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# THE OUTER CONTINENTAL SHELF LANDS ACT AMENDMENTS OF 1978†

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## I. INTRODUCTION

The purpose of the Outer Continental Shelf Lands Act<sup>1</sup> is to regulate the granting of mineral leases on the Outer Continental Shelf (OCS) by the federal government. The act authorizes the Secretary of the Interior to grant mineral leases on the OCS and to prescribe regulations for their administration. The federal government's jurisdiction over the OCS extends from the limits of state boundaries seaward to a depth of 200 meters or, according to the 1958 Geneva Convention, beyond that point "to where the depth of the superadjacent waters admits of the exploitation of the natural resources."<sup>2</sup>

The original OCS Lands Act of 1953 constituted what a Senate committee report called a "carte blanche delegation of authority to the Secretary of the Interior."<sup>3</sup> The OCS Lands Act Amendments of 1978 represent some congressional dissatisfaction with the Interior Department's administration of the act, but more importantly they reflect the growth in power of several political pressure groups during the past quarter century. Analysis of the 1978 amendments reveals that they respond to four general areas of criticism of the 1953 act.

The first, expressed by "consumer activists" and political liberals generally, asserted that the primary leasing method in use (cash bonus bidding with a fixed royalty) has not produced competitive results, that the government has not received "fair market value" for its leases, and that big oil companies have enjoyed an unfair advantage in the lease-sale market. In his endorsement of the proposed amendments, President Carter asserted that they would "enhance competition [and] ensure a fair return to the public."<sup>4</sup>

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1. 43 U.S.C. § 1331-1343 (1976).

2. Convention on the Continental Shelf Article 1, U.N. Doc. A/C. 13/L. 35 (1958).

3. REPORT OF THE COMMITTEE ON ENERGY AND NATURAL RESOURCES ON THE OUTER CONTINENTAL SHELF LANDS ACT AMENDMENTS OF 1977, S. REP. NO. 284, 95th Cong., 1st Sess. 43 (1977).

4. EXECUTIVE OFFICE OF THE PRESIDENT, THE NATIONAL ENERGY PLAN 56 (1977).

A second body of opinion, representing environmental groups, land use planners, and critics of conventional market-based energy decision making, wanted the federal government to expand greatly its economic planning role in respect to OCS energy resources.

Third, coastal state politicians (supported by environmental groups and state planners) argued that they should be given increased powers over decisions concerning the location, timing, and scope of energy exploration and production activities being conducted near their coastlines.

Finally, governors of coastal states and private groups whose interests conflicted with offshore energy development wanted a measure of financial protection against the risk of losses that they might bear as a result of OCS mineral leasing. The 1953 legislation provided for bonus, rental, and royalty payments to be made to the federal government from OCS leasing but gave no share of this revenue to coastal states, which nevertheless were expected to accept the risk of economic and environmental damage resulting from OCS development. These states were led, therefore, to oppose proposed leasing in adjacent federal waters. What they—and the commercial fishermen and other private groups affected by OCS developments—wanted was a source of economic impact or damage insurance funds in the event of another Santa Barbara-type incident, avoiding the need for lawsuits for recovery of damages suffered.

The political forces successfully supporting the amendments included environmental groups, "consumer advocates," coastal state politicians, and political liberals. Interests opposing the amendments included the oil and gas companies, other industry groups that would suffer from additional regulations, and political conservatives.

Part II of this analysis will describe the historical oil and gas lease sale bidding procedures and review the record of OCS leasing over the years since 1954. Part III will identify the principal provisions of the 1978 OCS Lands Act Amendments. In Part IV, an economic analysis of the new bidding options will be provided. Part V will examine the economic consequences of added regulations mandated in the new act. Conclusions will be drawn in Part VI.

## II. BIDDING PROCEDURES UNDER THE 1953 OCS LANDS ACT

Under guidelines established by the 1953 OCS Lands Act,<sup>5</sup> the Interior Department has established a well-defined set of procedures for its OCS leasing program.<sup>6</sup> The leasing process begins with a call

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5. 43 U.S.C. § 1334-1337 (1976).

6. 43 C.F.R. Part 3300 (1978).

for tract nominations and comments from industry and the public. On the basis of these responses, geographic areas identified for leasing are defined by the Interior Department. Environmental impact studies are then initiated. When draft environmental impact statements become available, public hearings are held in which industry, environmental groups, state and local governments, and other interest groups are invited to comment. On the basis of witness testimony, final environmental impact statements are then prepared and submitted to the President's Council on Environmental Quality. The Secretary of the Interior makes the final decision as to whether or not to hold a sale and what environmental restrictions are to be included in the lease-sale terms.

If a lease-sale is authorized, interested parties are invited to submit sealed bids on the basis of either (1) a cash bonus bid with a fixed royalty or (2) a pure royalty bid. Only these two methods of bidding were authorized under the 1953 act.

The financial record of federal oil and gas leasing from the Outer Continental Shelf from 1954 through 1977 is shown in Table 1. Over this 24-year period, the federal government collected \$25.3 billion, of which \$19.7 billion was accounted for by bonus payments.<sup>7</sup> In exchange for these payments to the government, lessees were given the right to produce oil and gas subject to various regulations. The record shows that \$33.4 billion of oil and gas has been produced. Thus gross revenues from OCS production have exceeded payments to the government by only 32 percent. Out of this excess, lessees have paid all exploration, development, production, transportation, management and other costs.

TABLE 1  
OCS OIL AND GAS LEASES, 1954-1977

Total acres offered for lease	32,068,227
Total acres leased	14,830,557
Total bonus receipts	\$19,693,164,406
Total royalties received	\$5,447,609,337
Total rent received	\$199,818,772
Total shut-in gas payments received	\$1,412,676
Total revenue received	\$25,342,005,191
Total value of oil and gas produced	\$33,400,638,263

Source: CONSERVATION DIVISION, U.S. GEOLOGICAL SURVEY, OUTER CONTINENTAL SHELF STATISTICS (1978).

7. In addition, three sulfur lease sales generating \$35.7 million and two salt lease sales generating \$105,814 have been held. Thus, oil and gas lease sales have accounted for 99.8 percent of total bonus revenue received from OCS mineral leases.

