



September 2019

# OFFSHORE OIL AND GAS

## Opportunities Exist to Better Ensure a Fair Return on Federal Resources

Accessible Version

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### Opportunities Exist to Better Ensure a Fair Return on Federal Resources

#### Why GAO Did This Study

Production of oil and natural gas from offshore leases is a significant source of federal revenue, totaling almost \$90 billion from 2006 through 2018. BOEM is required to seek a fair return from offshore leasing and production activities in federal waters. Companies generally pay (1) bids for leases for the right to develop tracts, (2) rents on leased but undeveloped tracts, and (3) royalties on revenues from the sale of oil and gas produced from leases. BOEM holds auctions to award leases to the company offering the highest bid so long as the bureau determines the bid represents fair market value.

GAO was asked to examine issues related to offshore federal oil and gas leasing. This report, among other objectives, (1) describes the effect of oil prices and royalty rates on industry bids for leases and (2) examines the extent to which BOEM's valuation process assures receipt of fair market value. GAO reviewed laws, policies, and regulations; interviewed BOEM officials; and developed an empirical model using BOEM data to analyze the effect of royalty rates and other factors on industry bidding.

#### What GAO Recommends

GAO is making four recommendations, including that BOEM (1) enlist an independent third party to examine whether the use of delayed valuations assures the receipt of fair market value and (2) take steps to ensure its bid valuation process is not biased toward lowering valuations. Interior disagreed with the first and partially agreed with the second, disagreeing with GAO's characterization of BOEM's process. GAO maintains the recommendations are valid as discussed in the report.

View [GAO-19-531](#). For more information, contact Frank Rusco at (202) 512-3841 or [ruscof@gao.gov](mailto:ruscof@gao.gov).

#### What GAO Found

GAO's analysis indicates that changes in the price of oil and in royalty rates drive changes in the amount companies in the offshore oil and gas industry bid for leases (the amount paid upfront at auction for the right to explore and develop offshore tracts of land). Specifically, between May 1985 and June 2018, peaks in industry bidding coincided with higher oil prices. Additionally, when the Department of the Interior's (Interior) Bureau of Ocean Energy Management (BOEM) offered leases at lower royalty rates, industry bid somewhat higher amounts per acre. For example, certain leases were sold from 1996 through 2000 with no royalties on initial volumes of production, which GAO estimates resulted in BOEM collecting, at most, nearly \$2 billion in additional bid revenue. However, bureau estimates indicate these leases resulted in about \$18 billion in foregone royalties through 2018.

BOEM's valuation process might not fully assure receipt of fair market value, based on GAO's analysis of BOEM data. BOEM develops valuations for offshore tracts it assesses to be economically viable—assessments of their fair market value—and awards leases so long as the bid is greater than or equal to BOEM's valuation. BOEM's valuations for tracts were generally low relative to industry bids because, according to BOEM officials, they conservatively forecast to account for inherent uncertainties in, among other things, the quantity of oil and gas present as well as exploration and development costs. In addition, GAO identified two ways BOEM's valuation process results in lowering its already conservative valuations that might not fully assure receipt of fair market value:

**Unreasonably high depreciation.** BOEM forecast that tracts would lose a median of 23 percent of their value in between sales, leading the bureau to accept lower bids because it determined the tracts might be worth even less in the future. Bureau officials told GAO that lower future values are generally due to BOEM discounting the delayed collection of revenue. However, BOEM's forecasted depreciation increased even though tracts are now available twice as frequently as they were prior to August 2017, reducing the time for discounting. Officials said they were unaware of the high rates and the issue warrants further examination. Enlisting a third party to examine the extent to which the bureau's use of delayed valuations assures the receipt of fair market value, and making changes as appropriate, would help BOEM mitigate risks of continuing to accept bids based on poor information on tracts' future values.

**Lowered valuations.** BOEM officials told GAO that they lower some initial valuations that are "slightly above" industry's bids and which would therefore be rejected per procedures to assure fair market value. Officials said they prefer to accept bids unless there is high certainty that the bids are inadequate. However, GAO identified bias, or statistical anomalies, where BOEM lowered many valuations that were initially higher than industry's bids. Specifically, from March 2000 through June 2018, BOEM rejected 27 bids for tracts that it ultimately valued at up to double industry's bid whereas it accepted 359 bids in which industry's bid was up to double BOEM's valuation. Tracts for rejected bids are, on average, subsequently sold for more than twice the initial rejected amount, suggesting that BOEM could be forgoing hundreds of millions of dollars in bid revenue by accepting bids that are too low.

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**Abbreviations**

BOEM	Bureau of Ocean Energy Management
Interior	Department of the Interior
OCSLA	Outer Continental Shelf Lands Act

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September 25, 2019

The Honorable Raúl M. Grijalva  
Chairman  
Committee on Natural Resources  
House of Representatives

The Honorable Alan S. Lowenthal  
Chairman  
Subcommittee on Energy and Mineral Resources  
Committee on Natural Resources  
House of Representatives

Production of oil and natural gas from leases on federal waters is an important part of the nation's energy portfolio, accounting for more than 50 percent of the oil and gas production on federal lands and waters. It is also a significant source of revenue for the federal government. From 2006 through 2018, the federal government collected almost \$90 billion in revenue from the management of offshore oil and gas resources. These revenues were generated primarily through (1) upfront cash payments (bonus bids) for leasing rights to explore, develop, and sell oil and gas resources; and (2) royalty payments as a percent of the value of oil and gas produced.

An objective of the Outer Continental Shelf Lands Act (OCSLA) is that the Outer Continental Shelf be made available for expeditious and orderly development, subject to environmental safeguards while maintaining competition for offshore resources.<sup>1</sup> The act also directs the Secretary of the Interior to conduct leasing activities to “assure receipt of fair market value for the lands leased and the rights conveyed by the federal government.” The Department of the Interior’s (Interior) Bureau of Ocean

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<sup>1</sup>Management of federal offshore oil and gas resources is primarily governed by OCSLA, as amended, which sets forth procedures for leasing, exploration, development, and production of those resources. Pub. L. No. 83-212, 67 Stat. 462 (Aug. 7, 1953) (codified, as amended, at 43 U.S.C. §§ 1331–1356a). The Outer Continental Shelf refers to the submerged lands outside the territorial jurisdiction of all 50 states, but within U.S. jurisdiction and control. The portion of the North American continental edge that is federally designated as the Outer Continental Shelf generally extends from 3 geographical miles off the coastline to at least 200 nautical miles.

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Energy Management (BOEM) is responsible for managing federal offshore oil and gas resources.<sup>2</sup>

To assure receipt of fair market value, BOEM first sets fiscal terms for leases to be sold at auction—including minimum bid amounts, rental rates on undeveloped leases, and royalty rates on production—and then evaluates the adequacy of bids. BOEM regularly holds auctions—called lease sales—at which companies bid on a specific geographic area, or tract, of unleased land made available for oil and gas development. Prior to these lease sales, BOEM determines the fiscal terms that are applied to the life of any lease sold as well as the duration of the leases. BOEM has authority to change any of these fiscal terms, within the parameters set by statute and in the bureau's implementing regulations, and the bureau has periodically done so. For example, between 2006 and 2008, BOEM increased royalty rates from the statutory minimum 12.5 percent for most depths to 18.75 percent for all depths, and in 2011 BOEM increased minimum bids for tracts in waters greater than 400 meters from \$37.50 per acre to \$100 per acre.<sup>3</sup> According to bureau procedures, after each lease sale, BOEM is to evaluate the adequacy of the highest bid received for each tract, and award the lease to the highest bidder so long as BOEM determines that the bid meets certain criteria, including that the bid is greater than or equal to BOEM's assessment of the fair market value of the tract.

We added Interior's management of federal oil and gas resources to our High-Risk List in February 2011 based on challenges we identified with several aspects of Interior's oversight responsibilities, including that Interior lacked reasonable assurance it was collecting a fair return in revenue from oil and gas produced on federal lands and waters.<sup>4</sup> In a

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<sup>2</sup>BOEM is responsible for determining the timing and location of lease sales among the oil- and gas-bearing regions of the Outer Continental Shelf based on a consideration of numerous factors, including existing information concerning the geographical, geological, and ecological characteristics of such regions and an equitable sharing of developmental benefits and environmental risks among the various regions. 43 U.S.C. § 1344. For the purposes of this report, "BOEM" includes both the present-day Bureau of Ocean Energy Management and its predecessor agencies, the Bureau of Ocean Energy Management, Regulation, and Enforcement and the Minerals Management Service.

<sup>3</sup>Under OCSLA, BOEM has several options for structuring bidding on leases, but for options that include a statutory minimum, fixed royalty rate, that statutory minimum is 12.5 percent in amount or value of the production saved, removed, or sold under the lease.

<sup>4</sup>GAO, *High-Risk Series: An Update*, [GAO-11-278](#) (Washington, D.C.: Feb. 16, 2011).

December 2013 report, we found that Interior had taken some steps to better ensure a fair return but did not have documented procedures for periodically conducting assessments of the offshore fiscal system—the terms and conditions under which the federal government collects revenues from oil and gas development—including for determining whether and how to change new offshore lease terms.<sup>5</sup> Among other things, we recommended that Interior establish documented procedures for determining whether and how to adjust lease terms for new offshore leases, and BOEM developed such procedures in 2015. Due to ongoing concerns regarding royalty determination and collection, among other things, we included Interior’s management of federal oil and gas resources in our 2019 update to the High-Risk List.<sup>6</sup>

You asked us to review Interior’s oil and gas fiscal system. This report (1) describes what effect, if any, oil prices and royalty rates have on bonus bids for offshore leases, (2) examines how BOEM assesses changes to fiscal terms, and (3) examines the extent to which BOEM’s tract valuation process assures receipt of fair market value.

To examine the effect of oil prices and royalty rates on bonus bids for offshore leases,<sup>7</sup> we reviewed BOEM studies and our prior work, and we conducted a literature search for oil and gas industry and academic studies that analyzed factors affecting oil and gas bidding, including changes to the fiscal system. To identify existing studies from peer-reviewed journals, we conducted database searches. We reviewed and assessed factors affecting bidding activity from the nine studies published between 2010 and 2017 that we identified through our literature search. We also analyzed BOEM data on lease sales from May 1983 (when BOEM started using competitive bids to award leases) through March 2018, the most recent data available for our analysis. Using these data, we developed an econometric model to analyze the effect of royalty rates and other key variables, such as the price of oil, on bonus bids for offshore leases between 1985 and 2018 (we did not include data from the

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<sup>5</sup>GAO, *Oil And Gas Resources: Actions Needed for Interior to Better Ensure a Fair Return*, [GAO-14-50](#) (Washington, D.C.: Dec. 6, 2013).

<sup>6</sup>GAO, *High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas*, [GAO-19-157SP](#) (Washington, D.C.: Mar. 6, 2019).

<sup>7</sup>We did not include gas prices because, according to BOEM documentation, over the last decade or so industry has not been incentivized to pursue exploration and development of gas-prone tracts in the Gulf of Mexico due to (1) low gas prices, (2) abundant onshore gas resources, and (3) the marginal nature of remaining offshore gas resources.



first two years of competitive bidding because both BOEM and companies in the offshore oil and gas industry were adjusting to the new bidding system).<sup>8</sup> Specifically, we analyzed how changes in royalty rates affected the winning bids for offshore leases. (See appendix I for additional information on our econometric model.) To assess the reliability of BOEM's lease sale data, we interviewed knowledgeable bureau officials, reviewed documentation describing the data set, and electronically tested the data to identify obvious errors with completeness or accuracy. We found these data sufficiently reliable for assessing the factors that have affected industry bidding activity. In addition, we used existing data analysis from Interior to ascertain the effect of royalty relief on offshore oil and gas revenues. We also interviewed BOEM officials, representatives from a key industry organization,<sup>9</sup> representatives from two private oil and gas companies that agreed to be interviewed, and five academic researchers to obtain their perspectives on the effect of royalty rate changes on bonus bids. We identified these academic researchers based on the results of our literature review and selected them because of their relevant and recent work on this topic. Because this was a nonprobability sample of industry representatives and academic researchers, their perspectives are not generalizable to all industry and academia.

To examine how BOEM assesses changes to fiscal terms, we reviewed the bureau's annual and supplementary lease sale specific analyses that informed fiscal terms for lease sales from March 2016 (when BOEM began implementing a formal process for assessing changes to fiscal terms) through August 2018, the time of the most recently completed lease sale when we conducted our review. We compared these analyses to BOEM regulations, policies, and procedures pertaining to BOEM's management of offshore oil and gas development. We interviewed BOEM officials to discuss their perspectives on any benefits or challenges regarding actions taken to amend the offshore fiscal system as well as preparations for any planned changes. We reviewed BOEM's progress in developing legislative and administrative proposals aimed at improving

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<sup>8</sup>Throughout this report, we use the gross domestic product deflator index to calculate inflation-adjusted dollar values, using 2018 as the base year. Thus, our inflation-adjusted dollar values are in 2018 dollars.

<sup>9</sup>We met with representatives of the American Petroleum Institute, which is a national trade association that represents the U.S. oil and natural gas industry. Its more than 600 corporate members—producers, refiners, suppliers, pipeline operators, and marine transporters, as well as service and supply companies—represent all segments of the industry.

the return to the federal government from the sale of federal resources. We assessed BOEM's approach against standards for internal control in the federal government, specifically for management's definition of objectives.<sup>10</sup>

To examine the extent to which BOEM's tract valuation process assures it receives fair market value, we reviewed statutes; BOEM guidance, including regulations, policies, and procedures; and interviewed BOEM officials regarding the bid evaluation process. We also analyzed available data from March 2000 through June 2018 related to BOEM's determinations on the adequacy of bids.<sup>11</sup> These data included high bid amounts, BOEM's viability determinations, types of tracts leased, BOEM's resource and fair market value estimates, and oil and gas production. To assess the reliability of these data, we interviewed knowledgeable agency officials, reviewed documentation describing the data set, and electronically tested the data to identify obvious problems with completeness or accuracy. We found these data to be sufficiently reliable for our purposes. We assessed BOEM's process for evaluating bid adequacy against BOEM's procedures and federal standards for internal control, specifically for management's use of quality information and establishment and operation of monitoring activities.<sup>12</sup>

We conducted this performance audit from May 2017 to September 2019 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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<sup>10</sup>GAO, *Standards for Internal Control in the Federal Government*, [GAO-14-704G](#) (Washington, D.C.: Sept. 2014).

<sup>11</sup>We selected this time frame because it was the date range for which BOEM has tract valuation data.

<sup>12</sup>[GAO-14-704G](#).

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## Background

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### Federal Authorities

Interior has oversight responsibility for the development of federal oil and gas resources located under more than 260 million surface onshore acres, 700 million subsurface onshore acres, and 1.7 billion offshore acres in the waters of the Outer Continental Shelf. In this capacity, Interior is authorized to lease federal oil and gas resources and to collect the royalties associated with their production. BOEM has leasing authority in offshore waters, including the U.S. Gulf of Mexico.<sup>13</sup>

BOEM schedules lease sales on a 5-year planning basis. In January 2017, the Secretary of the Interior finalized BOEM's *2017-2022 Outer Continental Shelf Oil and Gas Leasing Proposed Final Program*, which included information for 10 planned lease sales in the Gulf of Mexico.<sup>14</sup> BOEM has traditionally held two lease sales per year in the Gulf of Mexico region—one for the Central Planning Area and one for the Western Planning Area.<sup>15</sup> However, beginning with Lease Sale 249 in August 2017, BOEM transitioned to offering all available tracts in the Gulf of Mexico at each of its twice-yearly lease sales.

OCSLA, as amended, directs BOEM to establish minimum bid levels, rental fees, royalty rates, and other related fees to assure receipt of fair market value to the U.S. government for lands leased on the Outer

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<sup>13</sup>Management of resources within federal waters is governed by, among others, the Outer Continental Shelf Lands Act of 1953 (OCSLA), the Outer Continental Shelf Lands Act Amendments of 1978, the Federal Oil and Gas Royalty Management Act of 1982, the Outer Continental Shelf Deep Water Royalty Relief Act, and the Energy Policy Act of 2005. BOEM shares the management of offshore federal oil and gas resources with two other agencies within Interior: the Bureau of Safety and Environmental Enforcement and the Office of Natural Resources Revenue. The Bureau of Safety and Environmental Enforcement is generally responsible for developing and enforcing regulations for, permitting, and inspecting offshore oil and gas operations, as well as verifying production volumes on offshore leases, among other functions. The Office of Natural Resources Revenue is generally responsible for collecting, verifying, and disbursing revenues owed to the federal government from the development of offshore oil and gas resources, among other functions.

<sup>14</sup>In managing its offshore leasing program, BOEM is operating within the Secretary's authority under OCSLA, as amended, and other relevant statutes.

<sup>15</sup>BOEM also held periodic sales in the portion of the Eastern Gulf not under statutory moratorium.

Continental Shelf and the rights conveyed by the federal government.<sup>16</sup> OCSLA directs BOEM to manage the leasing program in a manner that considers economic, social, and environmental value, including the potential impact of oil and gas exploration on other resource values of the Outer Continental Shelf. Subject to the requirement to assure receipt of fair market value, BOEM has the authority to change certain lease terms within the oil and gas fiscal system. Specifically, BOEM has broad authority to change bid terms for offshore leases, including the royalty rate, the bonus bid structure, minimum bid amounts, lease duration, and rental terms within parameters defined in OCSLA. Prior to each lease sale, BOEM publishes a Final Notice of Sale that contains the specific conditions and terms applicable to any leases sold at the lease sale, including rental rates, minimum bid amounts, and royalty rates, each of which may vary by water depth.

