the increase is only two statistically insignificant percentage points. These findings support the BLM states hypothesis and demonstrate that at the executive level, the amount of federal lands in a state do matter. The pattern of results is consistent if the political party of the U.S. President is analyzed. The political influence is positive and statistically significant for the BLM states, but not for the full sample. (See Table 6)[43]

In addition to demonstrating Presidential influence on leasing, the results are also an indicator of the influence of the DOI and the BLM. Through the appointment of the Secretary of the Interior, the President influences the political environment at the DOI. Appointments of BLM directors extend this influence to the BLM. Therefore, the more dominant influence of the executive office in the BLM states is an indication of a stronger bureaucratic influence as well.

Regulatory Framework

To investigate the role of regulation on leasing, three time period indicators were used to represent the three periods of significant regulatory change. The year 1987 proved to be of particular importance in influencing the acres of competitive leases that were issued. This is not surprising given that the regulation required that all leases be issued competitively prior to being offered as non-competitive leases. This regulatory change was the largest in terms of the number of changes and additions to the code of federal register for competitive leasing and dictated that all leases were required to be issued competitively prior to their issuance as noncompetitive leases.[44] The graphically demonstrated increase in leases that occurred in part due to this regulation, see Figure 5, was reinforced by the empirical analysis. There is a consistently

[43] The magnitude of the coefficient indicates that for a one unit increase in the political party indicator, from Democrat to Republican, the probability of leasing increases by 17 percentage points.
[44] "The Code of Federal Regulations (CFR) is the codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal Government." (CFR, Main Page)

positive and statistically significant increase in acres of competitive leases issued per BLM acre in 1987. In Table 5a, the results indicate that after the regulation was put in place there was between a 15 and 20 percentage point increase in the probability of competitive leasing. In addition, Table 5b demonstrates that given that competitive leasing has occurred, after the regulation was put in place, the expected number of acres leased per acre of BLM lands increased by between approximately 0.7 and one percentage points. Clearly, this was a significant regulatory intervention in terms of competitive lease issuance. The subsequent Energy Policy Acts in 1992 and 2005 had much less influence on leasing. The 2005 Act was in some cases significant, but not consistently. Also, the 1992 Act was significant only when analyzing the role of the President.

In all cases where regulatory changes influenced leasing, the effect was positive. This finding seems to be counter to the hypothesis that regulation increases leasing costs and therefore decreases leasing. It should be noted however that particularly in the case of the 1987 regulation, it was designed to increase competitive leasing and so its effect on leasing costs was muted by the design of the regulation. If noncompetitive leases are analyzed, the effect of the 1987 regulation on leasing is negative. Also, importantly, if all leases are analyzed together, the effect of the 1987 regulation was also negative. Table 8 shows that after the regulation was put in place there was an approximately 25 percentage point decrease in the probability of leasing for the full sample. This supports the hypothesis that for leasing generally, increases in regulation do negatively influence leasing. The 1992 and 2005 Acts are not significant, however.

Prices and Market Factors

In addition to political ideology measures, Table 4 shows that price and well costs are not

significant for both samples.[45] If the joint significance of well costs and futures prices are analyzed they are also found to be jointly insignificant.[46,47] The lack of significance in the price results, both historical prices and futures prices, could be due to the fact that producers are basing their leasing decisions on prices much farther in the future. The futures prices used in the analysis are based on months in the future while leases issued currently will not be producing until approximately one to three years in the future. Also, as noted by Paddock, Siegel, and Smith (1988), the process of production has a high level of uncertainty in market factors other than resource price. The authors argue that across the three stages of production; exploration, development, and extraction, there are several factors that affect the valuation of a lease. In addition to uncertainty in future resource prices, these include uncertainty in resources, development and exploration costs, expected extraction rates, and expected tax structures. (Paddock, Siegel, and Smith 1988, p.483-485) In the future, other market factors may be analyzed to investigate the role of the market further, however, for this paper the focus is on the political determinants.

In addition to price and well cost, the state time trend is generally positive but proves to be consistently statistically insignificant across samples. The linear time trend was included to measure the overall influence of each year in the sample. It also serves as an indicator of technological progress.[48] In the future, alternative measures of technological progress will be utilized to more fully examine the role that technological changes have had on leasing.

[45] The findings regarding well costs are consistently insignificant across specifications using all political variables.
[46] The findings are consistent across the three-year moving average of oil prices and natural gas prices as well. The price and well costs measures are not jointly significant.
[47] If prices and well costs are tested in conjunction with the 2005 indicator variable the three measures are jointly significant. The regulatory indicator is a coarse measure with which to identify regulatory change. It also identifies a time period of significant price and leasing increases. Although the price, well cost, and the regulatory measure are not individually or pair wise significant. The joint significance and positive sign of the coefficient does indicate that the market factors are influencing leasing.
[48] The results were consistent if a linear time trend across states was used. Also, the findings regarding political influence are not significantly affected if a year random effects model is used.

Lastly, ρ, a measure of the percentage of the total variation in acres of competitive leases issued per acre of BLM lands that is due to persistent state characteristics is markedly different between the two samples. In the 16-state sample, the percentage of variation in leasing that is due to persistent state characteristics is approximately 40 percent while for the 11-state sample it is approximately 30 percent. This indicates that the 16-state sample is more heterogeneous than the 11-state sample. This finding supports the hypothesis that the BLM states are more homogeneous.[49] Since the federal political influence is not consistently significantly different in the BLM states, however, this finding does not support the hypothesis that the BLM states are more homogeneous due to a unique federal political environment.

Conclusions and Future Work

The results indicate that the role of federal elected political influence in determining oil and natural gas leasing outcomes on BLM lands is as hypothesized in three ways, but the findings are mixed with regards to the dominant role of politics that I expected in the BLM states. First, the ideology and party of the committee chairs, Senate Majority Leader, and U.S. President did influence leasing, demonstrating that the elected political framework does affect bureaucratic outcomes at the BLM. The influential role of the elected political leadership supports the existing literature which argues that bureaucrats are constrained in their behavior by the political environment in which they operate (i.e. Weingast and Moran, 1983). Additionally, the findings support arguments put forward in other papers regarding the important role that political party, ideology, and committee membership play in influencing outcomes, in this case bureaucratic rather than Congressional outcomes. (Levy, 2004; Poole and Rosenthal, 1991; Shepsle and Weingast, 1987) Second, this influence was positive across all measures indicating

[49] The percentage of variation due to persistent state affects also captures other economic, geographic, and political characteristics of each state.

that more conservative elected political influence does lead to increases in leasing. Lastly, the margin of influence was the same. Elected political influence affects the probability of leasing and has little influence on the number of acres leased per acre of BLM lands.

The expected dominance of the federal political influence for the BLM states relative to the full 16 state sample was robustly demonstrated for the office of the U.S. President, but it was not found in the legislative leadership. This indicates that the expected role of the federal government in the westernmost states in the United States is not consistent across political offices. The argument put forward by Nelson (2000) regarding the unique political environment in the west is not supported in terms of oil and gas leasing at the legislative level but it is at the executive level. Given the appointment power of the U.S. President over the DOI Secretary and BLM Director, the dominant role of the political influence of the U.S. President in the BLM states indicates that bureaucratic influence is stronger in these states as well.

The market influence, particularly as measured in terms of short term futures prices and historic prices was not significant. The lack of significance in the price results, both historical prices and futures prices, could be due to the fact that producers are basing their leasing decisions on prices much farther in the future. As Paddock, Siegel, and Smith (1988) noted, the three stages of the development process have uncertainties in various factors including expected price. Future work will focus on identifying additional futures prices that may more strongly influence the leasing decision. Finally, regulation, particularly the passage of FOOGLRA in 1987, played a key role in influencing competitive leasing outcomes and leasing outcomes generally.

Forthcoming work will examine in more detail the role of state delegations and the potentially disparate influence of committee leadership based on the state of origin of the leader.

In the future I plan to investigate further the role of the DOI and BLM and their influence on leasing outcomes in the West. It is important to note that the political findings describe the influence of elected political actors and not all political influence. The small influence on the number of acres leased leaves a large role for bureaucrats to use their discretion to dictate leasing outcomes.[50] A more detailed analysis of the bureaucratic influence on leasing is left for future work.

[50] The pseudo R-squared results indicate that elected political and market influence explain between 4 and 8 percent of the overall variation in acres leased per acre of BLM lands. I expect that some of the remaining variation in leasing is due to bureaucratic shifts over time.