While the 1953 act permitted both bonus and royalty bidding, the Interior Secretary elected to require cash bonus bidding for 3,124 out of 3,162 OCS tracts leased through the year 1977.<sup>8</sup> Only 38 tracts (1.2 percent) were leased using pure royalty bidding.<sup>9</sup> A significant change in approach was signaled in 1978, however. For the first time, the Secretary designated some bonus bid tracts as being subject to a sliding scale royalty rather than the traditional fixed (16 2/3 percent) royalty. In 1978, 87 out of the 249 tracts leased required royalty payments on a sliding scale basis.<sup>10</sup>

### III. PRINCIPAL PROVISIONS OF THE OCS LANDS ACT AMENDMENTS OF 1978

The 1978 amendments give more comprehensive regulatory and planning powers to various federal and state administrative agencies. Our judgment of the economic significance of the specific provisions of the new act will be based upon their probable resource allocation and income distribution effects.

1. Whereas the 1953 act authorized only cash bonus or royalty bidding,<sup>11</sup> the amendments specify eight alternative bidding systems and then authorize any combination of these bidding arrangements, plus any other system that may occur to the Interior Secretary.<sup>12</sup>

The specified bidding systems and the constraints placed upon them are identified in Table 2. The new legislation provides that bidding may be centered on any of the following four bid variables: (1) cash bonus, (2) royalty, (3) net profit share, and (4) work commitment. Each of these four bid variables is to be paired with one or two of five different factors which are fixed at the time at which bidding takes place: (1) a fixed royalty payment of at least 12½ percent of the oil or gas produced, or of its value, (2) a sliding scale royalty of at least 12½ percent, (3) a fixed net profits share of at least 30 percent, (4) a specified work commitment based on a dollar amount for exploration, or (5) a fixed cash bonus.

Congress specified that bidding systems other than the conventional cash bonus bid with a fixed royalty must be used for not less than 20 percent and not more than 60 percent of the total area offered for leasing each year during the first five years following

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8. U.S. DEPT OF INTERIOR, BUREAU OF LAND MANAGEMENT, OUTER CONTINENTAL SHELF STATISTICAL SUMMARY (1954-1978).

9. *Id.*

10. *Id.* (1978).

11. 43 U.S.C. §1337 (a) (1976).

12. 43 U.S.C.A. §1337 (a) (1) (Supp. 1979).

TABLE 2  
ALTERNATIVE BIDDING SYSTEMS

<i>Bid variable</i>	<i>Fixed item(s)</i>
1. Cash bonus	Fixed royalty of at least 12½%
2. Cash bonus	Sliding scale royalty of at least 12½% at beginning of lease period
3. Cash bonus	Fixed share of net profit of at least 30%
4. Cash bonus	Both (1) fixed royalty of at least 12½%, and (2) fixed share of net profit of at least 30%
5. Royalty	Either (1) specified work commitment based on dollar amount for exploration, or (2) fixed cash bonus, or (3) both
6. Net profit share	Fixed cash bonus
7. Work commitment based on dollar amount for exploration	Both (1) fixed cash bonus, and (2) specified sliding scale royalty of at least 12½%
8. Work commitment based on dollar amount for exploration	Both (1) fixed cash bonus, and (2) fixed royalty
9. Any other combination of alternatives listed in points 1-8 above	
10. Any other system of bid variables, terms, and conditions as determined by the Secretary of the Interior, except that no such bidding system shall have more than one bid variable. Subject to veto by either the Senate or House of Representatives	

Source: Outer Continental Shelf Lands Act Amendments of 1978, Pub. L. No. 95-372, 95 Stat. 629, § 205.

enactment of the legislation.<sup>13</sup> In addition, the Interior Secretary was authorized to defer payment of any part of a cash bonus whether the bonus was a bid variable or a fixed factor.<sup>14</sup> The maximum delay allowed is five years after the date of sale.<sup>15</sup>

An unusual provision of the new legislation authorizes the Secretary to allow multiple bidding on the same tract using any two or more of the alternatives listed in Table 2 on no more than 10 percent of the tracts offered each year.<sup>16</sup> The Secretary is also authorized to award leases using bidding alternatives selected at random.<sup>17</sup> In the language of the act, the purpose of this section is "to obtain statistical information to determine which bidding alternative will best accomplish the purposes and policies of the Act."<sup>18</sup>

2. The 1978 legislation mandates a significant expansion in eco-

13. *Id.* § 1337 (a)(5)(B).

14. *Id.* § 1337(a)(2).

15. *Id.*

16. *Id.* § 1337(a)(5)(A).

17. *Id.*

18. *Id.*

conomic planning. The Interior Secretary is required to provide a five-year leasing plan with annual revisions.<sup>19</sup> The plan is to consist of a schedule of proposed lease sales and requires management of the OCS in a manner which considers economic, social, and environmental values of the renewable and non-renewable resources contained therein.<sup>20</sup>

In addition, the lessees are required to prepare and submit exploration plans to the Secretary for approval.<sup>21</sup> The Secretary is empowered to require modifications of these plans as he deems necessary to achieve consistency with the provisions of the act and any regulations subsequently issued under the act.<sup>22</sup> These modifications are to be exercised after bidding has been completed and leases have been issued. After exploration begins, the Secretary is further empowered to order a suspension or temporary prohibition of any exploration activities and require preparation of a revised exploration plan.<sup>23</sup> Finally, the Secretary may require any lessee operating under an approved exploration plan to obtain a permit prior to drilling.<sup>24</sup>

As a third new planning step, the legislation requires that each lessee submit a development and production plan to the Interior Secretary for approval.<sup>25</sup> This plan must describe all facilities and operations which will be utilized in development and production of oil or gas from the lease area.<sup>26</sup> The description must include the location and site of such facilities as well as the land, labor, materials, and energy requirements associated with such facilities and all environmental and safety measures which are expected to be implemented. The facilities to be described are not limited to those to be owned by the lessee but must include all facilities to be used.<sup>27</sup>

3. Responding to demands from coastal states, the role of state and local government officials in planning for lease sales, exploration, and development has been considerably expanded. The five-year leasing plan must be submitted to the governor of each affected state for review and comment.<sup>28</sup> Any comments which request a modification require a written reply by the Interior Secretary.<sup>29</sup> All such

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19. *Id.* § 1344(a).