In some cases, lease terms have been defined in law. For example, in 1995, Congress passed the Outer Continental Shelf Deep Water Royalty Relief Act,<sup>17</sup> which waived or reduced the amount of royalties that companies would otherwise be obligated to pay on the initial volumes of production from certain deep water tracts leased from 1996 through 2000.<sup>18</sup> In implementing the act for leases sold in 1996, 1997, and 2000, BOEM specified that royalty relief would be applicable only if oil and gas prices were below certain levels, known as “price thresholds,” with the intention of protecting the government’s royalty interests if oil and gas

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<sup>16</sup>OCSLA defines the term “fair market value” as the value of any mineral (1) computed at a unit price equivalent to the average unit price at which such mineral was sold pursuant to a lease during the period for which any royalty or net profit share is accrued or reserved to the United States pursuant to such lease, or (2) if there were no such sales, or if the Secretary finds that there were an insufficient number of such sales to equitably determine such value, computed at the average unit price at which such mineral was sold pursuant to other leases in the same region of the outer Continental Shelf during such period, or (3) if there were no sales of such mineral from such region during such period, or if the Secretary finds that there are an insufficient number of such sales to equitably determine such value, at an appropriate price determined by the Secretary.

<sup>17</sup>Pub. L. No. 104-58, 109 Stat. 563 (1995).

<sup>18</sup>The Act imposed this requirement on applicable leases sold from the date of enactment, November 28, 1995, to five years from that date. However, the first applicable lease sale after that date of enactment was held in April 1996.

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prices increased significantly.<sup>19</sup> BOEM did not include these same price thresholds for leases it issued in 1998 and 1999.

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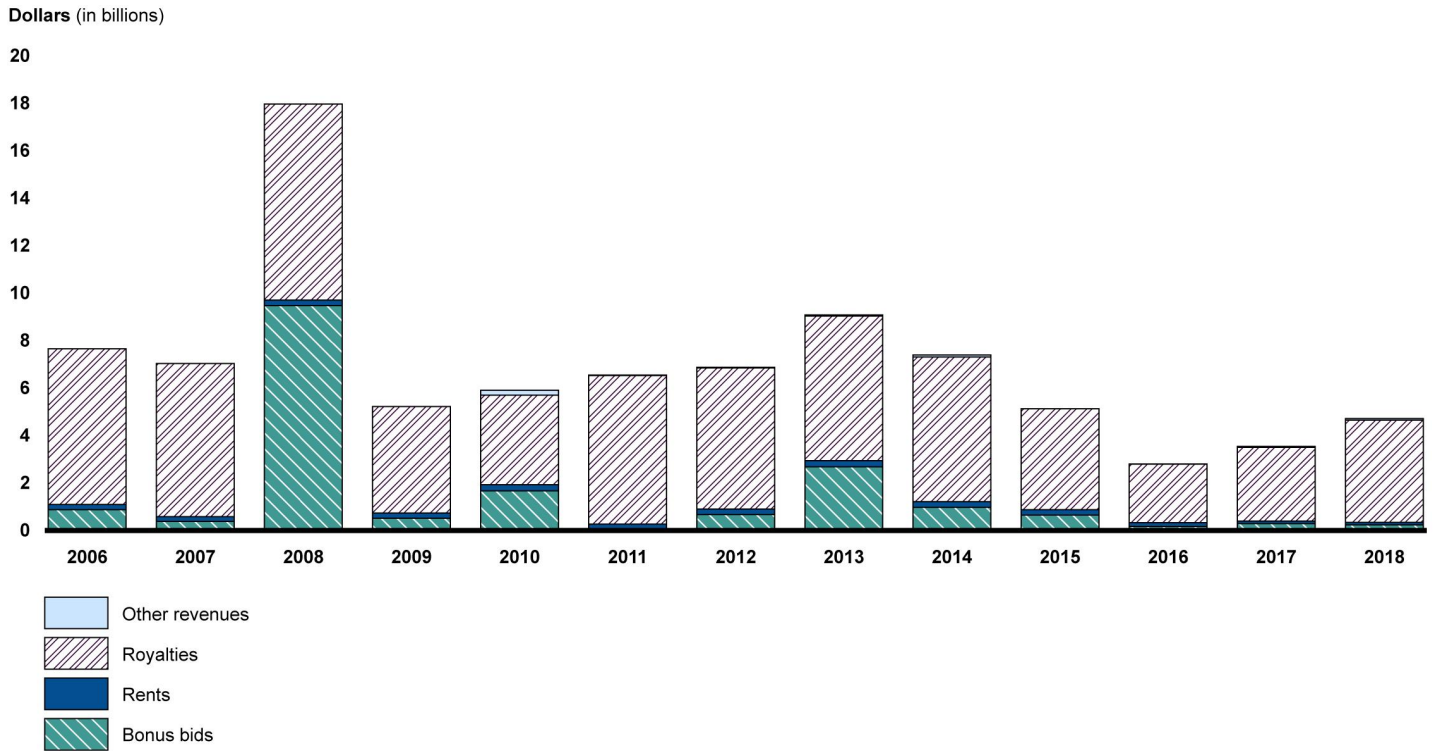
## Revenues from Oil and Gas Development

Figures 1 and 2 below show federal revenue from offshore oil and gas leases from 2006 through 2018. Annually and in aggregate, royalties constitute a majority of revenue from offshore oil and gas leases, followed by bonus bids.

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<sup>19</sup>In 2007, a federal court ruled that Interior's attempt to collect royalties, through the application of price thresholds, on production under leases subject to Deep Water Royalty Relief Act § 304 royalty suspension was unlawful, because those price thresholds were inconsistent with that statute's commands. *Kerr-McGee Oil & Gas Corp. v. Allred*, No. 2:06 CV 0439, 2007 WL 3231634, at \*4 (W.D. La. Oct. 30, 2007). That ruling was affirmed on appeal. *Kerr-McGee Oil & Gas Corp v. U.S. Dep't of Interior*, 554 F.3d 1082 (5th Cir. 2009) (cert. denied *Dep't of Interior v. Kerr-McGee Oil & Gas Corp.*, 558 U.S. 876 (2009)). However, these decisions were issued years after the lease sales, and corresponding bidding, that we examine in this report and would therefore not have impacted the bidding calculus at the time.

**Figure 1: Federal Revenue from Offshore Oil and Gas Bonus Bids, Rents, and Royalties, Calendar Years 2006 through 2018, in 2018 Dollars**



Source: GAO analysis of Office of Natural Resources Revenue data. | GAO-19-531

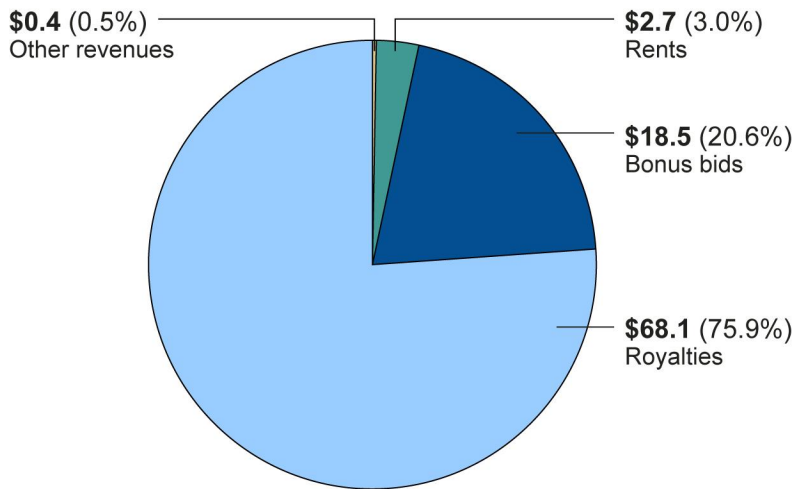
**Data table for Figure 1: Federal Revenue from Offshore Oil and Gas Bonus Bids, Rents, and Royalties, Calendar Years 2006 through 2018, in 2018 Dollars**

Year	Bonus Bids	Rents	Royalties	Other Revenues
2006	\$ 865,262,735.00	\$ 223,142,403.04	\$ 6,559,022,860.68	\$ (37,562,875.01)
2007	\$ 373,930,998.00	\$ 201,755,995.99	\$ 6,452,370,177.08	\$ (3,320,418.62)
2008	\$ 9,464,096,748.60	\$ 237,781,165.61	\$ 8,256,382,050.67	\$ 84,071,836.50
2009	\$ 505,945,598.40	\$ 218,866,829.33	\$ 4,491,988,892.80	\$ (86,809,006.03)
2010	\$ 1,660,319,747.07	\$ 262,587,080.54	\$ 3,772,354,038.20	\$ 206,082,919.01
2011	\$ 46,960,288.94	\$ 216,899,316.94	\$ 6,254,782,037.86	\$ 24,284,176.91
2012	\$ 663,714,729.00	\$ 232,968,098.48	\$ 5,943,045,560.73	\$ 28,002,736.78
2013	\$ 2,675,653,773.00	\$ 256,961,060.86	\$ 6,097,252,519.44	\$ 41,863,091.87
2014	\$ 967,365,328.00	\$ 237,617,515.03	\$ 6,096,467,062.31	\$ 87,241,922.99
2015	\$ 642,044,899.00	\$ 226,532,980.01	\$ 4,250,281,014.65	\$ (35,557,803.00)
2016	\$ 159,864,463.00	\$ 158,006,203.84	\$ 2,469,982,839.84	\$ 5,141,043.76
2017	\$ 281,256,697.00	\$ 107,382,041.18	\$ 3,107,457,377.04	\$ 37,731,414.09

Year	Bonus Bids	Rents	Royalties	Other Revenues
2018	\$ 228,999,443.00	\$ 106,344,673.08	\$ 4,307,485,055.48	\$ 61,303,123.81
Total	\$ 18,535,415,448.01	\$ 2,686,845,363.93	\$ 68,058,871,486.78	\$ 412,472,163.06

**Figure 2: Federal Revenue from Offshore Oil and Gas Aggregate Bonus Bids, Rents, and Royalties, Calendar Years 2006 through 2018, in 2018 Dollars**

Dollars (in billions)



Source: GAO analysis of Office of Natural Resources Revenue data. | GAO-19-531

**Data table for Figure 2: Federal Revenue from Offshore Oil and Gas Aggregate Bonus Bids, Rents, and Royalties, Calendar Years 2006 through 2018, in 2018 Dollars**

Bonus Bids	Other Revenues	Rents	Royalties
18.5	0.4	2.7	68.1
20.6%	0.5%	3.0%	75.9%

## Industry Considerations in Oil and Gas Development

Industry develops oil and gas resources on federal lands within the context of broader energy markets. Conditions in those markets—including commodity prices, competition, and technological developments—can change rapidly. For example, the price of oil on the open market has been volatile, ranging from about \$39 to \$136 per barrel (in 2018 dollars) over the last decade. In addition, companies must weigh potential offshore oil and gas investments against other potential oil and gas investment options domestically and overseas. For example, some

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companies have expanded the sphere of their development activities to waters off Mexico, areas which now compete for investment against the remaining oil resources in the Gulf of Mexico. Furthermore, technological innovations—such as developments in seismic imaging and in drilling technology—have affected where companies are able to locate and develop resources in subsea areas.

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## BOEM's Bid Evaluation Process

According to bureau documentation, BOEM is to evaluate the adequacy of bids in two phases of analysis—economic viability assessments and tract valuations—that incorporate departmental economic and geologic models. BOEM's bid evaluations are intended to ensure that the bureau awards leases only when the associated bid amount represents at least fair market value to the federal government.

### Phase I: Economic Viability Assessment

According to bureau documentation, after each lease sale, BOEM evaluates the economic viability of tracts receiving bids to determine if they require additional analysis before BOEM decides whether to accept or reject the bids.<sup>20</sup> To make these initial assessments, BOEM first develops thresholds of the minimum quantity of oil or gas that must be present to generate revenue that would offset exploration and development costs—known as the “break-even threshold”—at the given water depth, among other factors. Then, for each tract that receives a bid, BOEM estimates a range of how much oil or gas may be on the tract—known as the tract's “resource potential”—using geological and geophysical data. This process incorporates collecting and analyzing the

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<sup>20</sup>Tracts classified as development or drainage tracts bypass economic viability assessment and are automatically subject to BOEM's tract valuation. Development tracts have nearby productive (past or currently capable) wells with indicated hydrocarbons that are not interpreted to have a productive reservoir extending under the tract. Drainage tracts (1) are currently being drained by a producing well on a nearby leased tract or (2) could be drained by a currently non-producing well that is capable of producing oil or gas on a nearby leased tract if the well is placed into production. Conversely, tracts subject to economic viability assessments are those that BOEM has classified as (1) confirmed, meaning tracts that were previously leased, have a well that encountered hydrocarbons, and that may have produced or (2) wildcat, meaning those without past or present productive wells or evidence of hydrocarbons underneath the tract. The volume of hydrocarbons on confirmed tracts may be known or unknown. Wildcat tracts have a high likelihood of not encountering hydrocarbons when drilled.



most recently available seismic exploration and well data and any information gathered from drilling in that geographical area.

BOEM is then to categorize tracts as viable or nonviable by comparing the bureau's estimated resource potential against the relevant break-even threshold. Nonviable tracts are those for which BOEM's resource estimates are below the break-even threshold, meaning they are not likely to have enough oil and gas to be profitably explored, developed, and produced.<sup>21</sup> For tracts that BOEM concludes are nonviable, BOEM accepts the highest bid received as long as that bid is higher than the minimum acceptable bid amount. Conversely, viable tracts are those that exceed BOEM's economic viability threshold and that BOEM considers as having the potential to be profitably explored, developed, and produced.<sup>22</sup> BOEM subjects these tracts to further economic analysis in its next phase, tract valuation.

### Phase II: Tract Valuation

According to bureau documentation, for tracts determined to be economically viable, BOEM is then to conduct a more detailed economic analysis to determine if the high bids represent fair market value.<sup>23</sup> Specifically, BOEM develops an acceptable bid threshold by modeling the likely monetary value of production from a tract less the costs to explore and develop it, including industry profit and payments to the government. BOEM's Fair Market Value Review Committee oversees the development of tract-specific parameters—production potential, probability of geologic success, economic projections, and development costs and timeframes—that the bureau uses in its proprietary discounted cash flow analysis

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<sup>21</sup>Nonviable tracts are those that are (1) not associated with any discernible prospect—meaning, an area favorable for the accumulation of hydrocarbons—or geophysical anomaly that might indicate the presence of hydrocarbons or (2) located over known prospects that are judged to offer sub-economic quantities of hydrocarbons.

<sup>22</sup>Viable tracts are those located over a prospect for which the resource potential size equals or exceeds that of the relevant breakeven threshold.

<sup>23</sup>Until 2014, BOEM used a categorical rule known as the “number of bids” rule to accept the highest bid on a tract without conducting an economic viability assessment or a tract valuation if the tract received at least three bids and the lowest bid was at least 25 percent of the highest bid. BOEM data classifies tracts sold under the “number of bids” rule as viable.

model.<sup>24</sup> A discounted cash flow analysis is a valuation method used to estimate the present value of an investment—in this case a tract of land—based on estimated future cash flows. As inputs to its model, BOEM uses the oil and gas resource estimates it developed in its economic viability assessments to estimate how much oil and gas could be extracted from each tract, and it analyzes seismic and well data to determine the likelihood of discovering oil and gas.<sup>25</sup> BOEM also develops economic projections for future oil and gas prices as well as projections for exploration and development costs and time frames for each tract, based on historical cost data, drilling equipment, technological innovation, and other factors.

BOEM inputs these parameters into its proprietary discounted cash flow model to generate a distribution of potential tract values. BOEM uses the average of these potential values as representative of the present value of the tract.<sup>26</sup> BOEM also develops an estimate of each tract's value at the next scheduled lease sale—known as the delayed value. The delayed value for the next sale is computed as the present value associated with the delay in leasing under the projected economic, engineering, and geological conditions—for example, by accounting for depletion of

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<sup>24</sup>The Fair Market Value Review Committee is responsible for, among other things, reviewing (1) geological and geophysical subsurface maps identifying prospects, (2) geological and geophysical data to support the range and distribution of each parameter used to estimate the volume and the nature of potential hydrocarbon accumulations on high-bid tracts, and (3) geological and economic risk parameters in support of BOEM's discounted cash flow computer model to determine resource net present value on high bid tracts, as well as (4) developing and providing guidance to the Geological Risk Committee, (5) vetting the fair market value process to ensure geologic and economic evaluations are technically and scientifically sound and defensible, (6) reviewing discounted cash flow model engineering and economic analysis to ensure consistent, reasonable, and defensible evaluation. See *Charter, Offshore Oil And Gas Resource Evaluation, Geological & Geophysical Section, Fair Market Value Review Committee, Bureau of Ocean Energy Management* (April 2019).

<sup>25</sup>Determining the likelihood of discovering oil and gas is known as geologic risk assessment, and is the process of subjectively estimating the chance that at least a single hydrocarbon accumulation is present in the area being assessed.

<sup>26</sup>Specifically, BOEM's modeling produces Monte Carlo simulations that are used to model the probability of different outcomes in a process that cannot easily be predicted due to the intervention of random variables. It is a technique used to understand the impact of risk and uncertainty in prediction and forecasting models.