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Tables and Figures

Table 1: Oil and Gas Resources by State

State	Oil Resources	Natural Gas Resources
Arizona	• Minimal oil resources	• Minimal natural gas resources
California	• Third largest crude oil reserves in the U.S. • 10% of total U.S. annual production on average	• Less than 2% of total U.S. production
Colorado	• 3 of the top 100 oil fields in the U.S. • 1% of total U.S. annual production on average	• 10 of the top 100 natural gas fields in the U.S. • 5% of total U.S. annual production on average
Idaho	• No oil resources	• No natural gas resources
Kansas	• 2% of total U.S. annual production on average	• One of the top producing natural gas fields in the U.S.
Montana	• 2 of the top 100 oil fields in the U.S. • 2% of total U.S. annual production on average	• Minimal production
Nebraska	• Minimal oil resources	• Minimal natural gas resources
Nevada	• Minimal oil resources	• Minimal natural gas resources
New Mexico	• 3% of total U.S. annual production on average	• 10% of total U.S. annual production on average
North Dakota	• 2% of total U.S. annual production on average	• 1% of total U.S. annual production on average
Oklahoma	• 2 of the top 100 oil fields in the U.S. • 3% of total U.S. annual production on average	• 12 of the top 100 natural gas fields in the U.S. • 10% of total U.S. annual production on average
Oregon	• Minimal oil resources	• No natural gas resources
South Dakota	• Minimal oil resources	• Minimal natural gas resources
Texas	• 20 of the top 100 oil fields in the U.S. • 1/4 of U.S. oil reserves	• 1/3 of U.S. natural gas reserves • 1/3 of U.S. natural gas annual production on average
Utah	• 4 of the top 100 oil fields in the U.S. • 1% of total U.S. annual production on average	• 2 of the top 100 natural gas fields in the U.S. • 2% of total U.S. annual production on average
Washington	• No oil resources	• No natural gas resources
Wyoming	• 3% of total U.S. annual production on average	• 10% of total U.S. annual production on average

Source: EIA, State Energy Profiles

Table 2: Federal Mineral Estate and BLM Lands by State

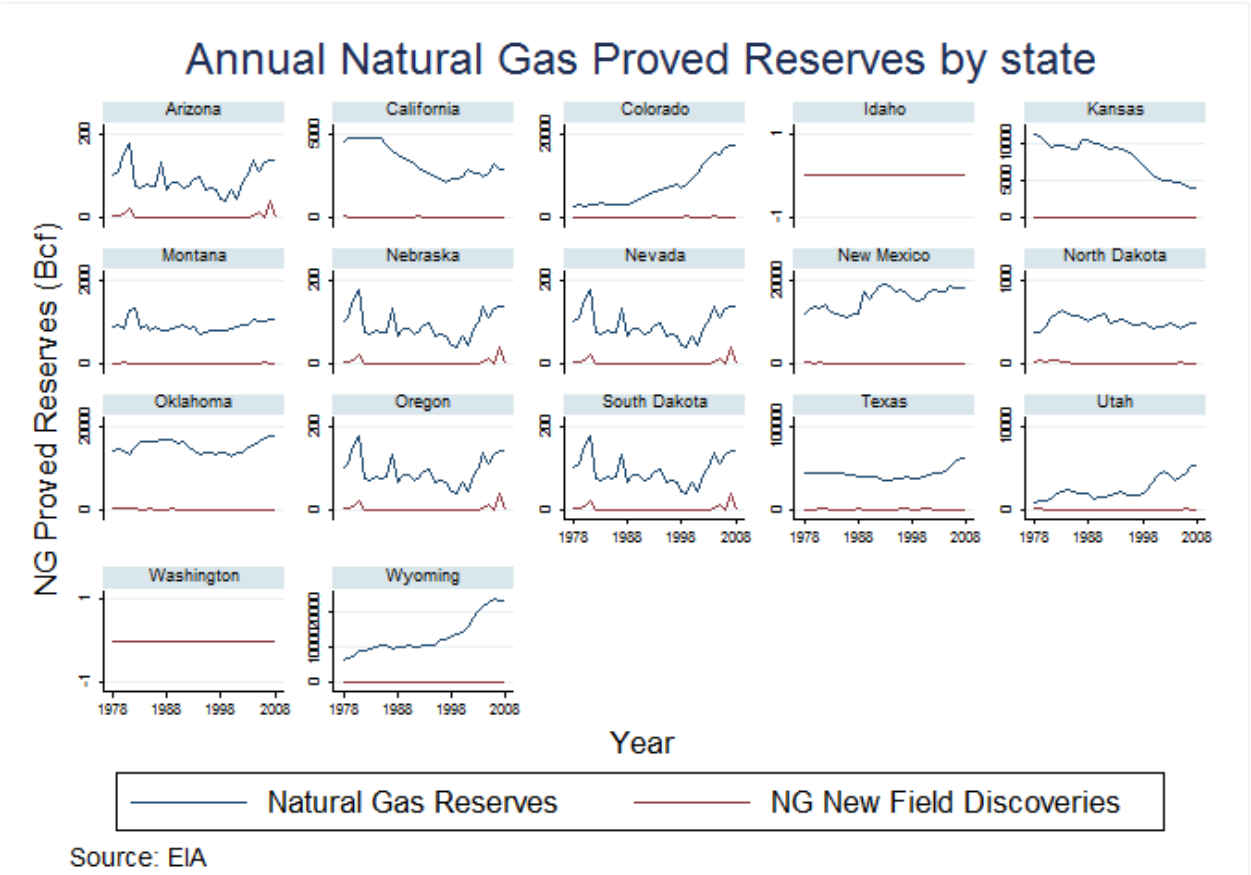
State	**Land Total** (Million Acres)	**Federal Minerals** (Million Acres)	**BLM Public Lands**[a] (Million Acres)	**Percentage BLM Lands**
Arizona	72.69	35.8	12.2	16.78%
California	100.21	47.5	15.3	15.27%
Colorado	66.49	29	8.3	12.48%
Idaho	52.93	36.5	11.6	21.92%
Kansas	52.51	0.8	0	0.00%
Montana	93.27	37.8	7.9	8.47%
Nebraska	49.03	0.7	0.1	0.20%
Nevada	70.26	58.7	47.8	68.03%
New Mexico	77.77	36	13.4	17.23%
North Dakota	44.45	5.6	0.1	0.22%
Oklahoma	44.09	2.3	0.1	0.23%
Oregon	61.6	33.9	16.1	26.14%
South Dakota	48.88	3.7	0.2	0.41%
Texas	168.22	4.5	0.1	0.06%
Utah	52.7	35.2	22.8	43.26%
Washington	42.69	12.5	0.4	0.94%
Wyoming	62.34	41.6	18.3	29.36%

a: "On these public lands, the BLM manages both surface resources and subsurface minerals."
Source: BLM, Public Land Statistics

Table 3: BLM States

State	BLM States
Nevada	1
Utah	1
Wyoming	1
Oregon	1
Idaho	1
New Mexico	1
Arizona	1
California	1
Colorado	1
Montana	1
Washington	0
South Dakota	0
Oklahoma	0
North Dakota	0
Nebraska	0
Texas	0
Kansas	0