20. *Id.* § 1344(a)(1).

21. *Id.* § 1340(c)(1).

22. *Id.*

23. *Id.* § 1340(f)(1).

24. *Id.* § 1340(d).

25. *Id.* § 1351(a)(1).

26. *Id.* § 1351(a)(2).

27. *Id.*

28. *Id.* § 1344(c)(2).

29. *Id.*

correspondence must then be submitted to Congress with the proposed plan.<sup>30</sup> The legislation further mandates that "the Secretary shall accept recommendations of the governor" if the Secretary determines that they provide a reasonable balance between the national interest and the well-being of the citizens of the affected state.<sup>31</sup> Consultation with and recommendations from officials of local government jurisdictions are also encouraged and solicited, but the Secretary is not constrained to accept these recommendations as in the case of recommendations by governors.<sup>32</sup> For the newly required exploration and production plans, the legislation specifies that the Secretary shall not grant a license or permit for any activity affecting land use or water use in the coastal zone of a state unless the state concurs that the activity does not conflict with any approved coastal zone management plan.<sup>33</sup>

4. Following a precedent established in administration of the oil import quota system, the federal government has increasingly used its power to favor small relative to large refiners. The 1978 legislation expands this "small-refiner bias" by mandating that every oil or gas lease require the lessee to offer to sell 20 percent of his oil and gas production to small or independent refiners at market value.<sup>34</sup> While other legislation defines the small or independent refiner, the difficulty of determining market value in specific cases is acknowledged in the legislation.<sup>35</sup> When arm's-length market value evidence is not available, the Interior Secretary is authorized to determine an appropriate price.<sup>36</sup>

5. The 1978 legislation also provides funds to compensate injured economic interests for damages arising out of oil spills or other activities related to oil and gas production from the OCS. The act creates an Offshore Oil Pollution Compensation Fund in an amount not to exceed \$200 million.<sup>37</sup> This fund is to be financed by a fee of not more than 3 cents per barrel of oil produced from the Outer Continental Shelf, which is imposed on the lessee at the point of production.<sup>38</sup> The fund is to become immediately available to compensate for oil spill removal costs, the processing and settlement of claims,

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30. *Id.*

31. *Id.* §1345(c).

32. *Id.*

33. 16 U.S.C.A. §1456(3) (Supp. 1979); 43 U.S.C.A. §1351(d) (Supp. 1979).

34. 43 U.S.C.A. §1337(b)(7) (Supp. 1979).

35. *Id.* §1331(o).

36. *Id.*

37. *Id.* §1812(a).

38. *Id.* §1812(d)(1).



and all administrative and personnel costs borne by the federal government arising out of oil spills.<sup>39</sup>

In addition, a Fishermen's Contingency Fund in an amount not to exceed one million dollars is created.<sup>40</sup> Again, the fund is to be financed by a levy on lessees in an amount to be specified by the Secretary of Interior.<sup>41</sup> The purpose of the fund is to provide compensation for damages to fishing gear as well as any economic loss to commercial fishermen due to activities related to oil and gas exploration or production.<sup>42</sup>

Creation of these funds increases the probability that damaged parties will be compensated, while avoiding resort to litigation. The fees will tend to internalize the external costs of oil spill and other damages associated with OCS oil production.

6. Critics of the 1953 OCS Lands Act have made the argument that, without an exploration and drilling program of its own, the federal government is placed in a position of not knowing the value of the oil and gas leases that it is required to sell. Proposals for a mandatory government exploration program were not included in the amended act, but a new section was inserted requiring that lessees shall provide the Interior Secretary access to all data and information (including processed, analyzed, and interpreted information) obtained from any exploration, development or production activity on federal leases.<sup>43</sup> The Secretary is required to make such information available to affected states.<sup>44</sup> The Secretary is also required to prescribe regulations which are designed to maintain confidentiality of privileged or proprietary information from lessees.<sup>45</sup> Civil action for damages may be instituted against any federal or state government employee who supplies confidential information to an unauthorized person.<sup>46</sup>

Oil companies vigorously resisted this part of the legislation on the grounds that such proprietary information is paid for by lessees and is a valuable asset.<sup>47</sup> The legislation creates a serious risk of the loss of such valuable assets without hope of compensation, creating a disincentive for certain types of expensive drilling programs. Maintaining confidentiality is believed to be impossible.

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39. *Id.* § 1812(c).

40. *Id.* § 1842(a).

41. *Id.* § 1842(c).

42. *Id.* § 1843(c)(1).

43. *Id.* § 1352(a)(1)(A).

44. *Id.* § 1352(b)(2).

45. *Id.* § 1352(c).

46. *Id.* § 1352(f)(1).

47. See, e.g., statements by oil company executives in *Hearings Before the Ad Hoc Select Committee on Outer Continental Shelf on H.R. 1614*, 95th Cong. 1st Sess. 1444 (1977).

#### IV. ECONOMIC ANALYSIS OF ALTERNATIVE BIDDING OPTIONS

In order to simplify analysis of the bidding alternatives, we will concentrate attention on the four bid variables, (1) bonus, (2) royalty, (3) profit-share, and (4) work-commitment bidding. Each of these four bid variables is, in turn, paired with a variety of fixed payment requirements.

Before discussing each of these leasing alternatives, it would be useful to identify the basic economics involved. The OCS oil and gas resources under U.S. jurisdiction belong to the people. The government is merely the trustee. In turning over to lessees rights to explore for and produce any oil and gas found on leases, the people, through their government, are entitled to receive the "economic rent." This is the difference between the value of oil and gas produced and the total *necessary* cost of exploration, development, and production, including in costs a competitive rate of return for the lessee. The important economic relationships are illustrated in Figure 1.

Because outlays and incomes flow at different points in time, it is necessary to use comparable values. This is done through the process of discounting future dollars to a common point in time. All revenues and outlays represented in Figure 1 are shown as "Discounted Present Values."

The vertical distance in the diagram represents the discounted present value of total revenue obtainable from a given oil or gas lease. The largest segment of Figure 1 represents the "necessary costs" of exploring for and producing oil and gas from a lease. Payments to the government are not included in these costs. The ROI segment represents the return on investment for all capital costs incurred by the lessee. This ROI is assumed to be the necessary minimum as determined by competition. The residual revenue, after subtraction of all necessary costs including normal profit, is the economic rent collectable by the landowner.