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resources due to extraction from a nearby tract that shares access to the reservoir.<sup>27</sup>

Based on its valuations, the bureau establishes acceptable bid thresholds for the tracts. The acceptable bid threshold for each tract is the higher of: (1) the lesser of the present value and the delayed value or (2) the minimum bid per acre in instances in which BOEM's present and delayed valuations are below the minimum bid per acre.<sup>28</sup> If the high bid exceeds the acceptable bid threshold, BOEM concludes that the bid represents fair market value and accepts it and awards a lease. Conversely, if the high bid does not exceed the acceptable bid threshold, BOEM rejects the bid as inadequate and the tract is made available for lease at the next lease sale.<sup>29</sup>

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## Changes in Oil Prices and Royalty Rates Are Key Drivers of Changes in Bonus Bids

According to our empirical analysis of BOEM data and interviews with BOEM officials and industry representatives, changes in the price of oil and changes in royalty rates drive changes in the amount industry bids for offshore oil and gas leases. Specifically, the current and expected future price of oil are key factors determining bonus bid amounts, in the context of industry's assessment of the expected presence of hydrocarbon reserves for a given tract, the likelihood of success in developing those reserves, and the uncertainties in geological and seismic information.<sup>30</sup>

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<sup>27</sup>BOEM's delayed values also account for whether leasing revenues consisting of the bonus bid plus royalties or profit shares would be greater if the high bid were to be accepted, rather than rejected and the tract reoffered in the next available sale.

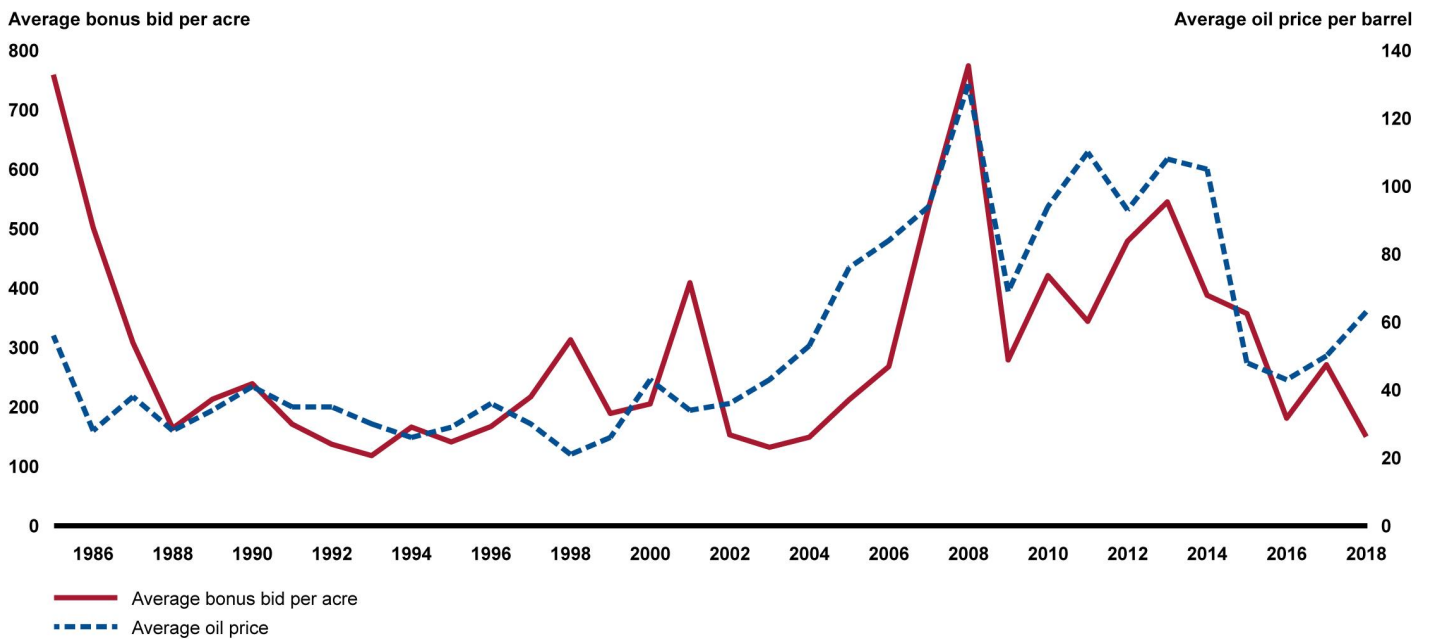
<sup>28</sup>BOEM can also accept bids below its valuations if they exceed the "revised arithmetic mean," which represents the average of the highest bid, all other bids that are at least 25 percent of the highest bid, and BOEM's current valuation of the tract.

<sup>29</sup>The bid adequacy procedures also permit BOEM to assess whether the results are consistent with ensuring receipt of fair market value and complying with other statutory goals, and if it concludes the results are not, then BOEM is permitted to utilize alternative procedures.

<sup>30</sup>Industry representatives told us that corporate processes for developing bids include proprietary assumptions to assess the (1) likelihood of hydrocarbon presence, type, quantity, and amount recoverable; (2) cost of exploration and development; (3) commodity price forecast for the duration of the lease; and (4) discount rate to develop a net present value of a given tract.

Specifically, our econometric model suggests a strong positive correspondence between higher oil prices and higher bonus bids; that is, when oil prices are higher, bonus bids tend to be higher and, conversely, when oil prices are lower, bonus bids tend to be lower.<sup>31</sup> For example, from 2006 through 2008, oil prices rapidly rose to historic highs. This period corresponded with an increase in average bonus bids in deep water from an average of about \$275 per acre in 2006 to an average of about \$800 per acre in 2008. Figure 3 shows the relationship between oil prices and per acre average bonus bids.

**Figure 3: Average Annual Oil Price per Barrel and Average Bonus Bid per Acre, in 2018 dollars**



Source: GAO analysis of data from Bureau of Ocean Energy Management and the Energy Information Administration. | GAO-19-531

<sup>31</sup>We used our econometric model to assess the effect of royalty rate changes on bonus bids. The model controlled for various factors that might affect bonus bids over time, such as technological improvement in seismic interpretation and the cost of exploration and development using annual fixed effects variables. In addition, the model included more limited controls for the expected hydrocarbon resources for a given tract. For detailed results of our model and analysis, see appendix I.

**Data table for Figure 3: Average Annual Oil Price per Barrel and Average Bonus Bid per Acre, in 2018 dollars**

Sale year	Real WTI oil price	Real high bid per acre
1985	56	759
1986	28	502
1987	38	308
1988	28	164
1989	34	213
1990	41	239
1991	35	171
1992	35	137
1993	30	118
1994	26	166
1995	29	141
1996	36	167
1997	30	217
1998	21	313
1999	26	189
2000	43	205
2001	34	409
2002	36	153
2003	43	132
2004	53	149
2005	76	212
2006	84	268
2007	94	535
2008	130	774
2009	69	279
2010	94	421
2011	110	344
2012	93	479
2013	108	545
2014	105	388
2015	48	357
2016	43	181
2017	50	271
2018	63	150

The results of our analysis are consistent with input from BOEM officials and industry representatives who told us that the price of oil is a key factor in industry bidding decisions.<sup>32</sup> Specifically, these officials and representatives explained that they use the current price of oil as a baseline for expectations regarding future prices of oil—that is, the price at which industry can sell the oil it produces. Therefore, high current oil prices lead to higher projections of future oil prices, thereby driving up bids. Likewise, they told us that industry bidding activity increases in high-price environments because production from existing wells provides financial resources companies can use to invest in acquiring additional leases. Moreover, according to these officials and representatives, higher oil prices make some tracts economically viable to develop that had been viewed as unprofitable at lower prices.

According to our analysis of BOEM data, changes in federal royalty rates also drive changes in the amount industry bids on offshore leases. Our econometric model indicates that increases in royalty rates lead to decreased bonus bids and, conversely, decreases in royalty rates lead to increased bonus bids. According to our model, during the royalty relief period from 1996 through 2000, when royalty rates were effectively zero,<sup>33</sup> bonus bids increased between 34 percent and 60 percent over what bonus bids would have been expected to be had the royalty rate remained at the pre-1996 rate of 12.5 percent. Specifically, we found that industry bid approximately 34 percent higher for leases sold in 1996, 1997, and 2000, when leases contained no royalty obligation until oil prices rose above a certain threshold. Similarly, industry bid approximately 60 percent higher for leases sold in 1998 and 1999, when leases carried no royalties for the life of the lease. However, changes in oil prices can work to counter the effect of royalty rate changes on bonus bids. For example, between 2006 and 2008, royalty rates in water depths greater than 400 meters increased from 12.5 percent to 18.75 percent. Based on our model, this royalty rate increase would have a significant

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<sup>32</sup>According to BOEM officials and industry representatives, the expected quality of the hydrocarbon resource—the likelihood of hydrocarbon presence, type, quantity, and amount recoverable—is the primary determinant in whether industry will consider pursuing a lease for a given tract. Given expectations about the quality of resources on a lease, industry is likely to bid more for a lease when oil prices are high than when they are low.

<sup>33</sup>In 1995, Congress passed the Outer Continental Shelf Deep Water Royalty Relief Act, which waived or reduced the amount of royalties that companies would otherwise be obligated to pay on the initial volumes of production from certain deep water tracts leased from 1996 through 2000.

downward effect on bonus bids.<sup>34</sup> However, the rapid increase in oil prices during this period resulted in the net effect of an increase in bonus bids for these tracts by more than 150 percent.

Our findings are consistent with the views of BOEM officials and industry representatives, who told us that lower royalty rates increase industry bidding because lower royalties result in higher industry tract valuations. Specifically, the smaller financial commitments to the government associated with lower royalty rates increases the projected value of any oil or gas produced. BOEM officials and industry representatives told us that, in turn, the increased projected value of these tracts would lead to increases in the dollar value of individual bids as well as the number of bids submitted. For example, they cited the royalty relief period of 1996 through 2000 as responsible for a significant increase in bidding activity during that time.

However, while decreases in royalty rates lead to higher bonus bids, they may still lead to lower overall federal offshore oil and gas revenues. Specifically, our model estimates and BOEM data show that eliminating royalties for tracts leased between 1996 and 2000 would have increased overall bonus bids for those tracts by at most about \$1.98 billion over what they would have been had royalty rates remained at their pre-1996 rate of 12.5 percent.<sup>35</sup> However, forgone royalty revenue was more than nine times greater. Specifically, Interior data show approximately \$18.0 billion in forgone royalty payments on these leases through the end of 2018. Because most of these leases are still in production, this estimate does not represent the final total of forgone royalty payments.

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<sup>34</sup>Our results showed a significant effect of royalty rates of 18.75 percent relative to 12.5 percent. However, our results did not show a significant effect of royalty rates of 16.67 percent relative to 12.5 percent, which may be due to a lack of statistical power and that relatively modest differences in royalty rates have only a small impact of bonus bids.

<sup>35</sup>To determine the high bound of additional bid revenue collected due to royalty relief, we applied the 60 percent rate increase observed for leases sold in 1998 and 1999—when no price threshold provisions were included in lease terms—across all deep water leases sold from 1996 through 2000.

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## BOEM Regularly Assesses Potential Changes to Fiscal Terms but Has Made Limited Progress in Developing a Progressive Royalty Structure

BOEM regularly assesses potential changes to fiscal terms in annual and supplementary lease sale-specific analyses. Additionally, BOEM has advertised its development of a progressive, priced-based royalty system for 6 years but has made little demonstrable progress toward developing this system.

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### BOEM Regularly Assesses Potential Changes to the Fiscal Terms

Based on our review of planning documents for lease sales held from March 2016 through August 2018, BOEM regularly assesses potential changes to fiscal terms in annual and supplementary lease sale-specific analyses. BOEM's annual analyses consider various factors that can affect the fiscal system, and its lease sale-specific analyses build on those factors to inform fiscal terms for individual sales.

### BOEM Conducts an Annual Analysis That Informs Fiscal Term Options

BOEM conducts an annual analysis of various factors affecting the offshore fiscal system that informs its development of fiscal term options for all lease sales to be held in the subsequent year.<sup>36</sup> According to our review of BOEM documentation and interviews with bureau officials, factors BOEM considers include the following:

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<sup>36</sup>BOEM documents its findings in Lease Term Reassessment Reports. BOEM began documenting these analyses in response to a recommendation we made in December 2013. See [GAO-14-50](#).



- **Resource potential.** BOEM estimates the likely amount of undiscovered recoverable oil and gas resources remaining in the region based on the bureau's most recent national assessment.<sup>37</sup>
- **Market conditions.** BOEM assesses trends in oil and gas prices as well as forecasts from the Department of Energy's Energy Information Administration, the World Bank, and the Office of Management and Budget. BOEM uses these assessments to estimate, under existing fiscal terms, results for the lease sales covered by the analysis—including the amount of bonus bids collected and the number of tracts sold—as well as resulting production and net economic value under various price scenarios.<sup>38</sup>
- **Leasing, drilling, development, and production activity.** BOEM reviews industry activity over the previous several years, including leases purchased, companies participating in lease sales, exploration and development drilling, new facility installations, and oil and gas production trends.
- **Industry news.** BOEM considers industry perception of its fiscal terms by evaluating industry estimates of break-even thresholds (oil and gas market prices at which production from a given area is cost-effective at current costs of production) and announcements of new discoveries, projects, and production.
- **International considerations.** BOEM reviews the fiscal terms of international jurisdictions to assess how they compare with the U.S. system.<sup>39</sup>

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<sup>37</sup>BOEM's national assessments provide estimates of undiscovered, technically, and economically recoverable oil and natural gas resources located outside of known oil and gas fields on the Outer Continental Shelf. These assessments consider recent geophysical, geological, technological, and economic information and utilize a probabilistic play-based approach to estimate the undiscovered technically recoverable resources of oil and gas for individual geologic plays. Undiscovered technically recoverable resources are resources that are yet to be discovered but that may not be profitable to develop with current prices or other economic conditions. Undiscovered economically recoverable resources are resources yet to be discovered, in quantities that BOEM estimates will be profitable to develop at specified oil and gas prices.

<sup>38</sup>Net economic value is the estimated return to society from producing oil and gas domestically rather than purchasing equivalent imports.

<sup>39</sup>BOEM's procedures for assessing the fiscal system require an annual analysis of topical aspects of international fiscal systems, along with a decennial comprehensive analysis comparing the U.S. offshore fiscal system with international offshore fiscal systems.

Within this context, BOEM considers potential changes to its fiscal terms by estimating their effects on outcomes including leasing activity, production, and revenue at various oil and gas prices. For example, in its annual analysis for its August 2017 and March 2018 lease sales, BOEM analyzed the potential effect of five royalty rate changes from the 18.75 percent rate that had been in place since 2008. Two of the potential changes were targeted to specific types of production or water depths and three would apply to all production. For the targeted changes, BOEM considered (1) a lower natural gas royalty and (2) a lower shallow water royalty—both at the statutory minimum of 12.5 percent. The other potential changes were to lower royalty rates on all production to (1) 12.5 percent, (2) 15 percent, and (3) 16.67 percent. For each of these scenarios, BOEM modeled effects on overall production and revenue at various market prices.<sup>40</sup>

### BOEM Conducts Lease Sale-Specific Analysis and Makes Recommendations

Based on our review of BOEM lease planning documents, BOEM conducts additional lease sale-specific analysis before finalizing the fiscal terms for each sale. For example, BOEM considered changes to each of the fiscal terms for its August 2018 lease sale—minimum bid, rental rates, and royalty rate—but recommended that they not change from the previous sale.<sup>41</sup> Specifically:

- **Minimum bid.** BOEM evaluated lowering the minimum bid for tracts in water depths of greater than 400 meters to account for the effects of decreases in (1) oil prices since BOEM raised the minimum bid to \$100 in 2011 and (2) corporate tax rates per the Tax Cuts and Jobs Act of 2017.<sup>42</sup> BOEM found that, because of these changes, a \$100 per acre minimum bid in 2018 was roughly equivalent to a \$170 per acre minimum bid in 2011 and that maintaining the \$100 per acre minimum bid in 2018 could reduce the number of tracts sold.

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<sup>40</sup>BOEM also estimated the effect that lower royalty rates would have on the economic viability of otherwise marginal tracts, decommissioning of infrastructure, and regional employment.

<sup>41</sup>BOEM officials told us that they generally brief the department leadership in advance of both the proposed and final stages of lease sale planning and that they conduct additional analysis in the interim if requested.

<sup>42</sup>Pub. L. No 115-97, 131 Stat. 2054 (Dec. 22, 2017).

However, BOEM assessed that industry has recently shown a preference for holding less acreage, evidenced by relinquishments and bidding on fewer blocks. Therefore, BOEM determined that lowering the minimum bid might not have the desired effect of increasing tracts leased; instead, it could lead to the same number of blocks being sold but with lower total bonus bid revenue.

- **Rental rate.** BOEM evaluated adjusting the rental rate to account for inflation since the last adjustment in 2009. It also evaluated increasing the rental rate in water depths greater than 400 meters to \$20 per acre to provide additional financial incentive to explore leases. However, BOEM did not recommend this option since it reported that it expected the effects to be minor.
- **Royalty rate.** BOEM evaluated the effect of lowering the royalty rate to 12.5 percent for two scenarios: (1) tracts with water depths between 200 and 400 meters and (2) all tracts. BOEM recommended leaving the royalty rate at 18.75 percent for all tracts deeper than 200 meters.<sup>43</sup> In doing so, the bureau cited little effect for lowering the rate for tracts with water depths between 200 to 400 meters—it projected less than a 0.1 percent increase in production and less than 0.1 percent decrease in revenue. BOEM also cited more substantial projected drops in overall revenue of 17 to 19 percent, paired with modest increases in production (1 to 2 percent increase in oil production and 2 to 5 percent increase in gas production) for lowering the royalty rate for all tracts.<sup>44</sup> BOEM also found that these losses to the federal government could be even more substantial if oil prices rise in the future.