Figure 1: Natural Gas Reserves

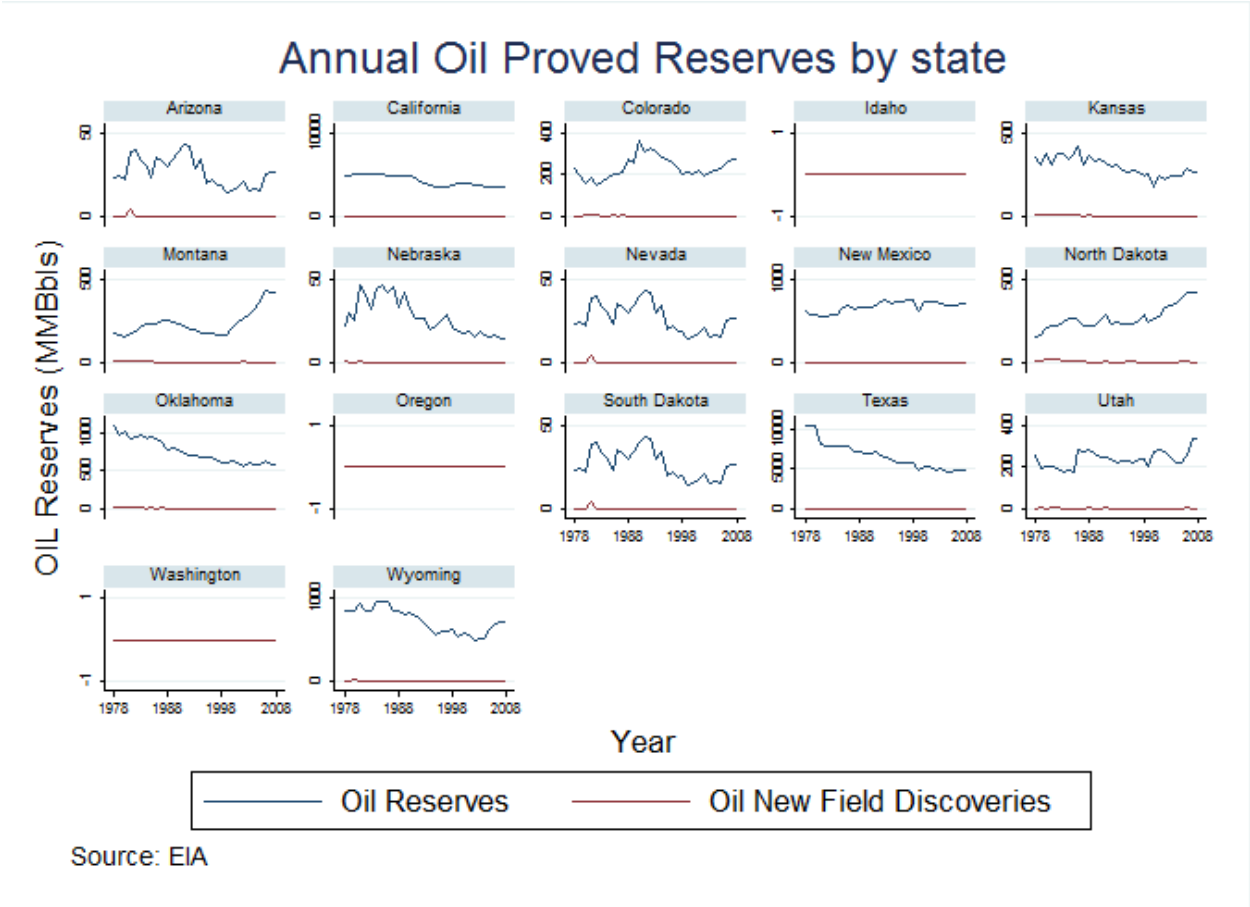


Note: In both Figure 1 above and Figure 2 below, proved reserves and new field discoveries are included. Generally, reserves can broken down into several categories based on the feasibility of recovering the reserves. (Natural Gas Resource, Natural Gas.org) The Energy Information Association (EIA), the statistical arm of the Department of Energy, tracks proved reserves by state[51], which "are those volumes of oil and natural gas that geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions.." [52] (EIA, Reserves) In addition to proved reserves changes over the 30 year sample, the figures also contains the amount of new field discoveries. New field discoveries are infrequent events in federal onshore leasing as compared with the consistent shifts in total proved reserves over the last 30 years. In terms of natural gas reserves two states lack existing proved reserves over this time frame Idaho and Washington. There are included in the sample because they did have some lease issuance.

[51] Operators are required to estimate proved reserves for each field annually and the EIA tracks additions and subtractions to reserves annually by state. (EIA, Reserves)

[52] For this analysis, I excluded reserves and production data for the federal outer continental shelf. Offshore leasing is managed by the MMS and a discussion of offshore leasing is left for future analysis.

Figure 2: Oil Reserves



Note: Idaho and Washington also lack oil reserves and Oregon joins this group for oil. Again, these states did have some lease issuance over this time frame. Figure's 3 and 4 below contain the number and acres of competitive leases issued over time by state.

Figure 3: Competitive Leases Issued by the BLM

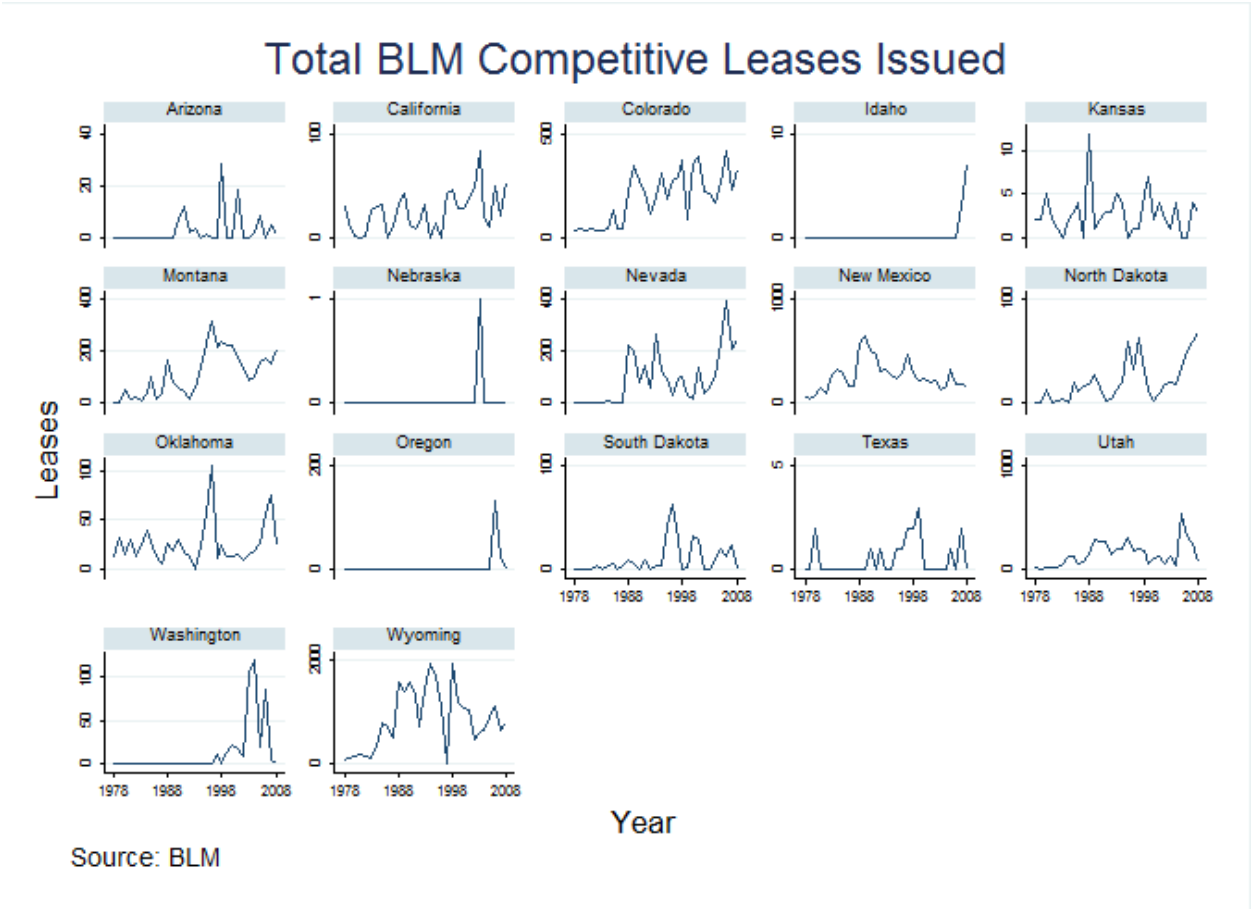
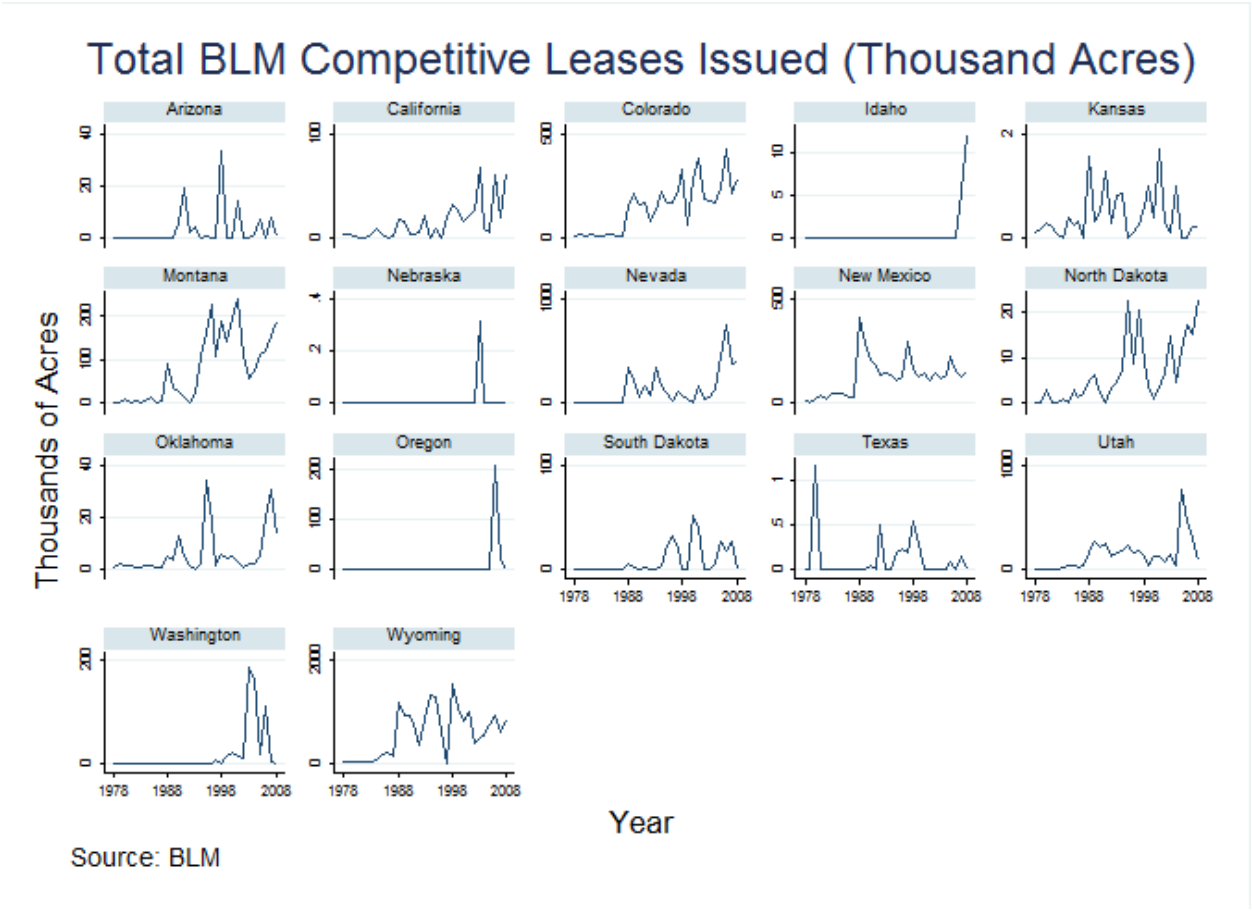