Figure 1 is constructed on the assumption that maximum efficiency is obtained. If a leasing policy introduces inefficient operations, then costs will be higher than necessary and economic rent will be lowered. Due to the uncertain presence of oil and gas on any individual lease, payments to the government may fall short of or exceed the true rent implicit in the lease. An effective leasing system collects all of the economic rent only in the aggregate. But collection of maximum economic rent requires efficient conditions of production. Maximum efficiency means that resource input (cost) is minimized relative to product output. This is the essence of the conservation principle, a principle which should be of interest to all segments of society.

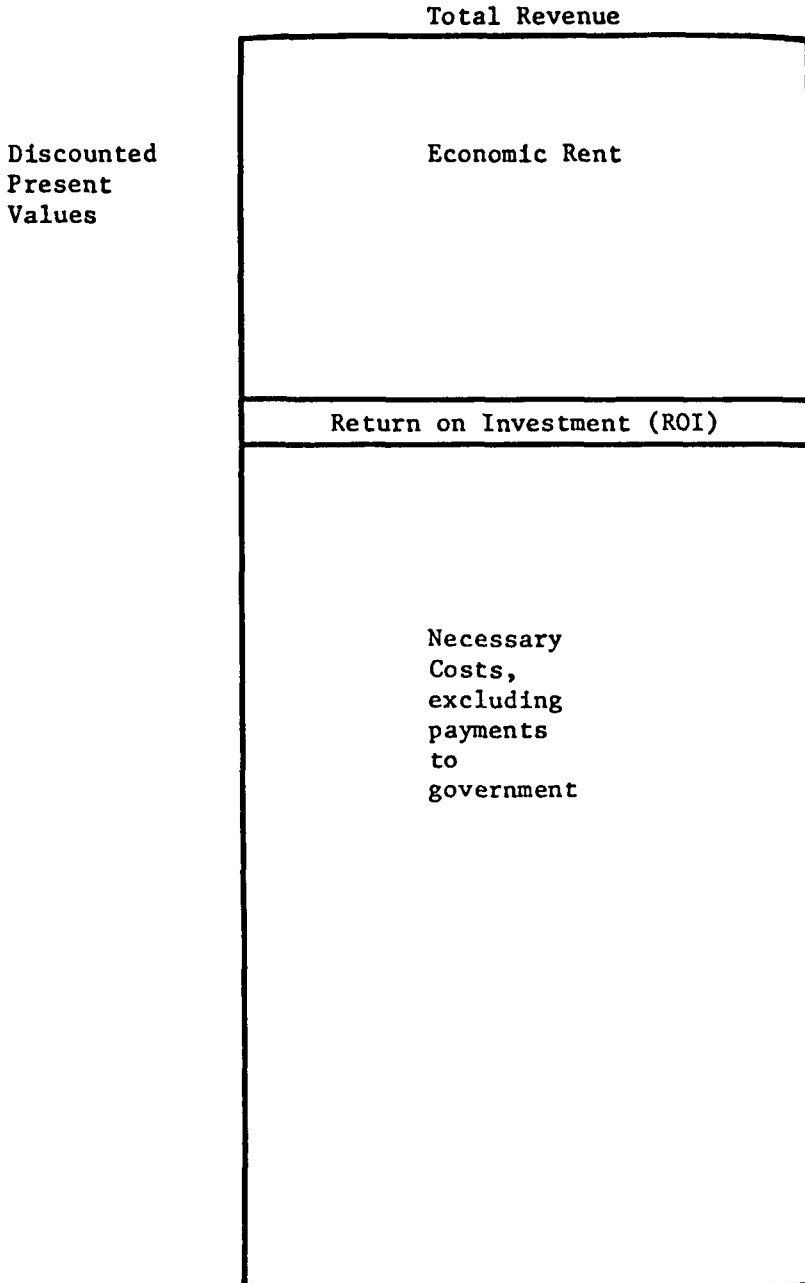


FIGURE 1  
MODEL OF ECONOMIC RENT ESTIMATION

### *Bonus Bidding*

Under bonus bidding, a single lump sum cash bid is offered. The principal advantage of the bonus bid variable is that it creates the greatest incentive for efficiency. The only charge against each unit of output under a pure bonus bid system is the real economic cost (labor, electricity, maintenance) of producing another barrel of oil. This important fact leads to efficient business judgments concerning (1) investments in secondary and tertiary recovery, and (2) the optimum shut down point when a well approaches exhaustion. Since only a lump sum payment to the government is required, this system is inexpensive to administer. The less the administrative cost, the greater is the economic rent collectible by the government. Finally, because the operator receives all residual values after payment of the bonus and any economic costs of oil and gas production, the operator has the greatest possible incentive to operate his lease efficiently.

The corresponding disadvantages of bonus bidding are two-fold. First, bonus bidding requires large amounts of "front-end money." Smaller firms may not be able to participate in bidding competition to the extent that they might wish because of limitations on their borrowing capacity. However, the severity of this problem has been exaggerated. Smaller firms, in fact, have been able to enter even the expensive OCS lease auctions by jointly bidding with others. Further, the deferred bonus provision of the 1978 act mitigates the front-end money problem. By introducing the deferred bonus idea, the government accepts the risk that poorly financed firms may "walk away" from part of their bonus payment obligation if they conclude, on the basis of their own or adjacent drilling, that the probable costs of additional lease development exceed probable revenues. In any case, it should not automatically be assumed that the public interest is advanced by encouraging entry into this industry by small firms. Oil exploration, development, and production in the hostile marine environment require a high degree of technological expertise as well as financial and operational integrity. Companies with this level of expertise and financial standing are generally large firms.

A second drawback of the bonus bidding system is the fact that there is no one-to-one relationship between the bonus payment to government for a specific lease, and the value of any oil and gas reserves ultimately found on it. At the extremes, this problem is illustrated by the 1968 Prudhoe Bay leases issued by the State of Alaska, where the probable present value of future revenue far exceeds the original bonus payments, and by the 1973 OCS sale offshore Florida (the "Destin Dome"), where the bonus payments were

extremely large but revenues were zero. However, recent research on federal OCS leases issued between 1954 and 1962 shows that, in the aggregate, under bonus bidding with a fixed royalty, there is a significant positive relationship between bonus payments to the government and the discounted present value of oil and gas production from such leases.<sup>48</sup>

This record also shows that of these 839 federal leases, 522 (62 percent) produced only dry holes. Another 132 (16 percent) leases were productive but unprofitable. Only 185 (22 percent) were profitable.<sup>49</sup> Effective competition requires that these profitable leases produce revenue flows sufficient to cover not only their own full costs but the bonus and exploration costs of all dry holes as well.