BOEM officials told us that, in general, they prefer to make minor iterative changes to fiscal terms in order to better gauge their effects—that is, they find it easier to measure the effects of a change to one term at a time rather than the effects of reconfiguring multiple terms—as well as provide predictability for industry. In keeping with this approach, BOEM has made one change to its royalty rate since 2012 (see table 1 for details on the recent history of lease terms in the Gulf of Mexico). Specifically, in advance of its August 2017 lease sale, BOEM announced a reduction in

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<sup>43</sup>BOEM lowered the royalty rate from 18.75 percent to 12.5 percent for tracts in less than 200 meters of water beginning in its August 2017 lease sale.

<sup>44</sup>BOEM projected a 16 to 20 percent increase in bonus bids, a 2 to 3 percent increase in rents, and a 30 percent reduction in royalties. Our econometric model observed a reduction in bonus bids of 42 percent when the royalty rate was increased from 12.5 percent to 18.75 percent from 2006 to 2008.

royalty rate for tracts with water depths of less than 200 meters from 18.75 percent to the statutory minimum of 12.5 percent. According to BOEM documentation, the driving factor for this decision was that shallow water in the Gulf of Mexico has been largely explored, leaving generally marginal tracts that either are largely depleted of resources or more gas prone. In turn, the goal in reducing the royalty rate was to incentivize additional industry interest in these more marginal shallow water tracts.

**Table 1: History of Fiscal Terms for Gulf of Mexico Outer Continental Shelf Oil and Gas Leases 2005 through 2018**

Sale date	Lease terms	Water depth (meters)			
		0-200	200-400	400-800	>800
8/17/2005 – 8/16/2006	Rent (\$/acre)	6.25	9.50	9.50	9.50
	Minimum bid (\$/acre)	25.00	25.00	37.50	37.50
	Royalty rate (%)	16.67	16.67	12.50	12.50
8/22/2007 - 10/3/2007	Rent (\$/acre)	<b>6.25</b>	<b>9.50</b>	9.50	9.50
	Minimum bid (\$/acre)	25.00	25.00	37.50	37.50
	Royalty rate (%)	16.67	16.67	<b>16.67</b>	<b>16.67</b>
3/19/2008 - 8/20/2008	Rent (\$/acre)	6.25	9.50	9.50	9.50
	Minimum bid (\$/acre)	25.00	25.00	37.50	37.50
	Royalty rate (%)	<b>18.75</b>	<b>18.75</b>	<b>18.75</b>	<b>18.75</b>
3/18/2009 – 3/17/2010	Rent (\$/acre)	<b>7.00</b>	<b>11.00</b>	<b>11.00</b>	<b>11.00</b>
	Minimum bid (\$/acre)	25.00	25.00	37.50	37.50
	Royalty rate (%)	18.75	18.75	18.75	18.75
12/14/2011 - 3/22/2017	Rent (\$/acre)	7.00	11.00	11.00	11.00
	Minimum bid (\$/acre)	25.00	25.00	<b>100.00</b>	<b>100.00</b>
	Royalty rate (%)	18.75	18.75	18.75	18.75
8/16/2017 – 6/30/2018	Rent (\$/acre)	7.00	11.00	11.00	11.00
	Minimum bid (\$/acre)	25.00	25.00	100.00	100.00
	Royalty rate (%)	<b>12.50</b>	18.75	18.75	18.75

Source: GAO analysis of Bureau of Ocean Energy Management data. | GAO-19-531

Notes: Bolded and shaded cells indicate changes in fiscal terms. One meter equals about 3.28 feet. The royalty rate is the percentage of the value of production paid to the federal government. Leases may be eligible for royalty relief as required by statute. Certain leases include royalty relief provisions for shallow water deep gas, and other leases may be eligible to apply for shallow water deep gas royalty relief, as specified by statute and regulations. Leases resulting from sales held after 2000 may be issued with certain royalty relief provisions, and all leases obtained after 2000 in water depths greater than 200 meters are also eligible to apply for royalty relief. Rent per acre is for years 1 through 5 of the lease. For lease durations of longer than 5 years, some rental rates escalate in subsequent years.

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## BOEM Has Made Little Headway in Developing a Progressive Royalty System

BOEM has publicized the development of a progressive royalty system since 2013 but has made little demonstrable headway toward developing such a system.<sup>45</sup> Specifically, in its budget justifications for fiscal years 2014 through 2017, BOEM stated it was developing a package of legislative and administrative proposals to, among other things, improve the return to the federal government from the sale of these federal resources. Among these proposed reforms was a price-based tiered royalty rate to replace the fixed royalty rate structure that BOEM has used since 1983. Under a price-based royalty system, the royalty rate would depend on prevailing commodity prices, with lower prices having lower royalty rates. According to BOEM documents, the current flat-rate royalty system is regressive—that is, a fixed rate that does not adapt to market conditions or the relative success of a lease—but a price-based royalty would share more revenue risk with the lessee and reduce the regressive nature of the system. A more progressive system would provide an increased incentive to lessees to develop resources during times of low oil and gas prices through lower royalty rates, while also ensuring that the federal government receives a greater return for offshore resources when prices are high. BOEM officials we interviewed told us that this type of adaptive system could be more efficient and provide higher returns relative to the existing fixed-rate system. That is, if properly designed, a priced-based system could increase return to the federal government in high-price environments while incentivizing continued industry investment when prices are low.

According to BOEM documentation, a progressive, price-based royalty rate could have the additional benefit of “future-proofing” the royalty system because it would adjust the rate for whatever prices prevail in the future and provide a stable, predictable market for industry. We reported

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<sup>45</sup>We previously reported that progressive systems are responsive to economic and market conditions and include features such as royalty rates that increase with oil and gas prices. Progressive systems are more stable than regressive systems because their built-in flexibility reduces incentives for industry or the public to push for ad hoc changes in fiscal terms as future prices change. Flexibility does not mean changing the fiscal terms of existing contracts but having a system in place that automatically adjusts to changing economic and market conditions. GAO, *Oil and Gas Royalties: The Federal System for Collecting Oil and Gas Revenues Needs Comprehensive Reassessment*, [GAO-08-691](#) (Washington, D.C.: Sept. 3, 2008). According to BOEM officials, the bureau has been considering a price-based royalty since at least 2012.

in September 2008 that the regressive nature of the offshore fiscal system, among other factors, caused it to be unstable over time and added risk to oil and gas investments that may reduce the total amount industry is willing to pay for the rights to explore and develop federal leases.<sup>46</sup> BOEM officials told us such a system that automatically adjusts could reduce the need for frequent revisiting and continual annual and lease sale-specific evaluations because it would automatically adapt to certain market conditions. According to these officials, a stable, long-lived system would also reduce political pressure to restructure it or rely on legislation—such as the Deep Water Royalty Relief Act<sup>47</sup>—in the future.

Additionally, long-term stability in the royalty system could benefit industry, according to a 2007 study.<sup>48</sup> Specifically, industry may consider fiscal system stability more important than the attractiveness of fiscal terms, as the appeal of low government revenue—incorporating bids, rents, and royalties—is limited if there is a high probability the terms will change. In the context of the offshore fiscal system, this means that some companies might prefer a flexible rate that lowers their royalty obligations in low-price environments so long as BOEM clearly defines the specific market conditions under which royalty rates would increase or decrease.

BOEM has continued to publicize its efforts to develop a price-based royalty system—though it did not complete them—as follows:

- **July 2017:** BOEM announced in a “note to stakeholders” that it was continuing to analyze a price-based royalty system and would subsequently engage stakeholders on this concept; however, it did not do so.
- **January 2018:** BOEM released the *2019-2024 National Outer Continental Shelf Leasing Draft Proposed Program*, which states that the bureau was studying a priced-based royalty structure as an alternative to the existing fixed royalty rate.
- **February 2018:** BOEM’s memorandum documenting lease term decisions for its March 2018 lease sale stated that the bureau was evaluating a potential future option for a price-based mechanism that

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<sup>46</sup> [GAO-08-691](#).

<sup>47</sup> Pub. L. No. 104-58, 109 Stat. 563 (1995).

<sup>48</sup> Wood Mackenzie, *Government Take: Comparing the Attractiveness and Stability of Global Fiscal Terms* (June 2007).

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would lower royalty rates at current oil prices while increasing rates above the current 18.75 percent royalty rate as price conditions warrant.

- **Spring 2018:** In the Lease Term Reassessment Report covering its August 2018 and March 2019 lease sales, BOEM indicated that the statutory floor of 12.5 percent might not be low enough to encourage new exploration and development, particularly for smaller fields for which a lower royalty would have a reduced financial benefit and effect on early cost recovery than for larger fields. As a result, BOEM was considering incorporating into its price-based royalty the suspension of royalty collection for a certain initial volume of oil or gas produced to effectively lower the royalty rate below the statutory minimum and incentivize the development of smaller, marginal fields.

However, BOEM has demonstrated little tangible progress in the 6 years since it began publicizing the development of a more progressive royalty system. BOEM officials told us that the general concept for a price-based royalty is robust, but the bureau has not determined optimal parameters for sharing risk when prices are low in return for a higher return when prices are higher. BOEM drafted a *Federal Register* notice and accompanying procedures for implementing a price-based royalty system that the bureau intended to publish to obtain public comment. These draft procedures include different permutations of royalty rates and price thresholds. However, BOEM officials told us that feedback from within the bureau included enough concerns about workability that the draft notice and procedures were not published and the draft no longer reflects bureau leadership's position on the issue.

According to BOEM officials, the main challenges to a price-based system are determining optimal rates and price thresholds for escalating royalties and quantifying the benefits to the government at lower price levels when government revenue would be lower than under the current regressive system. BOEM officials also cited additional challenges, including establishing price inflation parameters and developing mechanisms for assessing and collecting royalty payments on a sliding scale.<sup>49</sup>

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<sup>49</sup>Additionally, BOEM officials said that they would expect resistance from any state that receives a share of royalties per the requirements of the Gulf of Mexico Energy Security Act of 2006 (Pub. L. No. 109-432, Division C, Title I.).

After the development of the draft *Federal Register* notice and procedures, according to BOEM officials, they continued to work on a price-based royalty model. However, they did not provide us documentation of any progress made. BOEM officials told us that the concept is too immature to consider testing implementation on a pilot project basis and that there is not a time frame for when any decisions will be made, including whether to proceed with developing the system. According to federal standards for internal control, agency management should define objectives clearly to enable the identification of risks and define risk tolerances.<sup>50</sup> This involves clearly defining what is to be achieved, who is to achieve it, how it will be achieved, and the time frames for achievement. Developing a documented plan for assessing whether and how to implement a progressive royalty structure that defines these aspects would help position BOEM to better understand (1) the potential benefits such a structure could offer in terms of improving fair return to the taxpayer while fostering diligent offshore oil and gas development and (2) how to implement such a structure if it elects to do so.

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## BOEM's Tract Valuation Process Might Not Fully Assure Receipt of Fair Market Value

BOEM's tract valuation process might not fully assure receipt of fair market value, according to our analysis of BOEM tract valuation data and documentation. BOEM's valuations for tracts were generally low relative to industry bids, largely due to the cumulative effect of three aspects of its bid valuation process: (1) the bureau forecasts conservatively to account for uncertainties, (2) the bureau forecasts unreasonably high levels of depreciation, and (3) BOEM selectively further lowers many valuations from its model to justify accepting bids it otherwise would reject. In addition, BOEM conducts limited self-evaluations of its tract valuation process and does not have a systematic mechanism to address deficiencies, such as those described above.

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<sup>50</sup>[GAO-14-704G](#).



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## BOEM's Valuations Were Generally Low Compared to Industry Bids

BOEM's valuations for tracts it determined to be economically viable were generally low relative to industry bids.<sup>51</sup> Specifically, from March 2000 through June 2018, BOEM's acceptable bid threshold for the 2,035 tracts on which it conducted valuations was, on average, about one-third of industry's high bid (about \$2.26 million to \$6.43 million, respectively, as shown in table 2).<sup>52</sup> BOEM accepted the high bid on about 85 percent of tracts it determined to be viable (1,721 of 2,035), for a total of about \$12.8 billion in bid revenue, and it rejected about 15 percent of high bids (314 of 2,035) totaling about \$287 million. BOEM's bid rejections generally resulted in higher bids for the same tracts in subsequent lease sales, significantly increasing bid revenue for these tracts and indicating that industry viewed those tracts as more valuable than the original rejected bid. Specifically, for the 314 bids worth about \$287 million that BOEM rejected, BOEM subsequently accepted bids for almost 70 percent of the tracts (161 of 236) for about \$667 million—more than twice (about 230 percent) the aggregate rejected value for those tracts.<sup>53</sup>

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<sup>51</sup>BOEM assessed about 19 percent of tracts receiving bids as economically viable (2,124 of 10,945). On average, the bid per tract for tracts assessed as viable was more than seven times that of tracts assessed as nonviable (about \$6.80 million to \$961,000, respectively). Additionally, BOEM did not conduct valuations on the 89 bids for viable tracts it accepted for \$1.37 billion under its now-defunct "number of bids" categorical rule that it stopped using in 2014.

<sup>52</sup>BOEM's acceptable bid threshold represents either (1) the lower of its present or delayed valuations, (2) the minimum bid level, or (3) the "revised arithmetic mean" if a bid is below BOEM's valuations but meets certain criteria. The delayed valuation is BOEM's discounted projection of what the tract's valuation will be at the subsequent lease sale. BOEM uses the lesser of the present value and the delayed value as its acceptable bid threshold unless that value is below the regulatory minimum bid per acre, in which case the minimum bid level is used as the acceptable bid threshold. BOEM also employs its "revised arithmetic mean" categorical rule as the acceptable bid threshold if the bid is below BOEM's present and delayed valuations but above the average of the highest bid, all other bids that are at least 25 percent of the highest bid, and BOEM's present valuation of the tract.

<sup>53</sup>The total number of rejections for these 236 tracts—314—reflects that some tracts received bids that BOEM rejected at more than one lease sale. Additionally, the estimated return of 230 percent is conservative because we aggregated all rejected bids on a given tract when comparing them against an accepted bid.

**Table 2: Bureau of Ocean Energy Management (BOEM) Acceptable Bid Thresholds, March 2000 through June 2018, in 2018 Dollars**

	Number of bids	Average BOEM acceptable bid threshold (2018 dollars)	Average industry high bid (2018 dollars)
Accepted bids	1,721	2,058,563	7,436,193
Rejected bids	314	3,359,502	913,092
<b>Overall</b>	<b>2,035</b>	<b>2,259,297</b>	<b>6,429,680</b>

Source: GAO analysis of BOEM data. | GAO-19-531

Note: BOEM accepted 35 bids that were lower than its valuations for \$125 million using its “revised arithmetic mean” categorical rule.

BOEM’s acceptable bid thresholds were generally low relative to industry bids due to three compounding aspects of its valuation process: (1) BOEM conservatively forecasts the key parameters used in its valuation model, (2) BOEM forecasts unreasonably high levels of depreciation between lease sales, which further lowers acceptable bid thresholds, and (3) BOEM alters many valuations—valuations that are already low due to the two preceding aspects of its process—downward further in order to justify accepting bids.

BOEM Conservatively Forecasts Key Parameters Used in Its Model

BOEM officials told us that they forecast conservatively to account for uncertainties, which systemically lowers its tract valuations. Specifically, they told us that they face significant uncertainties associated with the key parameters that contribute to BOEM’s valuations: resource potential, probability of geologic success, price of oil and gas, and cost and scheduling estimates.<sup>54</sup> They told us that they forecast each of these parameters conservatively—that is, being cautious against overestimating any factor that might unreasonably inflate the bureau’s valuation—so as to not reject bids that might represent fair market value. BOEM’s conservative approach is evidenced by its reluctance to reject bids of significant value. Specifically, from March 2000 through June 2018, BOEM rejected three bids of more than \$5 million dollars—the highest was for approximately \$11.2 million—while accepting 570 bids of more than \$5 million.<sup>55</sup> BOEM officials told us that this conservative approach

<sup>54</sup>Industry officials with whom we spoke told us that industry faces similar levels of uncertainty in the process of determining how much to pay for a tract at auction.

<sup>55</sup>BOEM determined these 570 tracts to be viable and subjected them to its valuation process. BOEM accepted an additional 216 bids of at least \$5 million for tracts it determined to be nonviable.

represents fair market value because the objective of the bureau's tract valuation process is to lease tracts and collect associated revenues except when BOEM determines a tract is worth significantly more than the highest bid received. That is, they told us that the bureau is more inclined to accept bids and collect revenue—and facilitate exploration and development via the award of leases—rather than reject bids. Moreover, they told us that this approach also provides the bureau with greater justification for rejecting the bids when it does so, which they said can drive up subsequent bids for the same tracts.

### BOEM Forecasts Unreasonably High Levels of Depreciation

BOEM forecasts unreasonably high levels of depreciation as compared to the government's recommended discount rate, which further depresses acceptable bid thresholds that were already based on conservative forecasting. As discussed previously, BOEM's acceptable bid threshold is generally determined by the lesser of BOEM's present valuation and its delayed valuation.<sup>56</sup> For the 1,412 tracts with a positive present valuation assessed from March 2000 through June 2018, BOEM forecast a median loss in value on these tracts would be about 23 percent (about \$494,000) by the time of the next sale opportunity for those tracts.