Figure 4: Thousands of Acres of Competitive Leases Issued by the BLM



Source: BLM

Figure 5: Competitive Leases and Thousands of Acres of Competitive Leases Issued by the BLM in the United States

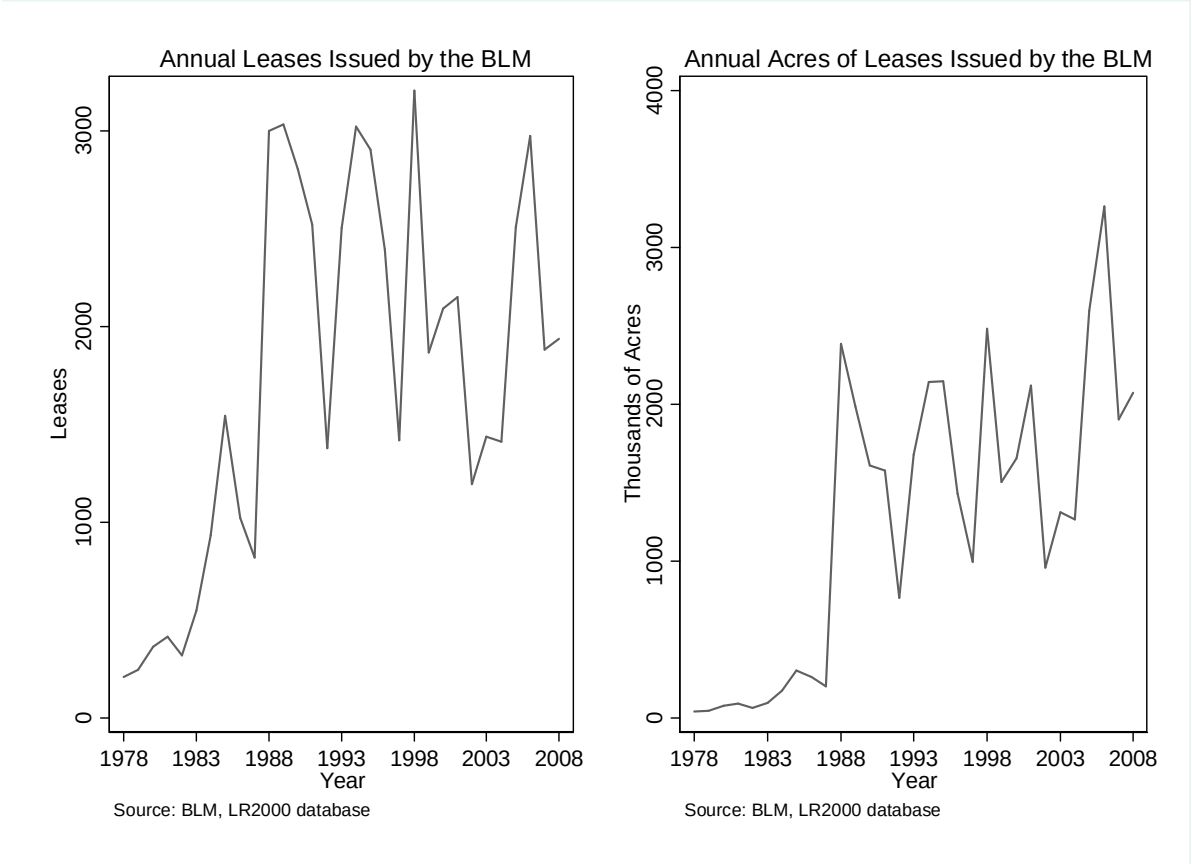