The rate of return that all lessees earned on their investment (bonus, exploration, development, etc.) in these leases has been estimated at 9.5 percent *before taxes*.<sup>50</sup> This rate of return is low relative to competitive performance elsewhere in the U.S. economy. The average return on equity in all manufacturing over the years 1954-1975 was 19.2 percent before taxes.<sup>51</sup> This evidence indicates that, contrary to congressional assumptions, bonus bidding for leases was highly competitive and the federal government received more than fair market value for its leases. Bidders, in fact, bid too much for leases issued during the time period studied.

### *Royalty Bidding*

Under royalty bidding, interested parties bid a percentage of gross wellhead value payable to the government for each and every barrel of oil or thousand cubic feet of gas produced from a lease. Royalty bidding has two major advantages.

First, payments to the government correspond with production, both in amount and time. If a lease is found to be dry, then no payments are required. If a lease is highly productive, then payments correspond with the value of production. Royalty is calculated as some specified percent of production, or value of production at wellhead.

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48. See R. Jones, W. Mead & P. Sorensen, Do Bidders in OCS Oil and Gas Lease Sales Behave Rationally? (June 1979) (paper presented before the IAEE-RFF Conference on International Energy Issues). This paper is available on request from the authors.

49. R. Jones, W. Mead & P. Sorensen, An Economic Analysis of the Performance of the Cash Bonus Bid Leasing System for OCS Oil and Gas Resources in the Gulf of Mexico 8 (November 1976) (paper presented at the Annual Meeting of the Southern Economic Association).

50. Jones, Mead & Sorensen, *Free Entry Into Crude Oil and Gas Production and Competition in the U.S. Oil Industry*, 18 NAT. RES. J. 859, 875 (1978).

51. FEDERAL TRADE COMMISSION, QUARTERLY FINANCIAL REPORT FOR MANUFACTURING, MINING AND TRADE CORPORATIONS for 1954-1975.

Second, in the absence of a fixed bonus, no "front end" payment is required. This may stimulate additional bidding competition. Firms are able to obtain leases with no payment being made to the government prior to production from such leases.

However, there are also substantial disadvantages arising out of a royalty bidding system. First, royalty bidding (and royalty payments) lead to premature abandonment of leases. The problem is illustrated in Figure 2. Costs of production are low in the initial phase of reservoir life. With the passage of time, reservoir pressure declines and production costs per barrel increase. In the absence of any royalty charge, production would be carried to point  $Q_1$ . Beyond that point, the cost of producing an additional unit of output is higher than its value. At point  $Q_1$ , the value of the resources used to produce the last barrel of oil is exactly equal to the value of the oil produced. Social waste would result from production beyond, or short of, this point.

Where a 52 percent royalty bid occurs, production would be terminated at  $Q_2$ . Figure 2 also illustrates an 82 percent royalty payment.<sup>52</sup> With this payment, the property illustrated would be abandoned at  $Q_3$ , when operating costs rise to \$2.52 per barrel and royalty equals \$11.48 per barrel ( $.82 \times \$14.00$ ). But from an economic efficiency viewpoint, production should be continued until real economic costs rise to \$14.00 per barrel. Thus a royalty leads to premature abandonment of valuable resources. It is correct to describe this as "premature abandonment" because the royalty payments are merely transfer payments from the operator to the government. They are not true economic costs in the sense that labor and materials are economic costs.

Returning to Figure 1, the effect of premature abandonment on economic rent can be shown. Because total revenue with a royalty payment is lower than it would be if no royalty were required, the total revenue column would be lower than shown in the diagram. But necessary costs and profits (ROI) would be reduced only slightly. Therefore, premature abandonment causes economic rents collectible by the government to be lower than their potential. In the royalty-bid case, the higher the royalty payment, the greater the loss in economic rent.

Premature abandonment might be avoided by successive reduction of royalty rates to zero. Everybody gains from reducing royalties to zero, relative to fixed royalties. Profits to the operator would in-

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52. These royalty percentages correspond with the lowest and highest winning royalty bids on eight royalty bid leases issued in an experimental OCS lease sale in October 1974.