BOEM officials told us that expected lower future values are generally due to discounting the eventual collection of revenue. Specifically, BOEM officials explained that the bureau's model considers the delayed collection of revenue—bonus bids and royalties—when developing its delayed values.<sup>57</sup> However, because tracts that received a rejected bid would be available for sale during the next year—or, more recently, 6 months on average—the period of discounting is very short. Discounting seems an unreasonable explanation of BOEM's forecasted depreciation rates for two additional reasons. First, BOEM's forecasted depreciation rates do not align with industry bidding patterns for tracts that were leased more than once—where the lease for a tract either expired or the

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<sup>56</sup>If the lower of the present or delayed values is lower than the minimum bid level, the minimum bid level becomes the acceptable bid threshold. If a bid is below the lower of the present or delayed value but meets certain categorical criteria per BOEM's "revised arithmetic mean" rule, the "revised arithmetic mean" becomes the acceptable bid threshold.

<sup>57</sup>BOEM officials also told us that its modeling cannot take into account other long-term factors, such as technological innovations or market changes, which could affect the value of tracts beyond the subsequent lease sale.

leaseholder relinquished it and the tract was therefore available at a subsequent lease sale. Specifically, for the 61 tracts that were leased more than once from March 2000 through June 2018, bids actually increased slightly over time (bids increased at a real average annual rate of 0.2 percent, or about \$6,700). Second, since oil prices are generally forecast to rise, the underlying oil and gas resource values would be expected to increase over time rather than decrease, suggesting a smaller difference between present and delayed values should be observed than is reflected in BOEM's tract valuations.

Additionally, BOEM's forecasted depreciation has increased even though tracts are now available twice as frequently. Until August 2017, BOEM held annual lease sales for each of two lease areas so that tracts were available once per year. On average during this time, BOEM forecast that the median loss in value for tracts with positive present valuations would be approximately 23 percent (about \$481,000) of their value in the year between lease sales (see table 3). BOEM has since made tracts available twice per year. Having less time between lease sales should decrease the amount of forecasted depreciation, as there is less time for discounting. Yet the average difference between present and delayed value increased for biannual lease sales to about 27 percent (or about \$1.03 million per tract) for tracts with a positive present valuation. BOEM's depreciation for biannual lease sales is equivalent to an annual rate of approximately 47 percent (or about \$1.78 million annually per tract),<sup>58</sup> which is nearly seven times the Office of Management and Budget's annual recommended discount rate of 7 percent.<sup>59</sup> That BOEM's forecasted depreciation has increased since moving to biannual lease sales is also at odds with the concept of how discounting should affect tract valuations, as shorter periods of time are generally associated with lower depreciation than longer periods of time.

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<sup>58</sup>We extrapolated an annualized depreciation rate by applying an additional 27 percent reduction to the observed biannual depreciation values.

<sup>59</sup>Office of Management and Budget, *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*, Office of Management and Budget Circular No. A-94. OMB's guidelines state that "the standard criterion for deciding whether a government program can be justified on economic principles is net present value—the discounted monetized value of expected net benefits." Depending on the situation, the guidelines call for agencies to use different discount rates and do not require that BOEM use any specific rate. However, for the benefit-cost analysis of public investments that provide benefits and costs to the general public, OMB asks that agencies use a real discount rate of 7 percent.

**Table 3: Median Bureau of Ocean Energy Management (BOEM) Forecasted Depreciation for Tracts with Positive Present Valuations, March 2000 through June 2018, in 2018 Dollars**

	BOEM Present Valuation				Overall
	\$0 to \$1 million	\$1 to \$5 million	\$5 million to \$10 million	Greater than \$10 million	
<b>Annual tract availability</b>					
Number of Tracts	338	707	198	134	<b>1,377</b>
Depreciation (percent)	-26.01	-20.53	-25.60	-22.67	<b>-22.72</b>
Depreciation (2018 dollars)	-109,415	-459,042	-1,819,795	-4,350,790	<b>-480,824</b>
<b>Biannual tract availability</b>					
Number of Tracts	5	21	8	1	<b>35</b>
Depreciation (percent)	-7.21	-28.06	-25.63	-58.62	<b>-26.64</b>
Depreciation (2018 dollars)	-17,134	-770,728	-1,888,220	-10,005,775	<b>-1,025,070</b>

Source: GAO analysis of BOEM data. | GAO-19-531

Note: Depreciation is the percentage difference between BOEM’s present valuation and its delayed valuation of a given tract.

Under federal standards for internal control, management should use quality information to achieve the entity’s objective.<sup>60</sup> Yet, according to our analysis of BOEM data, the bureau’s unreasonably large forecasts of depreciation have increasingly been the deciding factor in decisions to accept bids. Cumulatively, BOEM’s high forecasted level of depreciation resulted in the bureau accepting 205 bids for about \$672 million that it would have rejected if its present valuations had been used as the acceptable bid threshold. Based on the return BOEM has realized on rejected bids, had BOEM rejected these 205 bids, it might have subsequently collected more than \$873 million in additional bid revenue for these tracts, which would represent an increase in overall bid revenue of about 6.8 percent for tracts BOEM determined to be viable.<sup>61</sup>

BOEM officials told us that they were unaware that their model forecasts such high rates of depreciation and that the issue warrants further examination. However, BOEM officials did not indicate they had any plans to conduct such an examination. Though BOEM is not required to follow

<sup>60</sup>GAO-14-704G.

<sup>61</sup>As discussed above, the observed return on all rejected bids from March 2000 through June 2018 was approximately 230 percent. This average includes some bids for which BOEM’s assessed valuation was many multiples of industry’s high bid and for which we would expect a large return on BOEM’s rejection. For rejected bids where BOEM’s valuation was up to twice industry’s high bid, the return was approximately 213 percent.

government auditing standards, these standards highlight that it can be beneficial to consult an independent third party to assess issues that are highly technical as a safeguard to eliminate threats to independence or reduce them to an acceptable level.<sup>62</sup> As BOEM developed and has used its delayed valuations for at least 20 years, outside perspectives and expertise could be beneficial. Enlisting an independent third party to examine the extent to which the bureau's use of delayed valuations assures receipt of fair market value, and making changes—such as terminating the use of delayed valuations as acceptable bid threshold criteria or amending its model's assumptions to develop more justifiable depreciation rates—as appropriate, would help BOEM mitigate risks of continuing to accept bids based on poor information on tracts' future values.

### BOEM Further Lowered Many Valuations to Justify Bid Acceptance

Our analysis of BOEM data as well as BOEM testimony indicate that the bureau changed its forecasting parameters, thereby lowering many valuations and acceptable bid thresholds—which were already systematically low due to its conservative forecasting and excessive depreciation—in order to justify accepting bids. BOEM officials told us that when bids are slightly below the bureau's initial valuations—and therefore would be rejected per BOEM's procedures for ensuring receipt of fair market value—BOEM reviews and adjusts its forecasting parameters then reruns its model in order to produce new valuations, which they told us can—and which the data indicate generally do—result in lower valuations that justify accepting the bids.<sup>63</sup> BOEM officials told us that they would rather accept bids offered by industry—as well as any associated rental and royalty revenue—than reject them and potentially never recoup the forgone bid revenue.

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<sup>62</sup>GAO, *Government Auditing Standards: 2018 Revision*, [GAO-18-568G](#) (Washington, D.C.: July, 2018).

<sup>63</sup>The data indicate that rarely, if ever, do BOEM's further iterations cause its valuations to increase, which would be just as likely an outcome as a reduction if its further iterations were unbiased in a statistical sense. Specifically, if further iterations of analysis were not introducing more conservative assumptions, but reflected unbiased additional scenarios based on the existing assumptions, the expected outcomes would lead to increases in valuations as often as reductions. Therefore, the data appear to indicate that the further iterative analysis introduces systematically more conservative assumptions.

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We observed BOEM's bias, or statistical anomalies, indicating BOEM lowered a portion of its valuations in order to accept bids in our analysis of BOEM tract valuation data from March 2000 through June 2018. Specifically, we found that BOEM never valued a tract as being worth slightly more than industry's high bid (that is, instances in which BOEM's valuation is between 100 and 125 percent of the high bid). In contrast, BOEM valued tracts at slightly less than the industry high bid (that is, instances in which the high bid is between 100 and 125 percent of BOEM's valuation) about 10 percent of the time (117 of the 1,198 bids subjected to valuation for which the acceptable bid threshold was above the minimum bid level).<sup>64</sup> This anomalous absence of any instances in which BOEM valued tracts slightly more than industry is consistent with BOEM officials' statements that the bureau further lowered its initial valuations when these valuations were only slightly higher than bids.

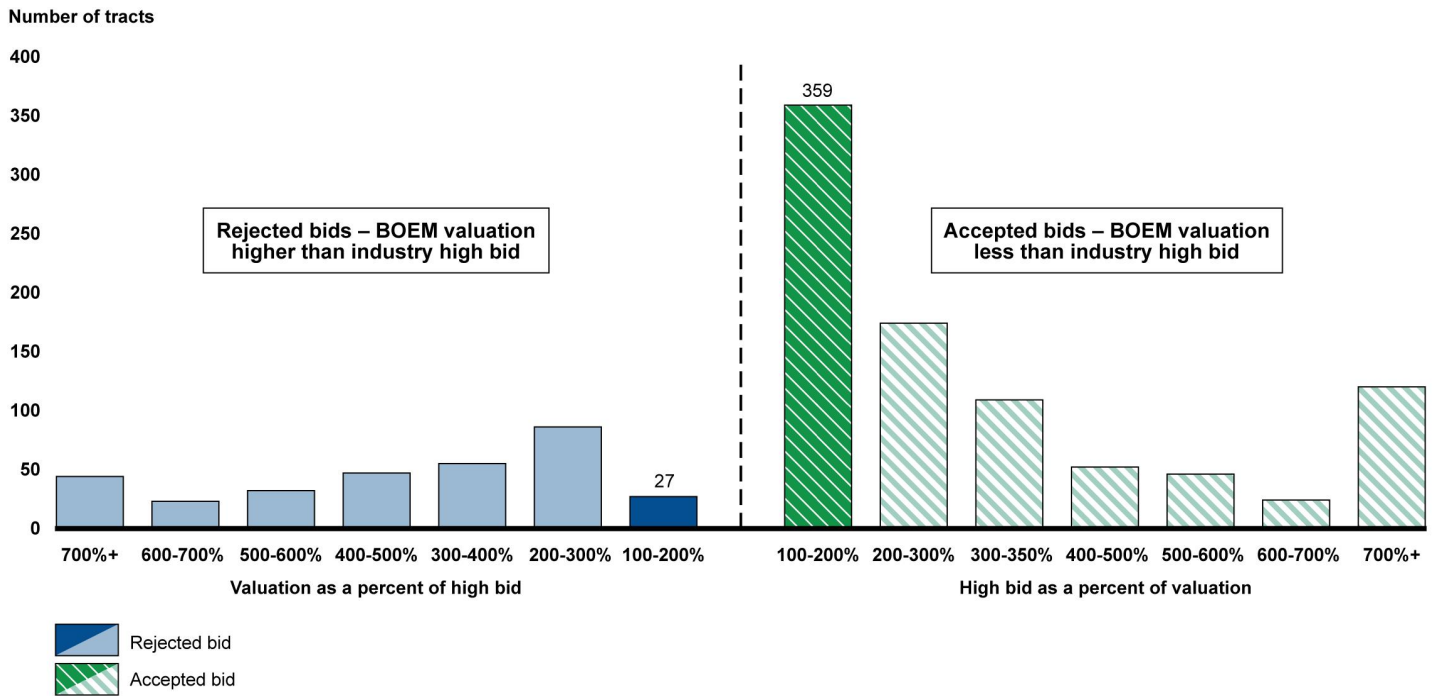
BOEM officials suggested that any pattern of adjusting valuations would be limited to lower-value bids whereby smaller dollar-value changes would represent greater percentage changes. However, the data do not support this, as we found that BOEM's bias toward lowering valuations does not appear to be limited to those slightly above industry's high bid, but is nearly systematic for valuations up to double industry's high bid across all bid levels. Figures 4 and 5 show the distribution of BOEM's valuations compared with industry's high bids, with green data points reflecting accepted bids and blue data points reflecting rejected bids. In particular, the middle two bars in figure 4 and the areas between the dotted lines on figure 5 represent instances in which the relationship between BOEM's valuation and industry's high bid—and vice versa—were relatively close (that is, BOEM's valuation was up to double industry's bid for rejected bids, and industry's bid was up to double BOEM's valuation for accepted bids). Within this range, BOEM's tendency to lower bid valuations to justify acceptance is clear due to the relative abundance of acceptances (359) and the relative scarcity of rejections (27)—a pattern of more than 13 acceptances for every rejection that is anomalous within the data. This disparity would be even greater if we had included in our analysis the 802 bids BOEM accepted because its

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<sup>64</sup>We removed the 802 valuations for which BOEM used the minimum bid level as its acceptable bid threshold from our analysis (that is, we did not include instances when BOEM's actual valuation was below the minimum bid level). We also removed the 35 valuations that were lower than industry bids but which BOEM accepted under its "revised arithmetic mean" categorical rule.

valuations were below the minimum bid level which is then used as the acceptable bid threshold.<sup>65</sup>

**Figure 4: Distribution of Bureau of Ocean Energy Management (BOEM) Tract Valuations Relative to Industry High Bids, March 2000 through June 2018**



Source: GAO analysis of BOEM data. | GAO-19-531

**Data Table for Figure 4: Distribution of Bureau of Ocean Energy Management (BOEM) Tract Valuations Relative to Industry High Bids, March 2000 through June 2018**

Relative Valuation Analysis	Number of tracts
700%+	44
600-700%	23
500-600%	32
400-500%	47
300-400%	55
200-300%	86

<sup>65</sup>BOEM officials told us that the bureau’s breakeven thresholds are designed to subject marginal tracts to valuation.



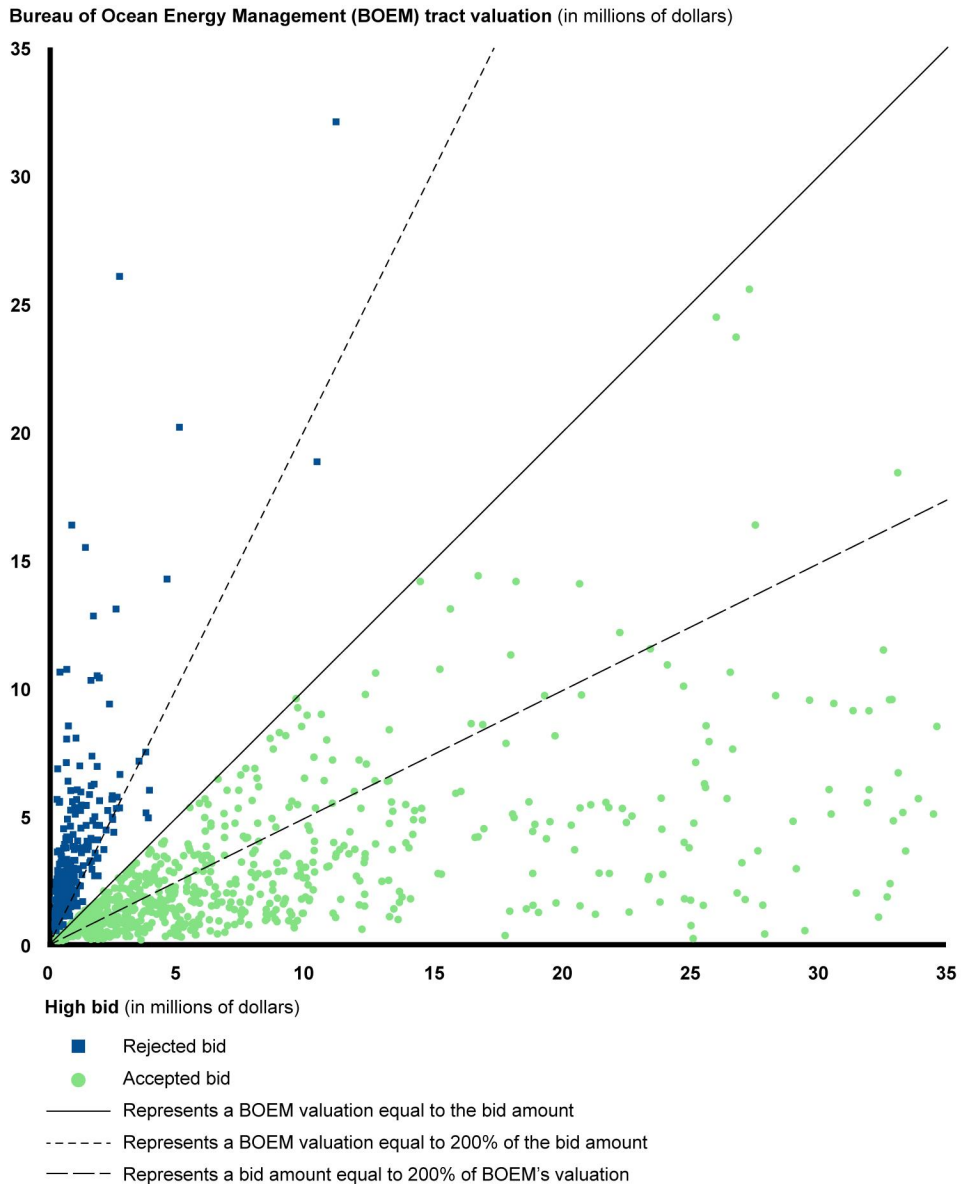
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Relative Valuation Analysis	Number of tracts
100-200%	27
100-200%	359
200-300%	174
300-400%	109
400-500%	52
500-600%	46
600-700%	24
700%+	120

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Note: This figure includes bids for which BOEM's discounted cash flow model's valuation—the lower of the present or delayed value for a given tract—was determinative in accepting or rejecting the bid. It does not include bids for viable tracts for which BOEM's acceptable bid level was based on the minimum bid level or the "revised arithmetic mean" categorical rule.