Figure 6: BLM Acres Leased per Total BLM Acres by State

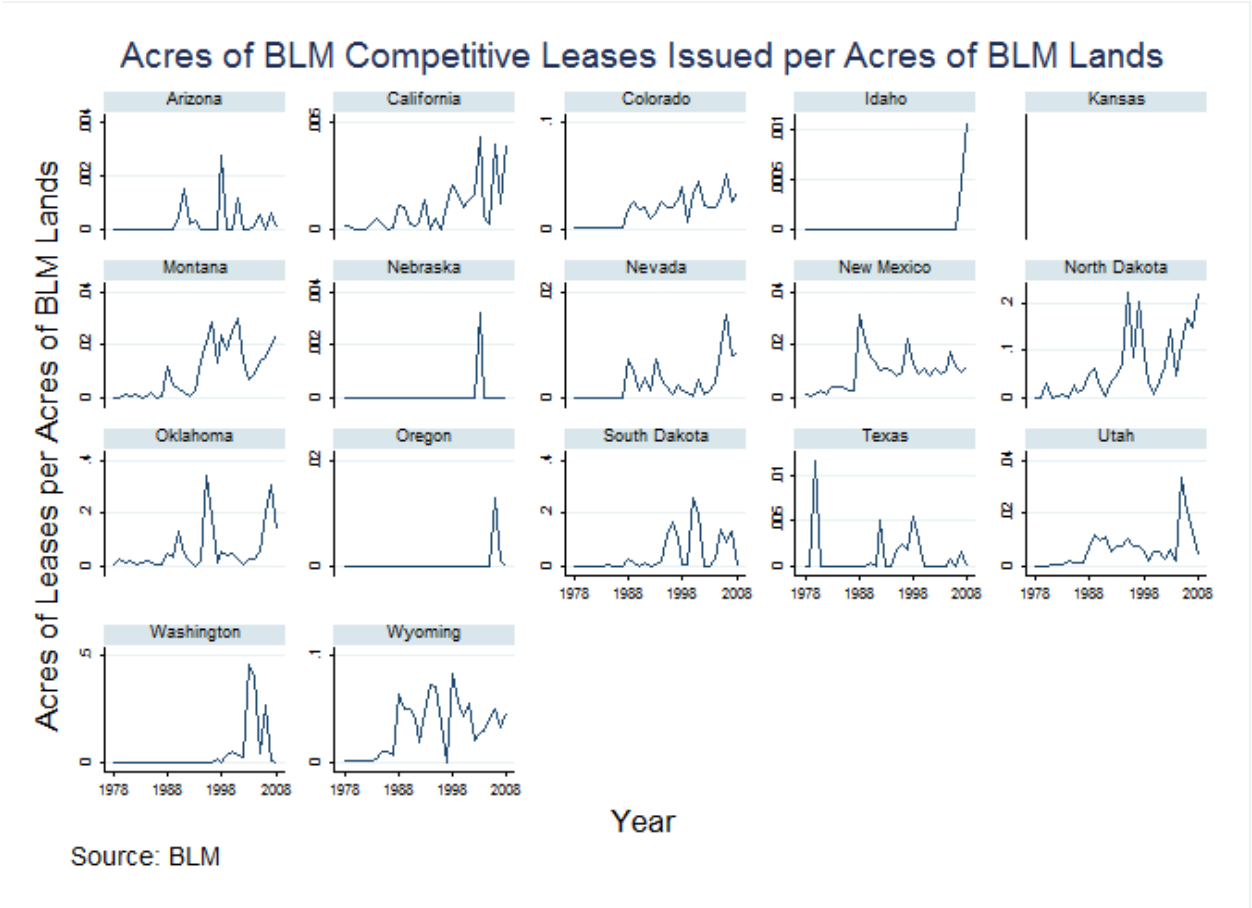


Figure 7: U.S. Futures Prices and Well Costs

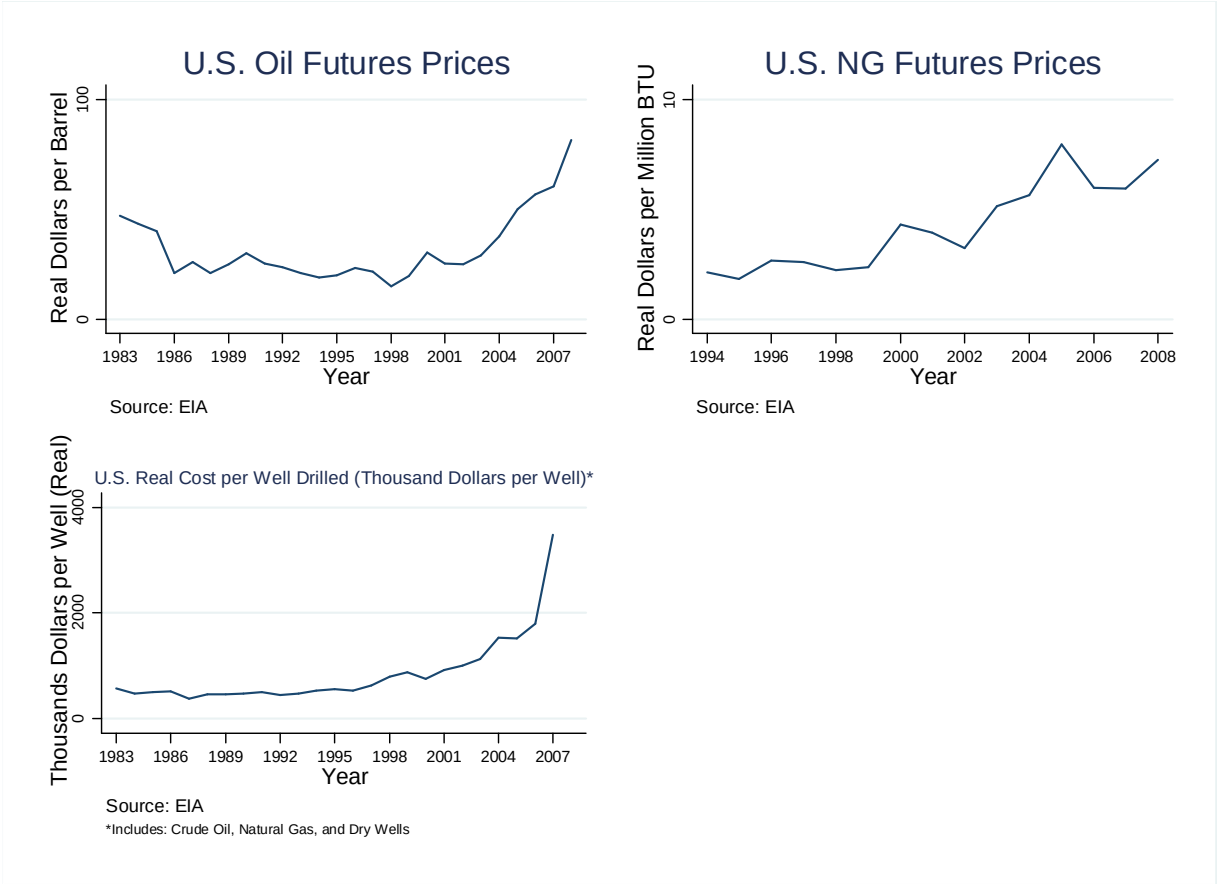
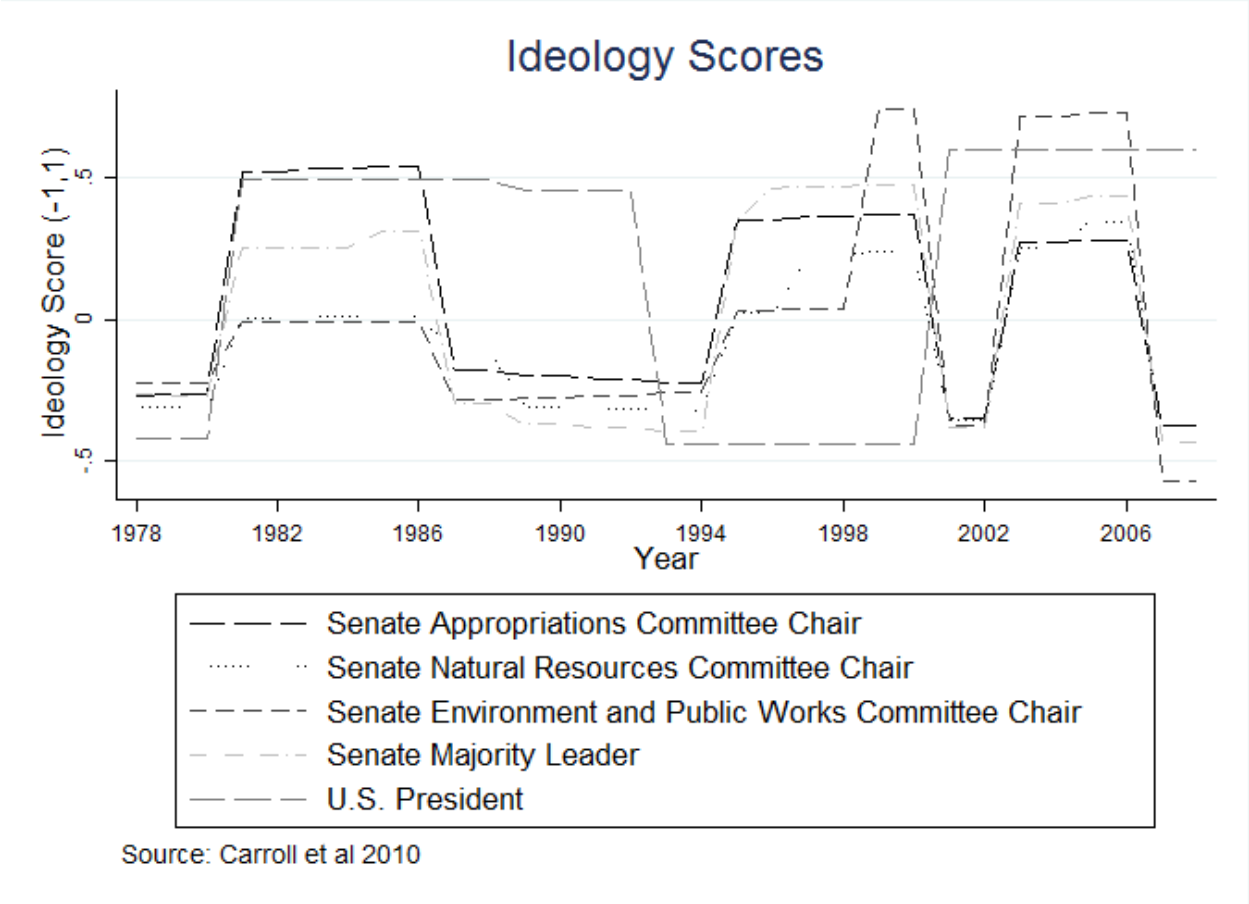