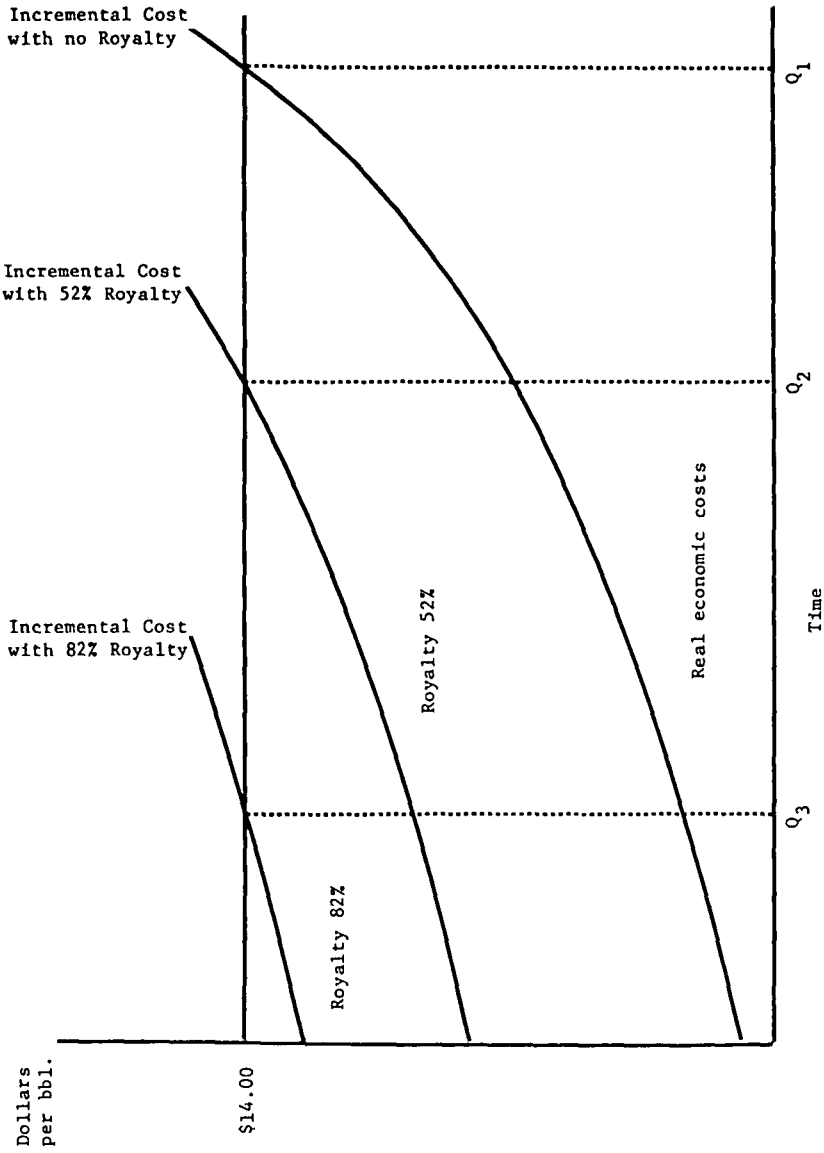


FIGURE 2  
MODEL OF OIL OR GAS WELL ABANDONMENT POINT UNDER  
VARIOUS ROYALTY RATES

crease, additional royalties would accrue to the government, employment would be higher, and the nation would receive additional oil production at social benefits which are greater than social costs. Under the 1953 OCS Lands Act, the Interior Secretary has had authority to reduce royalty rates,<sup>53</sup> but this authority has never been exercised, possibly because of the administrative difficulty.

The 1978 amendments explicitly provide for a sliding royalty scale.<sup>54</sup> If a sliding scale is used, the inefficiencies and consequent losses in economic rent analyzed above would still appear. Any investment in secondary and tertiary recovery would still be retarded. Such investments cause output to increase, and therefore incur higher royalty obligations. Costs also are increased, but they are ignored in a royalty system which is based on gross income only. The net effect would depress the ROI on the investment. In cases where the ROI is shifted from attractive to unattractive or negative levels, the government would suffer a loss of economic rents.

Further, expensive administrative costs are incurred. There is no efficient and objective means of setting sliding scale royalty rates. If royalty rates are made purely a function of production, the operator has an incentive to reduce production below the most efficient rate which would maximize the economic rent. And with royalty payments set at varying percentages of actual production, the operator has an incentive to fix his rate of production at one barrel less than the next highest royalty bracket. But production rates should be set at levels that maximize economic efficiency, not at rates that are influenced by a royalty payment schedule. Government administrators may try to avoid these problems with careful surveillance of the operator, but this requires expensive administration.

The cost of this bureaucracy may be shown in Figure 1 as a negative charge against economic rent. A relatively high level of rent might be collected, but some of it will be dissipated in administrative costs and will not accrue to the government. In addition, the lessees must also maintain staff personnel in order to develop and analyze data and negotiate with their government counterparts. This raises costs to the lessee beyond those which are represented to be "necessary costs" in Figure 1. Thus, economic rents are doubly reduced and net income available to the government declines even further.

It should also be noted as a drawback of royalty bidding that some smaller fields, which would be profitable to operate under low or zero royalty payments, become submarginal with higher royalty pay-

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53. 43 U.S.C. §1334(a)(1). These provisions are retained in the 1978 amendments. See 43 U.S.C.A. §1334 (Supp. 1979).

54. 43 U.S.C.A. §1337(a)(1)(C) (Supp. 1979).



ments. Thus, a newly discovered small field would be termed uneconomic to operate and would not be developed at all. This results in a monetary loss to the government and a social cost to the entire nation.

An evaluation of the October 1974 experimental royalty lease sale conducted by the Department of Interior supports these theoretical expectations. The analysis concluded that "royalty bidding may bring more bidders into OCS auctions . . . including more new bidders, and may also make independents more competitive in the auctions."<sup>55</sup> The report concludes, however, that "competition has perverse effects under the royalty bidding system. Competitive bidding drives royalty rates to levels that seriously erode the potential commercial value of a tract."<sup>56</sup> This leads to "a marked increase in the probability that tracts will not yield commercial finds; [and] an expected decrease in the ultimate recovery from any given commercial find."<sup>57</sup>

In summary, royalty payments result in reduced efficiency and therefore in reduced economic rents. The larger the royalty payments, the greater the loss in economic rent. Sliding scale royalty rates will avoid premature abandonment if they are reduced to zero at appropriate points. However, sliding scale royalties artificially discourage investments in secondary and tertiary recovery, lead to abandonment of wells that are economically operable, and result in wasteful administration costs, all of which lower economic rents available to the government.

### *Profit Share Bidding*

Under profit share bidding, each bidder offers a percent of the net profit on a lease as payment to the government for the right to explore and develop the lease. There are four possible advantages of profit share bidding.

First, it is an improvement over royalty bidding in that the profit share to be paid is based on net income (profit) rather than gross income. This means that, as a field approaches exhaustion, its profit declines towards zero. Unless the profit share bidding system also requires a fixed royalty payment, the problem of premature abandonment is avoided.

Second, profit share bidding avoids the front-end loading problem

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55. OFFICE OF OCS PROGRAM COORDINATION, U.S. DEP'T OF INTERIOR, AN ANALYSIS OF THE ROYALTY BIDDING EXPERIMENT IN OCS SALE #36 at 18 (1977).

56. *Id.*

57. *Id.*

that is characteristic of bonus bidding, unless profit share bidding is paired with a fixed bonus requirement. No payments are due until production appears and profits accrue to the operator. In the absence of front-end payments, smaller and less well-financed operators may enter the bidding competition and possibly win leases.

Third, payments correspond with benefits. Dry holes require no profit share payment. Conversely, the occasional rich discovery producing high profits requires larger payments to the government. This would avoid some of the political embarrassment associated with a Prudhoe Bay-size discovery.