**Figure 5: Relationship between the Bureau of Ocean Energy Management’s (BOEM) Valuations and Industry High Bids, March 2000 through June 2018, in 2018 Dollars**



Source: GAO analysis of BOEM data. | GAO-19-531

Note: This figure does not show the 80 bids for which industry’s high bid was greater than \$35 million, all of which BOEM accepted. This figure includes bids for which BOEM’s discounted cash flow model’s valuation—the lower of the present or delayed value for a given tract—was determinative in accepting or rejecting the bid. It does not include bids for viable tracts for which BOEM’s acceptable bid level was based on the minimum bid level or the “revised arithmetic mean” categorical rule.

BOEM officials told us that they occasionally change valuations to address the uncertainty inherent in the factors that comprise BOEM's tract valuation process, though doing so in order to justify bid acceptance is inconsistent with BOEM's fair market value procedures. Specifically, officials told us that the point valuation developed by its discounted cash flow model is not representative of the broadness of the distribution of potential values—though it does represent the average of the distribution. Additionally, these officials told us that the process is iterative—the bureau adjusts its forecasts multiple times before deciding on final valuations. Furthermore, officials said that valuations that are above, but near, the high bids are subject to more iterations. Moreover, BOEM officials told us that all forecasting parameters and valuations, including those that are revisited more frequently, are evaluated and approved through its Fair Market Value Review Committee, which is broadly responsible for ensuring consistency in the application of the bureau's tract valuation process. Adjusting valuations comports with what BOEM officials told us is their conservative approach and promotes accepting bids unless the bureau has a high level of certainty that the tract is worth more than the high bid. However, BOEM officials told us they were not aware that their adjustments had effectively reduced the acceptable bid thresholds of nearly all valuations that were initially up to double industry's high bid.

Given that BOEM already starts with a conservative approach to valuation, which is compounded by its model generally forecasting high levels of depreciation, this practice of introducing more conservative assumptions in cases when initial valuations are above bids is not consistent with the bureau's fair market value procedures prescribed in federal regulations, BOEM's Bureau Manual for ensuring fair market value, and in BOEM's bid adequacy procedures.<sup>66</sup> These procedures call for BOEM to use the outputs of its discounted cash flow model as the thresholds for determining whether to accept bids. In situations where BOEM determines that its valuation results are not consistent with programmatic goals, BOEM's procedures allow for the bureau to develop alternative bid evaluation protocols for a given lease sale, but BOEM has not done so. BOEM's procedures do not explicitly allow for valuations to be adjusted based on how close they are to industry bids, nor is there an

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<sup>66</sup>Bureau of Ocean Energy Management, *Bureau of Ocean Energy Management, Regulation, and Enforcement Manual* (October 25, 2010), Chapter 610.1: Fair Market Value and BOEM, *Summary of Procedures for Determining Bid Adequacy at Offshore Oil and Gas Lease Sales* (March 2016).

allowance for adjusting valuations in an ad hoc fashion for uncertainty. The practice of adjusting valuations this way undermines receipt of fair market value by holding industry to a lower and potentially inconsistent standard for purchasing leasing rights than those outlined in BOEM's valuation procedures.

The practice of lowering valuations also results in the potential loss of hundreds of millions of dollars in revenue. We do not know how many accepted bids would have been rejected based on their initial valuations because BOEM's data do not indicate which valuations were further lowered. However, if BOEM had rejected 26 percent of the bids that were up to double its valuations—which appears reasonable to interpolate based on the distribution of the other bid-to-valuation relationships—the bureau potentially could have subsequently collected approximately \$567 million additional dollars in bid revenue for tracts it determined to be viable (an increase of about 3.9 percent).<sup>67</sup> Without taking steps to ensure that BOEM's bid valuation process is not biased toward adjusting valuations downward based on their proximity to bids, the bureau risks continuing to undermine the receipt of fair market value for the sale of public resources.

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## BOEM Conducts Limited Self-Evaluations of Its Tract Valuation Process

BOEM conducts evaluations of some aspects of its tract valuation process but does not comprehensively evaluate the accuracy of its forecasting, the assumptions of its model, and their combined effect on assuring receipt of fair market value. Specifically, since 2004, BOEM has routinely conducted “lookback studies,” self-evaluations to identify opportunities to refine or improve BOEM tract evaluations and decisions.<sup>68</sup> In these lookback studies, BOEM evaluates its performance

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<sup>67</sup>In the 27 instances when BOEM rejected bids where its valuations were within 200 percent of industry's high bid, BOEM subsequently collected more than twice as much in bid revenue as it had rejected (about \$148 million to about \$69 million, or about 213 percent of the aggregate value rejected). This is approximately the same observed return of 230 percent that we observed for all rejected bids, indicating that BOEM receives consistent aggregate returns when its valuation is relatively near the industry bid. However, this estimated return is conservative because we aggregated all rejected bids on a given tract when comparing them against an accepted bid.

<sup>68</sup>BOEM has conducted these studies nearly annually since 2004. BOEM officials told us that they skip the effort in years in which few new exploratory wells have been drilled.

by comparing the quantity of discovered hydrocarbon resources with BOEM's pre-drill estimates of resource potential. However, the scope of BOEM's lookback studies is limited, which reduces the studies' effectiveness in helping the bureau improve its valuation process. We identified four main limitations, based on our review of the studies and interviews with BOEM officials, as follows:

- **Resource discoveries are not updated.** The lookback studies are not necessarily representative of the total resources on a tract because BOEM compares the forecast against the results of only the first exploratory well and does not update its studies with the results of further exploration.<sup>69</sup> Therefore, BOEM officials told us, the studies are a snapshot in time and are not representative of the total resource that may ultimately be discovered and developed on a tract. Consequently, the studies provide limited insight regarding the total quantity of the resource discovered relative to pre-drill forecasts and identify the causes of any significant differences.
- **BOEM does not assess certain factors.** BOEM does not formally assess other forecasted factors that are important in its valuations, such as likelihood of success or cost and schedule estimates, or the underlying assumptions and workings of its discounted cash flow model. BOEM officials told us that the bureau periodically updates its cost and schedule estimates based on available data and that it makes adjustments to its model, but that these processes are generally ad hoc and not consistently documented. As previously discussed, BOEM's model has produced unreasonably high projected levels of depreciation between lease sales—suggesting that BOEM could modify the model or its assumptions to be more consistent and accurate. For example, BOEM has not assessed how depreciation rates implied in its delayed valuations compare with actual depreciation observed in tracts that have been leased multiple times.
- **BOEM does not systematically use the studies to improve processes.** BOEM's lookback studies do not include a systematic process for identifying and documenting steps the bureau plans to take to improve the bid valuation process. BOEM does not use these studies' findings to systematically inform or document changes to policies, procedures, or processes related to BOEM's tract evaluations. For example, BOEM officials told us that the lookback

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<sup>69</sup>BOEM officials told us that they regularly update expected oil and gas reserves but that these numbers are not incorporated into its lookback studies.

database and the studies are used as training aids, the data are not comprehensive, the studies are used as spot checks and to provide lessons learned, and these studies are not a comprehensive effort to assess BOEM's valuation process (as BOEM conducts no such comprehensive effort). In its written comments on this report, Interior indicated that BOEM uses the results of its lookback studies to improve aspects of its valuation process. However, Interior did not provide documentation to support this claim.

- **Data do not reflect initial valuations.** BOEM's ability to measure the accuracy of its tract valuation process—both its forecasting and the performance of its model—is hindered because some of its data do not reflect the bureau's initial valuations but rather the adjusted valuations it used to justify bid acceptance. Specifically, BOEM is unable to observe the effect on revenues and sales bids when its initial valuations—which were already low due to conservative forecasting and generally high depreciation—indicated that bids should be rejected when bids are only slightly less than BOEM's valuation. By altering the valuations to justify acceptance, BOEM is unable to assess how industry would have responded to those rejections in subsequent lease sales. What we observed indicates that BOEM bid rejections for tracts it values as less than double the high bid lead to almost the same average return in future sales as do rejections in which BOEM's valuation is many multiples of the bid. By taking steps to ensure that BOEM's bid valuation process is not biased toward adjusting valuations downward based on their proximity to bids, BOEM could better evaluate how its valuations relate to actual outcomes, which would better inform the bureau as to the validity of its forecasting, modeling assumptions, and the extent to which it is assuring receipt of fair market value.

According to standards for internal control in the federal government, management should establish and operate monitoring activities to monitor the internal control system and evaluate the results as well as remediate identified internal control deficiencies on a timely basis.<sup>70</sup> Without implementing a systematic process for comprehensively evaluating its tract valuations, such as by expanding the scope of the bureau's lookback studies effort and remediating any identified deficiencies, the bureau does not have reasonable assurance that its tract valuation process is working as intended, and that opportunities to refine or improve the bureau's valuation process are identified and pursued to better assure the receipt

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<sup>70</sup>[GAO-14-704G](#).

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of fair market value for the federal government for offshore oil and gas leases. Such a systematic process could provide BOEM a better understanding of how well the bureau is able to forecast key factors against actual results.

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## Conclusions

BOEM has policies and practices intended to ensure the bureau receives fair market value for the hundreds of millions of dollars of offshore oil and gas leases sold each year. This includes a process to assess fiscal terms in advance of lease sales that has informed periodic changes to fiscal terms over the years. However, we found that BOEM has made limited progress in considering more fundamental changes. The bureau has publicized the development of a progressive royalty structure since 2013 that may better share the risks and rewards of offshore energy activities, but has made limited headway in developing one despite significant potential benefits of such a system. The bureau has not defined what is to be achieved, who is to achieve it, how it will be achieved, and the time frames for achievement. Developing a documented plan for determining whether and how to develop a progressive royalty structure that defines these aspects would help position BOEM to better understand (1) the potential benefits such a structure offers in terms of improving fair return to the taxpayer while fostering diligent offshore oil and gas development and (2) how to implement such a structure if it elects to do so.

After lease sales, BOEM has repeatedly rejected industry bids when they were lower than the bureau's assessments of a tract's value, generating significant additional revenue at subsequent lease sales. However, BOEM's valuation process might not fully assure receipt of fair market value for sale of offshore oil and gas leases because it systematically reduces the thresholds for accepting bids even though rejecting them could lead to significantly increased revenue. We found that BOEM does so by using a conservative approach to estimating tract values, forecasting unreasonably high levels of depreciation in its delayed valuations, and further lowering valuations in order to justify accepting bids it otherwise would have rejected. Enlisting an independent third party to examine the tradeoffs and benefits of the bureau's continued use of delayed valuations, and making changes—such as terminating the use of delayed valuations as acceptable bid threshold criteria or amending its model's assumptions to develop more justifiable depreciation rates—as appropriate, would help BOEM mitigate risks of continuing to accept bids based on poor information on tracts' future values. Furthermore, BOEM

generally lowers its valuations and thereby accepts bids as long as the bid is at least half of BOEM's initial valuation, which is inconsistent with bureau procedures for ensuring receipt of fair market value. Without taking steps to ensure that BOEM's bid valuation process is not biased toward adjusting valuations downward based on their proximity to bids, the bureau risks continuing to undermine the receipt of fair market value for the sale of public resources. Cumulatively, we calculate that taking these steps could result in BOEM collecting approximately 10.7 percent more in bid revenue for offshore tracts it determines to be economically viable, which would reflect hundreds of millions of dollars in additional bid revenue over the next decade.

BOEM's ability to assure receipt of fair market value is further hindered because it does not systematically assess its own performance and take steps to improve it. For example, BOEM does not (1) assess how its forecasts of key factors (e.g., reserves discovered, likelihood of success, and oil prices) compared to actual results, (2) assess the assumptions and accuracy of its discounted cash flow model results, such as how well the model accounts for depreciation, and (3) collect information about deviations between BOEM's initial and final valuations that could provide management insights into the frequency and implication of lowering valuations. Without implementing a systematic process for comprehensively evaluating its tract valuations, such as by expanding the scope of the bureau's lookback studies effort and remediating any identified deficiencies, the bureau does not have reasonable assurance that its tract valuation process is working as intended, and that opportunities to refine or improve the bureau's valuation process are identified and pursued to better assure the receipt of fair market value for the federal government for offshore oil and gas leases.

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## Recommendations for Executive Action

We are making the following four recommendations to BOEM:

The BOEM director should develop a documented plan for determining whether and how to develop a progressive royalty structure that clearly defines what is to be achieved, who is to achieve it, how it will be achieved, and the time frames for achievement. (Recommendation 1)

The BOEM director should enlist an independent third party to examine the extent to which the bureau's use of delayed valuations assures the receipt of fair market value, and make changes—such as terminating the



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use of delayed valuations or amending its model's assumptions—as appropriate. (Recommendation 2)

The BOEM director should take steps to ensure that BOEM's bid valuation process is not biased toward adjusting valuations downward based on their proximity to bids. (Recommendation 3)

The BOEM director should implement a systematic process for comprehensively evaluating its tract valuations, such as by expanding the scope of the bureau's "lookback studies" effort, and remediating any identified deficiencies. (Recommendation 4)

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## Agency Comments and Our Evaluation

We provided a draft of this report to Interior for its review and comment. In its written comments, reproduced in appendix II, Interior agreed with one recommendation, partially agreed with two, and disagreed with one, as discussed below. Interior also stated that it is concerned that certain aspects of the draft report do not paint a representative picture of BOEM's valuation process and efforts to ensure receipt of fair market value.

- Regarding the recommendation that BOEM should develop a documented plan for determining whether and how to develop a progressive royalty structure, the agency agreed and indicated that BOEM will develop such a plan. Specifically, the agency stated that BOEM would develop a plan to identify the theoretical and practical benefits and drawbacks of a progressive royalty structure based on existing research and prepare materials for management to determine whether implementation of a price-based royalty would be beneficial.
- Regarding the recommendation that BOEM enlist an independent third party to examine the extent to which the bureau's use of delayed valuations assures the receipt of fair market value, the agency disagreed. The agency stated it did not agree with our characterization of BOEM's delayed valuations and stated that BOEM believes it is neither necessary nor cost effective to enlist an independent third party. However, BOEM agreed to (1) examine its delayed value calculation, particularly as it relates to the impact of biannual lease sales, (2) develop a plan to perform a comprehensive internal review of delayed value calculations and make appropriate changes, and (3) institute a peer-review process for all potential changes. These actions may address some of the deficiencies we identified, but our concerns regarding BOEM's use of delayed

valuations are not limited to the move to biannual lease sales and the agency has not provided any reasonable explanations for its high levels of forecasted depreciation. BOEM forecast a median depreciation of about 23 percent. This implies we should observe significant declines in the actual value of tracts over long periods of time, which is impossible to reconcile with actual trends in bonus bids. The real average bonus bid per acre in 2018 was about the same as it was thirty years earlier in 1988. Alternatively, such a high forecast of depreciation implies either a long time frame between lease sales or a high discount rate. But the time between lease sales has been one year or 6 months, on average, and in our view, and the Office of Management and Budget's annual recommended discount rate of 7 percent would be more appropriate. Recognizing that Interior's view differs from ours in this regard, we continue to believe that enlisting an independent third party to examine all aspects of the bureau's use of delayed valuations—not just proposed changes to address the move to biannual lease sales—would better assure the receipt of fair market value.