Figure 8: U.S. Senate and President Ideology Scores



Source: Carroll et al 2010

Summary Statistics

Full 16 State Sample					
Statistics	**Number of Competitive Leases Issued Annually**	**Acres of Competitive Leases Issued Annually**	**Acres of Competitive Leases Issued per Acre of BLM Lands**	**Political Party of U.S. President (1=Republican 0=Democrat)**	**Ideology of the U.S. President (-1,1)**
Count	496	496	496	496	496
Mean	108.9052	79022.99	.0183181	.6440945	0.1836774
Median	14	3385.84	.0012408	1	0.49
Standard Deviation	254.7718	194515.4	.0492334	.4789754	0.4617792
Maximum	1920	1516111	.4623903	1	0.594
Minimum	0	0	0	0	-0.44

Statistics	**Political Party of Senate Majority Leader* (1=Republican 0=Democrat)**	**Ideology of the Senate Majority Leader (-1,1)**	**Ideology of the Senate Natural Resources Committee Chair (-1,1)**	**Ideology of the Senate Environment and Public Works Chair (-1,1)**	**Ideology of the Senate Appropriations Committee Chair (-1,1)**	**Percentage of State Population belonging to the Sierra Club**
Count	496	496	496	496	496	432
Mean	0.516129	0.0226452	0.0830645	-0.090129	-0.0729355	0.001931
Median	1	0.25	0.273	-0.009	0.006	0.001627
Standard Deviation	0.5002146	0.3724389	0.3417217	0.3950423	0.2444807	0.001407
Maximum	1	0.474	0.54	0.742	0.345	0.011523
Minimum	0	-0.433	-0.376	-0.567	-0.374	2.65×10^{-6}

Statistics	**U.S. Real Cost per Well Drilled (Thousand $)**	**Count of Federal Regulatory Changes Regarding Competitive Leasing by Year**	**Real Commercial Natural Gas Price ($ / Mcf)**	**Real First Purchase Oil Price ($ / Barrel)**	**U.S. Real Natural Gas Futures Price ($ / Million BTU)**	**U.S. Real Oil Futures Price ($ / Barrel)**
Count	480	496	496	496	240	416
mean	829.8608	1.032258	6.372357	29.06461	4.221136	32.28402
Median	622.382	0	6.018624	23.25863	3.958554	25.40288
Standard Deviation	601.8782	3.697524	1.688206	15.08248	1.933172	15.52661
Maximum	3481.8	20	11.09054	79.11977	7.975082	81.48171
Minimum	382.009	0	0	9.121818	1.837783	14.92603

* The political party of the Senate Committees is the same as that of the Senate Majority Leader.

BLM States Sample (11 Westernmost States)					
Statistics	**Number of Competitive Leases Issued Annually**	**Acres of Competitive Leases Issued Annually**	**Acres of Competitive Leases Issued per Acre of BLM Lands**	**Political Party of U.S. President (1=Republican 0=Democrat)**	**Ideology of the U.S. President (-1,1)**
Count	341	341	341	341	341
mean	153.1144	113001	0.011143	.6440945	0.183677
Median	34	13497.57	0.001086	1	0.49
Standard Deviation	296.7809	226596.1	0.038378	.4789754	0.462019
Maximum	1920	1516111	0.46239	1	0.594
Minimum	0	0	0	0	-0.44

Statistics	**Political Party of Senate Majority Leader*** **(1=Republican 0=Democrat)**	**Ideology of the Senate Majority Leader (-1,1)**	**Ideology of the Senate Natural Resources Committee Chair (-1,1)**	**Ideology of the Senate Environment and Public Works Chair (-1,1)**	**Ideology of the Senate Appropriations Committee Chair (-1,1)**	**Percentage of State Population belonging to the Sierra Club**
Count	341	341	341	341	341	297
mean	0.516129	0.022645	0.0830645	-0.090129	-0.0729355	0.002478
Median	1	0.25	0.273	-0.009	0.006	0.001964
Standard Deviation	0.500474	0.372632	0.3417217	0.3950423	0.2444807	0.001371
Maximum	1	0.474	0.54	0.742	0.345	0.011523
Minimum	0	-0.433	-0.376	-0.567	-0.374	2.65×10^{-6}

Statistics	**U.S. Real Cost per Well Drilled (Thousand $)**	**Count of Federal Regulatory Changes Regarding Competitive Leasing by Year**	**Real Commercial NG Price ($ / Mcf)**	**Real First Purchase Oil Price ($ / Barrel)**	**U.S. Real Natural Gas Futures Price ($ / Million BTU)**	**U.S. Real Oil Futures Price ($ / Barrel)**
Count	330	341	341	341	165	286
mean	829.8608	1.032258	6.582121	27.9404	4.221136	32.28402
Median	622.382	0	6.210856	22.91073	3.958554	25.40288
Standard Deviation	602.2009	3.699223	1.711404	14.87882	1.935013	15.53512
Maximum	3481.8	20	11.09054	78.60516	7.975082	81.48171
Minimum	382.009	0	3.566253	9.121818	1.837783	14.92603

* The political party of the Senate Committees is the same as that of the Senate Majority Leader.

Results

Table 4: Full Sample and BLM States Sample: Senate Committee (Tobit Random Effects)

Table 4: Dependent Variable: BLM Acres Leased per Acre of BLM Lands	Political Variable of Interest – Ideology of Senate Natural Resources Committee Chair	
	(1) Full 16-State Sample	(2) 11 BLM State
U.S. Real Oil Futures (Dollars per Barrel)	0.000223	0.000382
	(0.471)	(0.788)
Ideology Score Committee Chair	**0.0237***	0.0108
Continuous (-1, 1)	(1.889)	(0.852)
Count of Regulatory Changes by Year of Implementation	-0.000256	-0.000126
	(-0.312)	(-0.152)
Post 1987 Indicator	**0.0386*****	**0.0280****
	(3.072)	(2.210)
Post 1992 Indicator	0.00465	0.000944
	(0.424)	(0.0852)
Post 2005 Indicator	0.0223	-0.00248
	(1.165)	(-0.126)
Time Trend	0.000118	$8.98x10^{-5}$
(By State)	(1.477)	(1.580)
U.S. Real Cost per Crude Oil, Natural Gas, and Dry Well Drilled (Thousand Dollars)	$6.04x10^{-6}$	$6.43x10^{-6}$
	(0.566)	(0.590)
Constant	-0.0848***	-0.0674***
	(-2.930)	(-2.916)
σ_u (State specific standard deviation)	0.0474***	0.0306***
	(4.891)	(3.706)
σ_e (Observation specific standard deviation)	0.0538***	0.0462***
	(23.04)	(19.27)
ρ	0.437	0.304
Observations	400	275
Number of states	16	11
Pseudo R-squared	.078	.041

Note: asymptotic z-statistics in parentheses, *** p<0.01, ** p<0.05, *p<0.1. ρ is the percent contribution to the total variance of the panel-level variance component. σ_u: panel-level standard deviation; σ_e: standard deviation of e_it.

Table 4a: Full Sample and BLM States Sample: Senate Committee (Marginal Effects)

Table 4a: Dependent Variable: BLM Acres Leased per Acre of BLM Lands	**Political Variable of Interest – Ideology of Senate Natural Resources Committee Chair**			
	Probability of Leasing		**Expected Increase in Acres Leased Given That Leasing Has Occurred**	
	(1) Full 16-State Sample	**(2) 11 BLM States**	**(3) Full 16-State Sample**	**(4) 11 BLM States**
U.S. Real Oil Futures (Dollars per Barrel)	0.00124	0.00274	7.92×10^{-5}	0.000133
	(0.471)	(0.786)	(0.471)	(0.785)
Ideology Score Committee Chair	**0.132***	0.0778	**0.00840***	0.00376
Continuous (-1, 1)	(1.865)	(0.849)	(1.857)	(0.849)
Count of Regulatory Changes by Year of Implementation	-0.00142	-0.000906	-9.08×10^{-5}	-4.39×10^{-5}
	(-0.312)	(-0.152)	(-0.312)	(-0.152)
Post 1987 Indicator	**0.208*** **	**0.195** **	**0.0125*** **	**0.00891** **
	(3.132)	(2.294)	(3.200)	(2.346)
Post 1992 Indicator	0.0258	0.00677	0.00164	0.000328
	(0.424)	(0.0852)	(0.426)	(0.0853)
Post 2005 Indicator	0.123	-0.0178	0.00859	-0.000852
	(1.183)	(-0.127)	(1.073)	(-0.128)
Time Trend	0.000658	0.000644	4.20×10^{-5}	3.12×10^{-5}
(By State)	(1.471)	(1.577)	(1.463)	(1.563)
U.S. Real Cost per Crude Oil, Natural Gas, and Dry Well Drilled (Thousand Dollars)	3.36×10^{-5}	4.61×10^{-5}	2.14×10^{-6}	2.23×10^{-6}
	(0.566)	(0.590)	(0.565)	(0.590)
Observations	400	275	400	275
Number of states	16	11	16	11

Note: asymptotic z-statistics in parentheses, *** p<0.01, ** p<0.05, *p<0.1.