Fourth, a pure profit share bidding arrangement may constrain over-zealous regulators and environmentalists from imposing uneconomic costs on oil exploration and production. Under the profit share system, any economic waste is clearly shared by the operator and the government. Returning to Figure 1, when unnecessary costs are imposed on operators the economic rent segment of the chart is reduced. It should be pointed out that when a government imposes post-bidding environmental or other costly regulations, the initial impact is on lessee profit (ROI). But bidders will quickly come to expect a repetition of such regulation in subsequent sales. These expectations will be factored into future bid calculations so that, ultimately, the cost of such regulations will be borne by the government. Where the government shares in all operating costs explicitly (as in the profit share system), excessive regulations should not as easily be imposed in the first place.

There are substantial disadvantages involved in the profit share bidding system, however. While the layman may consider computation of profit to be a simple and straightforward calculation, at least three alternative measures might be employed: (1) an income tax basis in which profit is defined as gross revenue minus operating costs and capital consumption allowances; (2) a "fixed-capital recovery plan" where profit is defined as gross revenue less operating costs, but only after the total capital investment, multiplied by some factor greater than one (reflecting a normal return on capital), has been recovered from operating profits; (3) an "annuity capital-recovery system" in which the "total capital outlays with accumulated interest are converted to an annuity with a specified interest rate and term, and the amount of the annual annuity is subtracted from each year's operating profits in order to determine the base of the profit share."<sup>58</sup>

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58. S. McDONALD, *THE LEASING OF FEDERAL LANDS FOR FOSSIL FUELS PRODUCTION* 102-103 (1979).

Within each profit definition, a multitude of problems appears. For example, (1) the producer may be a vertically integrated company or be involved in trading of oil with another company. In either case, an arm's length sale of oil does not take place. "Revenue" becomes subject to estimation, and requires administrative expense on the part of both lessee and lessor. (2) If a company wishes to do some research and development concerned with oil exploration and production, it is likely to do so on leases involving profit share payments rather than on other company production utilizing bonus or royalty payments. (3) Where a company has a mixture of highly efficient and less efficient drilling rigs or ships, it is likely to use the poor equipment on the profit share lease and reserve the best equipment for other company operations. (4) When a company needs to train crews in drilling and reservoir development, it is likely to do its training on profit sharing leases. (5) "Gold-plating" (poor cost control) is likely to occur on profit share leases where the share paid to the government is very high and the retained share is low. Evidence of this practice may be found in the Long Beach (Wilmington) field, where profit shares paid to the government are extremely high. (6) Profit share leases may exhibit excessive public relations expenditures, particularly when such expenditures produce benefits for the lessee company as a whole. (7) In the event of oil field equipment supply shortages such as occurred in 1973 and 1974, available supplies are likely to be allocated by lessees to other than profit share leases first.

Companies differ in their level of efficiency. In order for government to select the highest bidder, it should evaluate probable efficiency of each competing bidder. While this is desirable, it is also expensive and may be impossible in practice. This means that the company which bids the highest profit share must be awarded the lease, even though that operator may not produce the most economic rent for the government.

In order to avoid the problems listed above, as well as others not listed, the government will likely attempt to police lessee operations extensively. This, of course, requires additional administrative costs. Further, because the interpretation of profit is difficult, one must expect litigation of disputes. This requires expensive attorney fees and court costs for both the operator and the government. All of these expenses further reduce available economic rents.

The effect of income taxes upon a company operating a profit share lease may be considerable. Since percentage depletion allowance benefits have now been totally phased out for all integrated oil companies and reduced for smaller non-integrated firms, the federal

corporate income tax will approach a 48 percent effective rate. Any state income taxes will increase this rate even further. A 48 percent corporate income tax paired with a 30 percent profit share bid results in an effective profit share (or tax) rate of 63.6 percent, based on the first measure of profit listed above. In this case, out of every additional dollar saved through efficiency, the company retains 36.4 cents. If an 80 percent profit share bid is paired with a 48 percent corporate income tax, the effective tax rate is 89.6 percent. This leaves only 10.4 cents out of each dollar saved as a reward for efficiency. This incentive is too small to produce reasonable efforts toward efficiency. In terms of Figure 1, expenses will be higher than necessary with the result that economic rents available to the government are sacrificed.

As in the case of royalty payments, profit share payments discourage investments in intensive reservoir management including well workovers, pressure maintenance projects, and secondary recovery investments. Some supermarginal investments will become submarginal and will be passed over. The lost net benefits are borne by the government in the form of reduced economic rents, and by all citizens in the form of resource waste.

The 1978 amendments require that the Interior Secretary utilize bidding methods other than the conventional cash bonus system for between 20 and 60 percent of all leases.<sup>59</sup> Such experimental procedures appear to be inappropriate. California and the City of Long Beach have a record of oil production under profit share bidding arrangements beginning in 1965. This record has never been subjected to a thorough economic analysis. In the Long Beach case, the profit share bid for the largest operating interest amounted to 95.56 percent of accounting profit. While this may seem good for the lessor,<sup>60</sup> the profit share retained by the lease operators (after profit share payment, a 3 percent management fee, and income taxes) is only 0.75 percent. In effect, there is no efficiency incentive. As a substitute, the Department of Oil Properties has developed a fifty-person permanent staff to supervise and police the operators. Administrative interference with the operation of the field becomes a necessity. The Long Beach-Wilmington contract provides that:

The City Manager . . . shall exercise supervision and control of all

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59. 43 U.S.C.A. §1337(a)(5)(B) (Supp. 1979).

60. The Department of Oil Properties, City of Long Beach, proudly noted that "the City of Long Beach's record for obtaining unusually high revenue-producing contracts for developing the Tidelands is, according to available records, unequalled. . . . Because of this skill, citizens of Long Beach and the State of California receive maximum benefits." DEPT OF OIL PROPERTIES, CITY OF LONG BEACH, ANNUAL REPORT 35 (1965).

day-to-day unit operations . . . and . . . shall make determinations and grant approvals in writing as he may deem appropriate for the supervision and direction of day-to-day operations of the Field Contractor, and the Field Contractor shall be bound by and shall perform in accordance with such determination . . . .<sup>61</sup>

A spokesman for one operator has stated that "hassle after hassle has developed regarding charges to the net profits account."<sup>62</sup> All of the problems outlined above can be verified in the Long Beach situation, including the "gold-plating" problem.