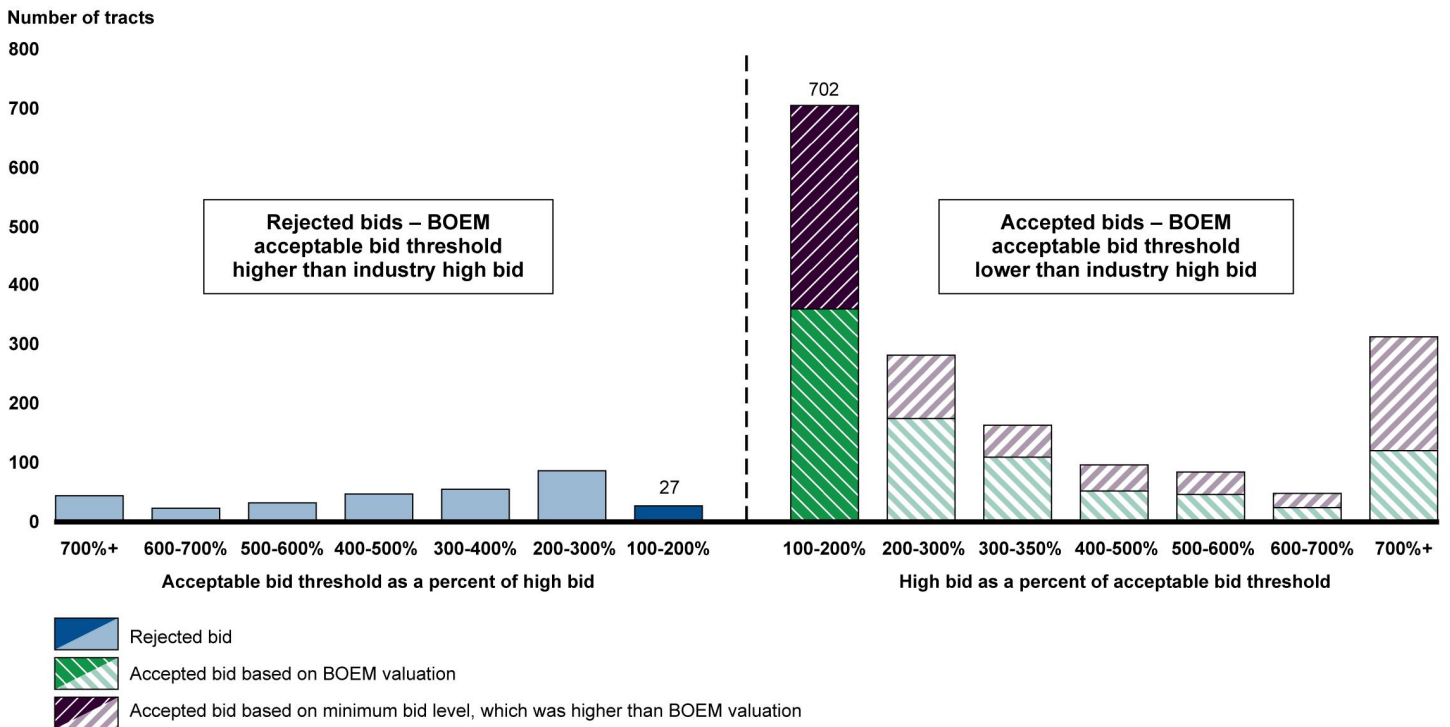
- Regarding the recommendation that BOEM take steps to ensure that its bid valuation process is not biased toward adjusting valuations downward based on their proximity to bids, Interior partially agreed. Specifically, Interior stated it agreed with the recommendation, but did not agree with our characterization of BOEM's bid valuation process. Interior stated that the apparent anomaly—the lack of instances when BOEM valued tracts up to double industry's bid—is skewed because a very large percentage of the data set comprise relatively low bids, and BOEM-generated valuations relative to the bids are constrained by the minimum bid amount. That is, Interior stated that the minimum bid level created an artificial floor for BOEM's acceptable bid threshold even in instances in which BOEM's valuation is substantially lower, resulting in more bids being up to double BOEM's valuation than would be the case if BOEM's acceptable bid thresholds were not constrained by the minimum bid amount. However, as discussed above, we removed all valuations for which BOEM used the minimum bid level as its acceptable bid threshold from our analysis (that is, we did not include instances when BOEM's actual valuation was below the minimum bid level).<sup>71</sup> Had we included these valuations, the asymmetry in the relationship between bids representing 100 to 200 percent of BOEM's acceptable bid threshold (acceptances) and

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<sup>71</sup>We added additional language to the report to more clearly highlight that they were not included in our analysis.

BOEM's acceptable bid threshold representing 100 to 200 percent of industry's bid (rejections) would have nearly doubled (see figure 6).<sup>72</sup> Moreover, even though we did not include these instances, the minimum bid level only affects the distribution of instances when BOEM's valuation was less than industry's high bid. As such, it does not explain why there are so few instances when BOEM valued tracts slightly more than industry. We continue to believe that taking steps to ensure that its bid valuation process is not biased toward adjusting valuations downward based on their proximity to bids would be beneficial and will monitor BOEM's efforts as part of our regular recommendation follow-up.

**Figure 6: Distribution of Bureau of Ocean Energy Management (BOEM) Tract Valuations Relative to Industry High Bids, Including BOEM Use of Minimum Bid Level as the Acceptable Bid Threshold, March 2000 through June 2018**



Source: GAO analysis of BOEM data. | GAO-19-531

<sup>72</sup>Specifically, inclusion of acceptable bid thresholds represented by the minimum bid level would increase the relationship from approximately 13-to-1 (359 acceptances to 27 rejections) to approximately 26-to-1 (702 acceptances to 27 rejections).

**Data table for Figure 6: Distribution of Bureau of Ocean Energy Management (BOEM) Tract Valuations Relative to Industry High Bids, Including BOEM Use of Minimum Bid Level as the Acceptable Bid Threshold, March 2000 through June 2018**

Rejected bid	Accepted bid	Total
44		44
23		23
32		32
47		47
55		55
86		86
27		27

Accepted bid based on BOEM valuation	Accepted bid based on minimum acceptable bid level	Total
359	343	702
174	107	281
109	54	163
52	44	96
46	38	84
24	24	48
120	192	312

- Regarding the recommendation that BOEM implement a systematic process for comprehensively evaluating its tract valuations, such as by expanding the scope of the bureau’s lookback studies effort, and remediating any identified deficiencies, Interior partially agreed. Specifically, Interior stated it agreed with the recommendation, but did not agree with our characterization of BOEM’s bid tract evaluation process and review procedures. The agency identified two areas where they did not agree with our characterization. First, the agency stated that our statement that “resource discoveries are not updated” is inaccurate. According to its comments, BOEM develops independent estimates of recoverable oil and gas contained within discovered fields by conducting field reserve studies. However, any updated estimates are not reflected in the lookback studies, which represent BOEM’s formal mechanism for self-evaluation. For the lookback studies, as noted above, BOEM compares their forecast against the results of only the first exploratory well and does not

update its studies with the results of further exploration. Second, the agency stated that we were incorrect to state that BOEM does not use the studies to improve processes because it uses its lookback studies to improve its valuations. However, BOEM did not provide documentation to support this claim. We continue to believe that implementing a systematic process for comprehensively evaluating its tract valuations would be beneficial and will monitor BOEM's efforts as part of our regular recommendation follow-up.

In addition, Interior stated in its letter that it appeared that we did not account for industry assumptions regarding the applicability of price thresholds in comparing estimated increased bonus bid revenue and forgone royalties for leases subject to deep water royalty relief sold from 1996 through 2000. However, as stated above, we based our econometric modeling on the lease terms provided in Interior's final notice of sale documents for those leases, which reflect the expectations for royalty relief that industry bid on at the time of sale. In addition, as described in appendix I, we used several alternative model specifications to test the sensitivity of our results to the possibility that industry had different understandings of royalty relief than those contained in the sale documents. Our results are robust across these alternative specifications.

As noted above, leases sold in 1996, 1997, and 2000 included provisions for royalty relief subject to price thresholds (that is, lease terms indicated that royalties would only be owed if the price of oil exceeded certain thresholds). Leases sold in 1998 and 1999 did not contain price thresholds (that is, lease terms indicated that no royalties would be owed regardless of the price of oil). As evidenced by our econometric modeling results, during the 1996 through 2000 period, we observed higher bidding when no price threshold provisions were included in lease terms, suggesting that industry accounted for the expectation of no royalties when developing bids.<sup>73</sup>

As noted above, in 2007, a federal court ruled that Interior's attempt to collect royalties through the application of price thresholds on production under leases subject to the 1996 through 2000 royalty suspension was unlawful. In its comments, Interior stated that industry bidding would have been different had companies known at the time of sale that the price

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<sup>73</sup>We estimate that bidding increased by 34 percent for those leases that included price threshold provisions and 60 percent for those that did not.

thresholds would not apply, and as a result, the net amount of forgone revenue—the difference between collected bonus bids and forgone royalties—would have been lower. To account for this, we adjusted our calculation of estimated additional bonus bid revenues so that it is more comparable to BOEM estimated foregone revenues. This adjustment increased our estimate of additional bonus bid revenues to \$1.98 billion (an increase of approximately \$530 million), which is still subsumed by the \$18 billion in foregone royalties collected through the end of 2018.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the appropriate congressional committees, the Secretary of the Interior, and other interested parties. In addition, the report will be available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-3841 or [ruscof@gao.gov](mailto:ruscof@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix III.



Frank Rusco  
Director, Natural Resources and Environment

# Appendix I: Econometric Model Methodology and Results

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## Methodology

We developed an econometric model to analyze the effect of royalty rates and other key variables on bonus bids for offshore leases between 1985 and 2018. Specifically, we analyzed how changes in royalty rates affected the winning bids for offshore leases. Our analysis used data from 23,081 individual lease sales in the period from 1985 to 2018.

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## Dependent Variable

- Our model analyzes the winning bid for each lease auctioned by the Bureau of Ocean Energy Management (BOEM). We used the log of the inflation-adjusted winning bid per acre for this dependent variable:

$$y_{it} = \log(Y_{it})$$

Where  $y_{it}$  represents the inflation-adjusted (real) value of the winning bid per acre and  $y_{it}$  is its log value.

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## Explanatory Variables

- Our key set of explanatory variables was a set of indicator (dummy) variables that captured the different levels of royalty rates that pertained during our study period. We ran three alternative model specifications to capture the effects of royalty rates and royalty relief that occurred between 1996 and 2000. Each specification contained:
  - A dummy variable for the 16.67 percent royalty rate.
  - A dummy variable for the 18.75 percent royalty rate.
  - In addition to a 16.67 and a 18.75 royalty rate dummy, model 1 included two additional dummy variables: one dummy variable for royalty relief that occurred in 1996, 1997 and 2000, which allowed a 0 percent royalty rate until the oil price reached a specified

threshold; and a second dummy variable for royalty relief that occurred in 1998 and 1999, which allowed a 0 percent royalty rate in perpetuity.<sup>1</sup>

- In addition to a 16.67 and a 18.75 royalty rate dummy, model 2 included five additional dummy variables for each year from 1996 to 2000.
- In addition to a 16.67 and an 18.75 royalty rate dummy, model 3 included a single dummy variable for the period 1996 to 2000.
- The omitted royalty rate dummy variable category was a rate of 12.5 percent. The estimates of the parameters for the other royalty rate dummies show the effect relative to this 12.5 percent royalty rate.
- Our model controlled for variables that were expected to be related to potential lease production and profitability. These variables included a dummy variable for whether the lease was determined by BOEM to be viable or nonviable; a set of dummy variables for different values of the number of bids, that is, 1 bidder, 2 bidders, 3 bidders, and so on; and a variable for the amount of oil production in the area (protraction area) of the lease's location at the time of the lease auction.
- We also controlled for various administrative factors. We used a dummy variable to indicate when the winning bid was too low and was rejected; the value of the minimum bid allowed for the auction; and a set of dummies that captured the use of different royalty suspension provisions, variation in rents charged and different amounts of deep gas relief. To control for effects that vary over time, we included a set of time dummy variables for each date of sale. These dummies account for effects that vary over time but are fixed for any given date, such as technology changes and oil and gas market conditions including the price of oil and gas. Our objective was to control for as many time-varying factors as possible. Attempting to include separate effects of, for example, oil prices and exploration costs, would create problems of leaving out important effects that are difficult to measure or for which there are no data. Finally, we included a set of fixed-effect dummies for each protraction area-block combination that account for

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<sup>1</sup>After the lease sale it transpired that leases sold under these conditions were allowed to be free of royalties for the full amount of production volumes specified by statute, regardless of oil or gas prices. However, at the time of the lease sale, it was announced that the royalty exemption would only apply provided oil and gas prices stayed below a specified threshold. Since these leases were sold under different expectations compared to the 1998 and 1999 royalty relief, we use a separate dummy variable.



locational effects not measured by our other explanatory variables. These fixed effects assist in controlling for unobserved heterogeneity.

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## Model Specification

The regression analysis employed an unbalanced panel model using data for offshore BOEM lease auction sales between 1985 and 2018 as follows:

$$y_{ijt} = \sum_m c_m C_m + \sum_t f_t F_t + \sum_i g_i G_i + \sum_k \alpha_k X_{ijt}^k + \varepsilon_{it}$$

- $y_{ijt}$  is the dependent variable; namely, the log of the real winning auction bid for lease  $j$  at location (protraction area-block combination)  $i$  for sale date  $t$ .
- $c_m$  is a fixed effect parameter for its associated dummy variable  $C_m$  for winning bidder, company  $m$ .
- $g_i$  is a fixed effect parameter for its associate dummy variable  $G_i$  for location (protraction area-block number combination)  $i$ .
- $f_t$  is a fixed effect parameter for dummy variable  $F_t$  for year  $t$ .
- $X_{ijt}^k$  is the  $k$ th characteristic associated with lease  $j$  at location  $i$  for sale date  $t$ . There is one of these for each of the control variables discussed above and  $\alpha_k$  is the parameter associated with each of these variables.
- $\varepsilon_{it}$  are the error terms.
- We used `xtreg` in STATA to estimate our model. Our standard errors are heteroscedasticity-robust and are adjusted for clustering at the protraction area-block combination level.

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## Results

In some cases, our model showed that leases sold when royalty rates were lower had significantly higher winning bids. While not all the royalty rate dummy variables were statistically significant, those dummy variables that measured the largest differences compared to the omitted 12.5 percent royalty rate were statistically significant. Specifically,

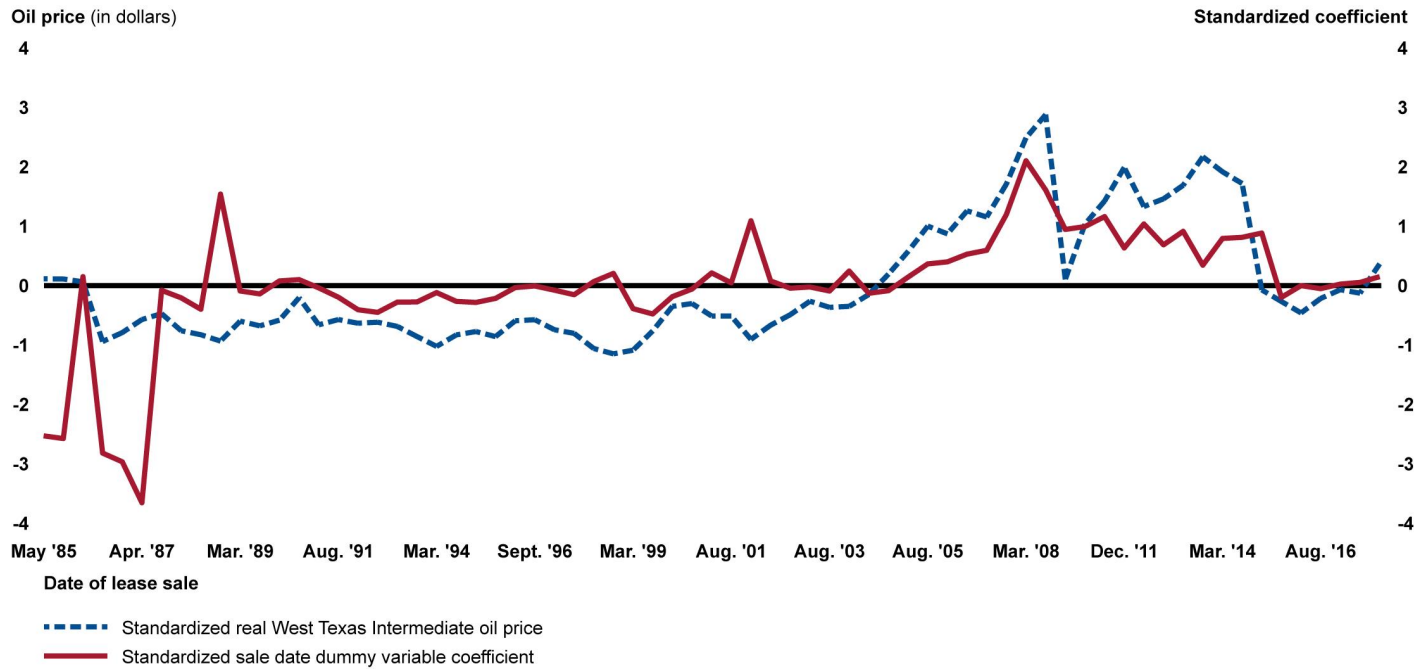
- In model 1, the royalty exemption for 1996, 1997, and 2000, when producers expected zero royalties until oil prices rose above a given

threshold, corresponded with an increase in bonus bids of about 34 percent. Similarly, the zero-in-perpetuity royalty rate relief for 1998 and 1999 corresponded with an increase in bonus bids of about 60 percent.

- In model 2, the royalty exemption dummy variables for each individual year, 1996 to 2000, when producers expected royalty relief, were all significant. The results for these parameter estimates range translate into about 19 to 64 percent increase in real bonus bids.
- In model 3, the royalty exemption dummy variable for 1996 to 2000 combined, when producers expected royalty relief, was significant. The result for this parameter estimate translates into about a 40 percent increase in real bonus bids. We tested for the restriction on the dummy variable parameters (all parameters equal) implied in model 3 versus model 2. Our test rejected equal parameters in favor of the specification in model 2.
  - The 18.75 percent royalty rate dummy parameter was statistically significant and negative in all three models, which is to be expected since the base (comparison) case is 12.5 percent. The result for this effect translates to a drop in bonus bids of about 28 percent in all three models. However, the 16.67 percent dummy variable was not statistically significant in any of the models.

We used a set of time-fixed effects for each sale date and, therefore, we could not separate out the individual effects of time-varying variables such as oil prices. These dummies show the effect on bonus bids of conditions pertaining on that particular sale date, where a larger positive value translates to higher bonus bids and a smaller or negative value translates to lower bonus bids. Figure 7 compares oil prices and the values of the sale date dummy variables over time and suggests a correspondence between higher oil prices and the size of these dummy variable estimates. This suggests that higher oil prices are likely to result in higher bonus bids.