Table 5a: Full Sample and BLM States Sample: Senate Committees (Marginal Effects – Probability of Leasing)

Table 5a: Dependent Variable: BLM Acres Leased per Acre of BLM Lands	Political Variable of Interest – Ideology of Senate Appropriations Committee Chair		Political Variable of Interest - Senate Ideology of Environment and Public Works Committee Chair	
	(1) Full 16-State Sample	(2) 11 BLM States	(3) Full 16-State Sample	(4) 11 BLM States
U.S. Real Oil Futures (Dollars per Barrel)	0.00113	0.00154	0.00109	-0.000202
	(0.422)	(0.438)	(0.383)	(-0.0539)
Ideology Score Committee Chair	**0.152***	**0.188***	0.0657	**0.144****
Continuous (-1, 1)	(1.826)	(1.725)	(1.297)	(2.137)
Count of Regulatory Changes by Year of Implementation	-0.00241	-0.00243	-0.00102	-0.000771
	(-0.521)	(-0.403)	(-0.224)	(-0.130)
Post 1987 Indicator	**0.173*****	**0.189****	**0.145****	**0.152****
	(2.839)	(2.456)	(2.419)	(1.989)
Post 1992 Indicator	0.0235	-0.0353	0.0473	-0.0432
	(0.379)	(-0.435)	(0.789)	(-0.551)
Post 2005 Indicator	0.126	-0.00560	0.135	0.0323
	(1.206)	(-0.0399)	(1.282)	(0.226)
Time Trend	0.000642	0.000635	0.000646	0.000630
(By State)	(1.434)	(1.552)	(1.445)	(1.537)
U.S. Real Cost per Crude Oil, Natural Gas, and Dry Well Drilled (Thousand Dollars)	$2.54x10^{-5}$	$6.03x10^{-5}$	$1.96x10^{-5}$	$7.53x10^{-5}$
	(0.437)	(0.787)	(0.333)	(0.973)
ρ	0.436	0.305	0.434	0.305
Observations	400	275	400	275
Number of states	16	11	16	11

Note: asymptotic z-statistics in parentheses, *** p<0.01, ** p<0.05, *p<0.1. ρ is the percent contribution to the total variance of the panel-level variance component.

Table 5b: Full Sample and BLM States Sample: Senate Committees
(Marginal Effects - Expected Increase in Acres Leased Given That Leasing Has Occurred)

Table 5b: Dependent Variable: BLM Acres Leased per Acre of BLM Lands	Political Variable of Interest - Senate Appropriations Committee Chair		Political Variable of Interest - Senate Environment and Public Works Committee Chair	
	(1) Full 16-State Sample	(2) 11 BLM States	(3) Full 16-State Sample	(4) 11 BLM States
U.S. Real Oil Futures (Dollars per Barrel)	7.19×10^{-5}	7.42×10^{-5}	6.98×10^{-5}	-9.69×10^{-6}
	(0.422)	(0.438)	(0.383)	(-0.0539)
Ideology Score Committee Chair	**0.00968***	**0.00907***	0.00420	**0.00692****
Continuous (-1, 1)	(1.818)	(1.719)	(1.294)	(2.125)
Count of Regulatory Changes by Year of Implementation	-0.000154	-0.000117	-6.53×10^{-5}	-3.70×10^{-5}
	(-0.520)	(-0.402)	(-0.224)	(-0.130)
Post 1987 Indicator	**0.0104*****	**0.00862****	**0.00884****	**0.00698****
	(2.910)	(2.507)	(2.486)	(2.038)
Post 1992 Indicator	0.00149	-0.00171	0.00300	-0.00209
	(0.380)	(-0.432)	(0.793)	(-0.546)
Post 2005 Indicator	0.00876	-0.000269	0.00951	0.00158
	(1.091)	(-0.0400)	(1.149)	(0.221)
Time Trend	4.09×10^{-5}	3.06×10^{-5}	4.13×10^{-5}	3.02×10^{-5}
(By State)	(1.428)	(1.539)	(1.439)	(1.526)
U.S. Real Cost per Crude Oil, Natural Gas, and Dry Well Drilled (Thousand Dollars)	1.62×10^{-6}	2.90×10^{-6}	1.25×10^{-6}	3.61×10^{-6}
	(0.437)	(0.785)	(0.333)	(0.970)
ρ	0.436	0.305	0.434	0.305
Observations	400	275	400	275
Number of states	16	11	16	11

Note: asymptotic z-statistics in parentheses, *** p<0.01, ** p<0.05, *p<0.1. ρ is the percent contribution to the total variance of the panel-level variance component.

Table 6: Full Sample and BLM States Sample: Political Party of Senate Majority Leader and U.S. President (Tobit Random Effects)

Table 6: Dependent Variable: BLM Acres Leased per Acre of BLM Lands	Political Variable of Interest – Political Party of Senate Majority Leader[a]		Political Variable of Interest – Political Party of U.S. President	
	(1) Full 16-State Sample	(2) 11 BLM States	(3) Full 16-State Sample	(4) 11 BLM States
U.S. Real Oil Futures (Dollars per Barrel)	$6.20x10^{-5}$	0.000268	$2.29x10^{-5}$	-0.000124
	(0.183)	(0.789)	(0.0582)	(-0.322)
Political Party	**0.0190****	0.0105	0.00757	**0.0232****
(1= Republican 0 = Democrat)	(2.554)	(1.424)	(0.767)	(2.395)
Count of Regulatory Changes by Year of Implementation	-0.000215	$-9.79x10^{-5}$	-0.000112	$-3.58x10^{-5}$
	(-0.262)	(-0.120)	(-0.136)	(-0.0444)
Post 1987 Indicator	**0.0379*****	**0.0284****	**0.0221****	0.0158
	(3.146)	(2.382)	(2.024)	(1.479)
Post 1992 Indicator	0.00230	0.000245	**0.0207***	**0.0222****
	(0.229)	(0.0247)	(1.957)	(2.149)
Post 2005 Indicator	**0.0310***	0.00637	0.0208	0.00414
	(1.836)	(0.377)	(1.256)	(0.254)
Time Trend	0.000111	$8.29x10^{-5}$	0.000110	$7.92x10^{-5}$
(By State)	(1.399)	(1.566)	(1.385)	(1.497)
Constant	-0.0797***	-0.0616***	-0.0708**	-0.0616***
	(-2.834)	(-2.892)	(-2.535)	(-2.941)
σ_u (State specific standard deviation)	0.0470***	0.0285***	0.0470***	0.0285***
	(4.974)	(3.776)	(4.965)	(3.784)
σ_e(Observation specific standard deviation)	0.0539***	0.0455***	0.0544***	0.0452***
	(23.47)	(19.69)	(23.47)	(19.72)
ρ	.431	.281	0.427	.284
Observations	416	286	416	286
Number of states	16	11	16	11

Note: asymptotic z-statistics in parentheses, *** p<0.01, ** p<0.05, *p<0.1. ρ is the percent contribution to the total variance of the panel-level variance component.

a: Political party changes were the same for the Senate Majority Leader and all three committee chairs.

Table 7: Full Sample and BLM States Sample: Senate Majority Leader* and U.S. President (Tobit Random Effects)

Dependent Variable:	Political Variable of Interest – Ideology of Senate Majority Leader		Political Variable of Interest – Ideology of U.S. President	
BLM Acres Leased per Acre of BLM Lands	(1) Full 16-State Sample	(2) 11 BLM States	(3) Full 16-State Sample	(4) 11 BLM States
U.S. Real Oil Futures (Dollars per Barrel)	0.000109	0.000293	$2.33x10^{-5}$	-0.000121
	(0.323)	(0.868)	(0.0595)	(-0.316)
Ideology Score	**0.0233****	**0.0134**	**0.00733**	**0.0224****
Continuous (-1, 1)	(2.514)	(1.459)	(0.769)	(2.395)
Count of Regulatory Changes by Year of Implementation	-0.000258	-0.000125	-0.000125	$-7.42x10^{-5}$
	(-0.314)	(-0.153)	(-0.151)	(-0.0921)
Post 1987 Indicator	**0.0355*****	**0.0274****	**0.0224****	**0.0166**
	(3.045)	(2.369)	(2.058)	(1.562)
Post 1992 Indicator	0.00255	$8.21x10^{-5}$	**0.0197****	**0.0190****
	(0.254)	(0.00827)	(1.999)	(1.977)
Post 2005 Indicator	**0.0300***	0.00603	0.0208	0.00406
	(1.784)	(0.358)	(1.255)	(0.249)
Time Trend	0.000110	$8.27x10^{-5}$	0.000110	$7.92x10^{-5}$
(By State)	(1.389)	(1.562)	(1.385)	(1.497)
Constant	-0.0697**	-0.0562***	-0.0668**	-0.0494**
	(-2.510)	(-2.690)	(-2.383)	(-2.361)
σ_u (State specific standard deviation)	0.0470***	0.0285***	0.0470***	0.0285***
	(4.974)	(3.777)	(4.965)	(3.784)
σ_e(Observation specific standard deviation)	0.0539***	0.0455***	0.0544***	0.0452***
	(23.47)	(19.69)	(23.47)	(19.72)
ρ	.431	.281	.427	.284
Observations	400	286	400	286
Number of states	16	11	16	11

Note: asymptotic z-statistics in parentheses, *** p<0.01, ** p<0.05, *p<0.1. ρ is the percent contribution to the total variance of the panel-level variance component. σ_u: panel-level standard deviation; σ_e: standard deviation of e_it.
*Political party of the Senate Majority Leader and Senate Committee Chairs are the same.

Table 8: Noncompetitive Leases and Both Competitive and Noncompetitive Leases (Marginal Effects – Probability of Leasing)

	Political Variable of Interest – Ideology of Senate Natural Resources Committee Chair	
Dependent Variable: BLM Acres Leased per Acre of BLM Lands	**(1) Noncompetitive Leases**	**(2) Both Competitive and Noncompetitive Leases**
U.S. Real Oil Futures (Dollars per Barrel)	-1.17×10^{-5}	-0.000161
	(-0.0126)	(-0.176)
Ideology Score	0.00484	0.0303
Continuous (-1, 1)	(0.200)	(1.254)
Count of Regulatory Changes by Year of Implementation	**0.00314****	**0.00303***
	(2.050)	(1.956)
Post 1987 Indicator	**-0.136*****	**-0.108*****
	(-5.714)	(-4.532)
Post 1992 Indicator	-0.0174	-0.0121
	(-0.813)	(-0.565)
Post 2005 Indicator	-0.0114	0.00551
	(-0.285)	(0.140)
Time Trend	0.000125	0.000212
(By State)	(1.016)	(1.485)
U.S. Real Cost per Crude Oil, Natural Gas, and Dry Well Drilled (Thousand Dollars)	-3.44×10^{-6}	1.59×10^{-5}
	(-0.155)	(0.739)
Constant	0.0946**	0.0601
	(2.001)	(1.156)
ρ	.295	0.358
Observations	400	400
Number of states	16	16

Note: asymptotic z-statistics in parentheses, *** p<0.01, ** p<0.05, *p<0.1. ρ is the percent contribution to the total variance of the panel-level variance component.

Robustness Checks

Table 9: BLM States Interaction – All Political Variables (Tobit Random Effects)

Table 9	(1)	(2)	(3)	(4)	(5)
Dependent Variable: BLM Acres Leased per Acre of BLM Lands	Political Variable of Interest – Ideology of Senate Natural Resources Committee Chair	Political Variable of Interest – Ideology of Senate Appropriations Committee Chair	Political Variable of Interest – Ideology of Senate Environment and Public Works Committee Chair	Political Variable of Interest – Ideology of Senate Majority Leader	Political Variable of Interest – Ideology of U.S. President
Ideology Score	**0.0361***	**0.0424***	0.0106	**0.0418*****	**-0.0248***
Continuous (-1, 1)	(1.889)	(1.808)	(0.745)	(2.667)	(-1.704)
BLM States	-0.00886	-0.0116	-0.0113	-0.00851	-0.0194
	(-0.324)	(-0.425)	(-0.417)	(-0.310)	(-0.709)
Interaction: BLM State * Political Indicator	-0.0180	-0.0234	0.00176	**-0.0297***	**0.0396*****
	(-0.881)	(-0.897)	(0.114)	(-1.746)	(2.777)
U.S. Real Oil Futures (Dollars per Barrel)	0.000224	0.000211	0.000193	0.000208	0.000483
	(0.472)	(0.440)	(0.377)	(0.443)	(1.017)
Post 1987 Indicator	**0.0380*****	**0.0306*****	**0.0262****	**0.0349*****	**0.0267****
	(3.074)	(2.769)	(2.401)	(3.043)	(2.444)
Post 1992 Indicator	0.00562	0.00624	0.00922	0.00227	0.0180
	(0.536)	(0.598)	(0.890)	(0.205)	(1.591)
Post 2005 Indicator	0.0223	0.0226	0.0245	0.0231	0.0212
	(1.164)	(1.183)	(1.256)	(1.212)	(1.054)
Time Trend	0.000111	0.000108	0.000108	0.000110	0.000110
(By State)	(1.352)	(1.320)	(1.323)	(1.330)	(1.340)
U.S. Real Cost per Crude Oil, Natural Gas, and Dry Well Drilled (Thousand Dollars)	6.05×10^{-6}	4.43×10^{-6}	3.61×10^{-6}	5.65×10^{-6}	-1.78×10^{-6}
	(0.567)	(0.424)	(0.341)	(0.541)	(-0.163)
Constant	-0.0772**	-0.0637*	-0.0623	-0.0706*	-0.0671*
	(-2.052)	(-1.681)	(-1.625)	(-1.870)	(-1.782)
σ_u (State specification Variation)	0.0471***	0.0471***	0.0468***	0.0473***	0.0471***
	(4.858)	(4.856)	(4.855)	(4.861)	(4.872)
σ_e (Observation specific Variation)	0.0538***	0.0538***	0.0539***	0.0535***	0.0535***
	(23.04)	(23.05)	(23.04)	(23.06)	(23.05)
Observations	400	400	400	400	400
Number of states	16	16	16	16	16

Note: asymptotic z-statistics in parentheses, *** p<0.01, ** p<0.05, *p<0.1. ρ is the percent contribution to the total variance of the panel-level variance component. σ_u: panel-level standard deviation; σ_e: standard deviation of e_it.

Table 10: Linear Models

Table 10: Dependent Variable: BLM Acres Leased per Acre of BLM Lands	**Political Variable of Interest – Ideology of Senate Natural Resources Committee Chair**	
	(1) Fixed Effects	**(2) Random Effects**
U.S. Real Oil Futures (Dollars per Barrel)	0.000113	0.000160
	(0.653)	(0.651)
Ideology Score Committee Chair	**0.0159***	**0.0163***
Continuous (-1, 1)	(1.944)	(1.891)
Count of Regulatory Changes by Year of Implementation	0.000234	0.000109
	(0.723)	(0.885)
Post 1987 Indicator	0.0160	**0.0208*****
	(1.316)	(2.872)
Post 1992 Indicator	0.00380	0.00846
	(0.316)	(1.510)
Post 2005 Indicator	**0.0236***	0.0216
	(1.789)	(1.286)
Time Trend	0.000826	**7.45×10^{-5}*** **
(By State)	(0.422)	(2.793)
U.S. Real Cost per Crude Oil, Natural Gas, and Dry Well Drilled (Thousand Dollars)	-3.76×10^{-6}	-2.24×10^{-7}
	(-0.509)	(-0.0590)
Constant	-0.224	-4.91×10^{-5}*
	(-0.433)	(0.0392)
R-squared	.092	.11
Observations	400	400
Number of states	16	16

Note: asymptotic z-statistics in parentheses, ** p<0.01, * p<0.05. ρ is the percent contribution to the total variance of the panel-level variance component..