Figure 7: Sale Date Dummy Variable Coefficient and Real West Texas Intermediate Price. Standardized values, 1985 to 2018



Sources: Federal Reserve Bank of St. Louis data and GAO analysis of Department of the Interior data. | GAO-19-531

Data table for Figure 7: Sale Date Dummy Variable Coefficient and Real West Texas Intermediate Price. Standardized values, 1985 to 2018

Date of lease sale	Standardized Real WTI Oil Price	Standardized Sale Date Dummy Variable Coefficient
5/22/1985	0.1153	-2.528
8/14/1985	0.1129	-2.573
12/18/1985	0.0656	0.152
4/30/1986	-0.9398	-2.818
8/27/1986	-0.7897	-2.965
4/22/1987	-0.5701	-3.654
8/12/1987	-0.4707	-0.078
3/30/1988	-0.7583	-0.205
8/31/1988	-0.8255	-0.397
11/16/1988	-0.9327	1.542
3/15/1989	-0.5970	-0.089
8/23/1989	-0.6759	-0.138
3/21/1990	-0.5808	0.080
8/22/1990	-0.2019	0.102

**Appendix I: Econometric Model Methodology  
and Results**

<b>Date of lease sale</b>	<b>Standardized Real WTI Oil Price</b>	<b>Standardized Sale Date Dummy Variable Coefficient</b>
3/27/1991	-0.6585	-0.037
8/21/1991	-0.5703	-0.194
5/13/1992	-0.6323	-0.405
8/19/1992	-0.6149	-0.449
3/24/1993	-0.6859	-0.277
9/15/1993	-0.8558	-0.274
3/30/1994	-1.0217	-0.116
8/17/1994	-0.8288	-0.264
5/10/1995	-0.7718	-0.282
9/15/1995	-0.8570	-0.214
4/24/1996	-0.5909	-0.032
9/25/1996	-0.5731	-0.005
3/5/1997	-0.7417	-0.076
8/27/1997	-0.8028	-0.152
3/18/1998	-1.0579	0.069
8/26/1998	-1.1470	0.207
3/17/1999	-1.0860	-0.387
8/25/1999	-0.7615	-0.476
3/15/2000	-0.3485	-0.184
8/23/2000	-0.3008	-0.057
3/28/2001	-0.5099	0.215
8/22/2001	-0.5121	0.047
12/5/2001	-0.9037	1.093
3/20/2002	-0.6653	0.080
8/21/2002	-0.4885	-0.042
3/19/2003	-0.2613	-0.022
8/20/2003	-0.3648	-0.090
12/10/2003	-0.3477	0.246
3/17/2004	-0.1485	-0.128
8/18/2004	0.1944	-0.084
3/16/2005	0.5774	0.145
8/17/2005	1.0031	0.367
3/15/2006	0.8724	0.401
8/16/2006	1.2599	0.531
8/22/2007	1.1564	0.596
10/3/2007	1.7108	1.198

Date of lease sale	Standardized Real WTI Oil Price	Standardized Sale Date Dummy Variable Coefficient
3/19/2008	2.4886	2.103
8/20/2008	2.8796	1.611
3/18/2009	0.1059	0.947
8/19/2009	1.0351	0.995
3/17/2010	1.4254	1.163
12/14/2011	1.9904	0.635
6/20/2012	1.3329	1.039
11/28/2012	1.4619	0.688
3/20/2013	1.6901	0.915
8/28/2013	2.1699	0.345
3/19/2014	1.9178	0.795
8/20/2014	1.7206	0.814
3/18/2015	-0.0699	0.886
8/19/2015	-0.2659	-0.197
3/23/2016	-0.4583	0.001
8/24/2016	-0.2148	-0.050
3/22/2017	-0.0672	0.027
8/16/2017	-0.1262	0.055
3/21/2018	0.3670	0.152

Note: Standardized values for the variables are the deviation from its mean divided by its standard error.

The set of dummy variables for the number of bids produced parameter estimates that were statistically significant and for the most part were of the expected size and sign. These suggest that greater interest (more bids) is associated with higher bonus bids (the exception was the slight deviation from this pattern for the 8 bids dummy). The number of bids may not represent market concentration because anyone is permitted to bid on a given lease, so potentially there are a large number of bidders. This set of dummies is more likely to represent perceived quality of the lease on the part of bidding firms.

Other key factors were either significant with the expected direction of effect or else not statistically significant. Oil production in the protraction area at the time of the auction was positive and significant. Rejected bids were associated with smaller highest bids. Joint winning bids were associated with higher bonus bids. Leases designated as viable by Interior were associated with higher bids.

**Appendix I: Econometric Model Methodology  
and Results**

**Table 4: Bonus Bid Regression Results for Offshore Oil and Gas Leases, 1985 to 2018. Dependent variable is the log of inflation-adjusted winning bids (significance levels are in parentheses below the parameter estimates)**

<b>Variable</b>	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>
Royalty relief 1996, 1997, & 2000 and water depth > 200m	0.292*** (0.00000)		
Royalty relief 1998 & 1999 and water depth > 200m	0.468*** (0.00000)		
Royalty rate 16.67%	0.0447 (0.73670)	0.0412 (0.75751)	0.0449 (0.73497)
Royalty rate 18.75%	-0.330* (0.03884)	-0.331* (0.03801)	-0.332* (0.03865)
Royalty relief 1996 and water depth > 200m		0.178** (0.00726)	
Royalty relief 1997 and water depth > 200m		0.337*** (0.00000)	
Royalty relief 1998 and water depth > 200m		0.468*** (0.00000)	
Royalty relief 1999 and water depth > 200m		0.496*** (0.00006)	
Royalty relief 2000 and water depth > 200m		0.456*** (0.00001)	
Royalty relief 1996-2000 and water depth > 200m			0.334*** (0.00000)
High bid rejected	-0.665*** (0.00000)	-0.665*** (0.00000)	-0.664*** (0.00000)
Viable tract	0.571*** (0.00000)	0.571*** (0.00000)	0.572*** (0.00000)
Minimum bid set by Interior for the lease at auction	0.0122*** (0.00000)	0.0116*** (0.00000)	0.0124*** (0.00000)
Oil production per acre (100,000 of barrels) in protraction area at time of auction	0.0125*** (0.00045)	0.0118** (0.00105)	0.0127*** (0.00040)
Winning bid from a joint bid	0.213*** (0.00000)	0.213*** (0.00000)	0.214*** (0.00000)
Observations	23,068	23,068	23,068

\*\*\*significant at the 0.1 percent level.

\*\*significant at the 1 percent level.

\*significant at the 5 percent level.

Source: GAO analysis of data from the Department of the Interior. | GAO-19-531

Note: The specifications included, but we do not report: fixed effects for protraction area-block combinations, time (sales date) dummies, winning company dummies, dummies for the number of bidders on the lease; and a set of dummies for that captured the use of different royalty suspension provisions, variation in rents charged by Interior and different amounts of deep gas relief. The standard errors are heteroscedasticity-robust and are adjusted for clustering at the protraction area-block combination level. Omitted royalty rate dummy is for 12.5 percent. All variables in the table are dummy variables except for oil production and minimum bid.

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## Limitations of the Regression Model

- Our model contains no explicit consideration of market concentration effects. Our use of the number of bidders in the model may capture some market concentration effects but possible endogeneity issues that may arise with the use of such measures are not addressed due to lack of reasonable instruments.
- Our model does not explicitly isolate the impact of oil prices because we needed to include time-fixed effects (dummies). However, we are able to evaluate the effect of oil prices indirectly by observing the correspondence between the estimated values of the time dummies and oil prices. Our tests for joint significance of the time dummies rejected the null hypothesis of non-significance in all cases.
- Our results showed a significant effect of royalty rates of 18.75 percent relative to 12.5 percent. However, our results did not show a significant effect of royalty rates of 16.67 percent relative to 12.5 percent, which may be due to a lack of statistical power and that relatively modest differences in royalty rates have only a small impact of bonus bids.
- The model has limited controls for geological conditions at the lease location. We control for location imperfectly using fixed effects for protraction area-block combinations, and by including the amount of oil production on the date of the lease sale in that protraction area. Our use of these protraction area-block fixed effects does not allow us to control for water depth explicitly.
- Our analysis used data from 1985 to 2018. Earlier data were available, beginning in 1983, but initial tests of our model suggested the 1983 and 1984 data were not well captured by the model's specification. BOEM's system of using competitive bidding for leases began in 1983 and there may have been an initial period during which market operators learned how to bid efficiently under the new system.
- Our model includes a control for the minimum bid but we did not account for any censoring effects that may have arisen from setting this threshold.

- Ideally, we would have liked to establish whether there were different responses of bonus bids to the control variables in deep versus shallow water. However, separate models for deep and shallow water leases produced mostly non-significant effects for royalty rates, which suggested that splitting the sample in this way resulted in insufficient statistical power to estimate these effects.



# Appendix II: Comments from the Department of the Interior



United States Department of the Interior

OFFICE OF THE SECRETARY  
Washington, DC 20240

SEP 06 2019

Mr. Frank Rusco  
Director, Natural Resources and Environment  
U.S. Government Accountability Office  
441 G Street NW  
Washington, DC 20548

Dear Mr. Rusco:

Thank you for providing the Department of the Interior (Department) the opportunity to review and comment on the draft Government Accountability Office (GAO) report entitled, *Offshore Oil and Gas: Opportunities Exist to Better Ensure a Fair Return on Federal Resources* (GAO-19-531). The Department appreciates GAO's review of offshore Federal oil and gas leasing and shares GAO's interest in improving management and oversight of oil and gas development on the Outer Continental Shelf (OCS). The Department works diligently to comply with its responsibilities to manage Federal offshore oil and gas resources and to implement the objectives of the Outer Continental Shelf Lands Act (OCSLA). Specific to the scope of this GAO engagement, the Department takes seriously its responsibilities for assuring "receipt of fair market value for the lands leased and the rights conveyed by the Federal Government," as required by the OCSLA<sup>1</sup>.

The Department welcomes critical examination of how we are performing and is open to recommendations for how we might further improve our operations and better carry out our responsibilities as stewards of important resources on the OCS. More specifically, as related to the scope of this engagement, the Department is open to recommendations that enhance fair market value processes. The Department remains concerned, however, about certain aspects of the draft report which do not paint a representative picture of the Bureau of Ocean Energy Management's (BOEM) diligent valuation processes and efforts to ensure the receipt of fair market value. We refer you to the feedback provided earlier to GAO with respect to the Statement of Facts dated May 23, 2019, that provides clarification and factual information demonstrating BOEM's comprehensive processes and accomplishments, for GAO's consideration when finalizing the report.

<sup>1</sup> OCSLA requires that "[l]easing activities shall be conducted to assure receipt of fair market value for the lands leased and rights conveyed by the Federal Government." 43 U.S.C. 1344. Fair market value is generally understood to be the price arrived at in a transaction between a willing, knowledgeable and unpressured buyer and a willing, knowledgeable and unpressured seller. GAO uses the term "fair return," which is a broader concept than fair market value and captures an array of costs and benefits to the public. "Fair return" is not found in the oil and gas provisions of the OCSLA.

In the draft report, the GAO issued BOEM four recommendations in response to its overall findings. The following responses include multiple actions planned by BOEM to implement the draft report's recommendations, as well as clarify inaccurate characterizations of BOEM activities in the draft report.

**Recommendation 1: The BOEM director should develop a documented plan for determining whether and how to develop a progressive royalty structure that clearly defines what is to be achieved, who is to achieve it, how it will be achieved, and the time frames for achievement.**

**Response: Concur.** BOEM concurs with this recommendation and will develop a plan that considers whether a price-based royalty structure should be implemented, and if so, will include specifics about the process for implementation.

To comply with this recommendation, BOEM will develop a plan to consider whether or how to develop a progressive royalty structure. First, BOEM will outline the research and analysis that has been conducted to date on price-based royalty by BOEM and IHS-Markit<sup>2</sup>, and consider other relevant information as available. BOEM will then evaluate the theoretical and practical benefits and drawbacks of a progressive royalty structure.

Finally, BOEM will prepare materials outlining its research and analysis for the Assistant Secretary for Land and Minerals Management, who will determine whether a price-based royalty would be desirable to implement in upcoming lease sales as a method to accomplish OCSLA's objectives.

**Recommendation 2: The BOEM director should enlist an independent third party to examine the extent to which the bureau's use of delayed valuations assures the receipt of fair market value, and make changes—such as terminating the use of delayed valuations or amending its model's assumptions—as appropriate.**

**Response: Do Not Concur.** BOEM does not agree with GAO's characterization of the delayed value; and, accordingly, BOEM believes that it is neither necessary nor cost effective to enlist an independent third party evaluation of its use of delayed valuations.

However, BOEM agrees to examine its delayed value calculation, particularly as it relates to modeling the impact of recently-implemented biannual lease sales. BOEM will develop a plan to perform a comprehensive internal review of the delayed value calculations and make appropriate changes. BOEM would then institute a peer-review process for all potential model changes.

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<sup>2</sup> The IHS-Markit study, *Comparative Analysis of the Federal Oil and Gas Fiscal Systems: Gulf of Mexico International Comparison*, was published in November 2018, and is available at <https://www.boem.gov/2018-GOM-International-Comparison/>

**Recommendation 3: The BOEM director should take steps to ensure that BOEM's bid valuation process is not biased toward adjusting valuations downward based on their proximity to bids.**

**Response: Partially Concur.** BOEM does not concur with how its bid valuation process is characterized in GAO's report. BOEM concurs with the recommendation to review its bid valuation process to reduce any bias that may exist. Previous reviews carried out by BOEM resulted in the establishment of the risk assessment team to address bias in the risk component and ensure consistency in the evaluations.

This recommendation is largely based on GAO's finding that the abundance of industry bids between 100 and 200 percent of BOEM's valuations is anomalous. However, the apparent anomaly is skewed by the fact that a very large percentage of the data set comprise relatively low bids, and BOEM-generated values relative to the the low bids are constrained by the minimum bid amount (i.e., the data will show BOEM's valuation as the minimum bid amount even when it believes the value is substantially less). This has the effect of placing more industry bids in the 100 to 200 percent range than would be the case when compared to BOEM's actual valuation.

**Recommendation 4: The BOEM director should implement a systematic process for comprehensively evaluating its tract evaluations, such as by expanding the scope of the bureau's "lookback studies" effort, and remediating any identified deficiencies.**

**Response: Partially Concur.** BOEM does not concur with GAO's characterization of BOEM's tract evaluation process and review procedures, but concurs with the recommendation to comprehensively evaluate its tract evaluations.

While BOEM believes it is important to review processes and procedures, GAO's characterization of its FMV self-review procedures is not fully informed. The GAO inaccurately states that "resource discoveries are not updated." The Department is required under OCSLA to "...conduct a continuing investigation...for the purpose of determining the availability of all oil and natural gas produced or located on the Outer Continental Shelf." In order to meet this requirement, BOEM develops independent estimates of recoverable oil and gas contained within discovered fields by conducting field reserve studies. BOEM maintains data on over 1,300 oil and gas fields in the Gulf of Mexico, which are used as analog data for FMV evaluations.

The GAO states that "BOEM does not use the studies to improve processes." In fact, BOEM utilizes its Lookback study to ensure that prospects similar to those on which industry bids are evaluated. BOEM not only captures success rates for certain plays, updates cost and schedule files (how long it takes for an oil and gas project to go from leasing, to discovery, to production), but also updates the underlying assumptions and workings of the discounted cash flow model. This information is directly incorporated into FMV evaluations.

**Additional Comments to GAO Findings**

In its draft report, GAO highlights its finding that the increase in bonus bids associated with the 1996-2000 Deepwater Royalty Relief Act leases were not enough to counter the future forgone royalties from those leases.

BOEM highlighted in its written comments on GAO's Statement of Facts that it does not appear that GAO has accounted for the price threshold issue when drawing this conclusion and, thus, is overstating the claimed effect. Since most or all of the bidding on 1996-2000 leases assumed royalty relief would have been subject to price thresholds, it is highly unlikely companies would have assumed they would receive the maximum amount of royalty relief when formulating their bids. Moreover, a court decision, made well after the leases were issued, eliminated the price thresholds, resulting in more forgone royalties than would have been expected at the time of the lease sale.

If you have any questions, please contact Andrea Nygren, BOEM Audit Liaison Officer, at (202) 208-4343, or Deanna Meyer-Pietruszka, BOEM, Chief, Office of Policy, Regulations, and Analysis, at (202) 208-6352.

Sincerely,



Casey Hammond  
Acting Assistant Secretary  
Land and Minerals Management

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## Text if Appendix II: Comments from the Department of the Interior

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Page 1

Sept. 6, 2019

Mr. Frank Rusco

Director, Natural Resources and Environment

U.S. Government Accountability Office 441 G Street NW

Washington, DC 20548 Dear Mr. Rusco:

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Sincerely

Casey Hammond

Acting Assistant Secretary

Land and Minerals Management

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# Appendix III: GAO Contact and Staff Acknowledgments

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## GAO Contact

Frank Rusco, (202) 512-3841 or [ruscof@gao.gov](mailto:ruscof@gao.gov)

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## Staff Acknowledgments

In addition to the individual named above, Quindi Franco, Assistant Director; Matthew Tabbert, Analyst-in-Charge; Natalie Block; Tara Congdon; William Gerard; Cindy Gilbert; Michael Kendix; Michael Krafve; and Dan Royer made significant contributions to this report.

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