In summary, while profit share bidding avoids some of the problems present in both bonus bidding and royalty bidding, it has its own set of serious problems. Economic analysis indicates that economic rents received by the government will be substantially lower under profit share bidding than under bonus bidding.

#### *Work Commitment Bidding Based upon a Dollar Amount Guaranteed for Exploration*

Under this system, the bidder specifies in detail the dollar amount he will commit for exploration in exchange for a lease. Presumably this means that the bidder must cost-out his entire exploration, development, and production program. The disadvantages of this system are overwhelming.

First, it is questionable whether government officials who must approve such leases are in a position to determine the most efficient work program. If they select any program other than the most efficient one, economic rents will be reduced.

Second, experience in North Sea work program bidding has shown that when those characteristics of the work commitment that are viewed with favor by the sale administrators become known, firms will concentrate their efforts and corresponding dollar amounts in these directions. After the early North Sea leases were awarded, it became known that the bidder offering to drill the most holes would win the leases. Subsequent lease bids therefore promised excessive drilling. This practice greatly reduced economic rents available to the British government.

There is no practical way that the optimum number of wells to be drilled on a lease can be known and specified in advance. This num-

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61. Contractor's agreement, Article 14, Wilmington Oil Field, California, Long Beach unit.

62. Mead, *Federal Public Lands Leasing Policies*, COLO. SCHOOL MINES Q. 212 (October 1969).

ber may be determined only after experience in drilling in a specific area is gained. Other characteristics of an exploration program will also follow this principle.

If the winner of a lease is determined on the basis of the dollar amount of his work commitment, then the government sacrifices all or part of a potential cash bonus and receives in exchange a probably excessive work commitment. If bidder selection is not based on the *highest* dollar amount of the work commitment, there is no objective way to select the winning bidder. This opens up a possibility of corruption of government officials.

As with profit share leasing, any work commitment must be policed. Administrative costs of selecting the winning bidder and verifying the costs claimed will be very high. Correspondingly, the lessee must maintain added staff in order to negotiate with the government staff. These administrative costs are not part of the "necessary costs" of production, but will be paid out of economic rent.

There is no need for the government to experiment with the work commitment bidding form. There is abundant experience in both British and Norwegian North Sea experience. This experience has been evaluated by Kenneth Dam, who concluded that "the discretionary system turns out to be a most expensive subsidy."<sup>63</sup> It is instructive to note that the British leased 15 North Sea blocks by competitive bonus bidding in 1971. If these blocks had been leased by the usual discretionary system, the British would have failed to receive 37 million pounds (\$90 million), the total amount of the bonus bids.<sup>64</sup> The only offsetting gain to the government would be the incremental value of the work program. However, it is probable that the operators would have undertaken an optimal work program in the absence of the coercion involved in a work commitment bid, and therefore the British government would have gained nothing.

The work commitment bidding system is probably the most socially costly alternative of all those analyzed in this paper. It is highly unlikely that fixed work commitments could ever have a value to the nation equal to the bonus bids which would have been received in their place. Work commitment bidding is a contradiction of both engineering and economic logic and would appear to have no rationale except as a make-work policy for the exploration industry and the government bureaucracy.

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63. K. DAM, OIL RESOURCES 39 (1976).

64. *Id.*

## V. ECONOMIC CONSEQUENCES OF MISCELLANEOUS NEW REGULATIONS

The 1978 amendments significantly increase the number of reports to be prepared by both the government and lessees.<sup>65</sup> These newly required reports may be justified uses of national resources; but it should be clearly understood that their costs are paid for by society. To the extent that lessees must prepare reports, the costs become part of the total cost of lease operation and directly reduce economic rents available to the government, as shown in Figure 1. The use of government employees to supervise or analyze these reports further reduces the net benefits society gains from OCS operations.

The exploration plan now required of the lessee is to be submitted after the bidding has been completed.<sup>66</sup> Thus, terms of this plan are not known until after the lease bargain has been struck. Further, the development and production plan required of the lessee must be prepared prior to development of any discovered reserves. Plans for exploration and for development and production must be submitted to the governors of any affected states, who have been given veto powers in the new law. The legislation specifies that "[t]he Secretary shall not grant any license or permit . . . unless the State concurs or is conclusively presumed to concur with the consistency certification."<sup>67</sup> Therefore, in the future, winning a lease does not guarantee that the lessee will be permitted to operate his lease under customary terms. Both state governors and the Interior Secretary have the power to withhold permits or to require the lessee to meet terms demanded by either political entity. The new legislation will have the

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65. For example, 43 U.S.C.A. § 1337(a)(9) (Supp. 1979) requires the Energy Secretary each year to report to Congress on the use of various bidding options. Simultaneously, § 1343 requires the Interior Secretary to file two reports annually to Congress (1) showing the record of leasing and production during the prior year and (2) recommending measures to promote competition for leases. Section 1346(a)(1) requires the Interior Secretary to conduct new environmental studies in order to develop information for later environmental impact studies. Section 1347(a) mandates a joint Interior Department-Coast Guard study of the adequacy of existing safety and health regulations technology, equipment and techniques available for exploration, development and production of OCS minerals. Section 1347(e) requires the Secretary of Commerce, in cooperation with the Coast Guard and the National Institute of Occupational Safety and Health, to conduct studies of underwater diving techniques and equipment. The President is required to study whether private oil pollution insurance is available on "reasonable terms" and whether the market for such insurance is sufficiently competitive to assure purchasers of a reasonable range of deductibles, coinsurance provisions, exclusions, and the like. Lessees are required by § 1340(c)(1) to prepare an exploration plan, and by § 1351(a) to prepare development and production plans, as well as a report on all facilities and operations to be used in the development and production of oil or gas.

66. 43 U.S.C.A. § 1340(c)(1) (Supp. 1979).

67. *Id.* § 1351(d).

dual effects of (1) increasing operating costs whether "necessary" in the framework of Figure 1 or not, and (2) increasing uncertainty at the point of bidding. But increased uncertainty means that discount rates used by bidders will be higher than otherwise, and consequently discounted present values of future expected revenues will be lower. Both these effects will lower the economic rent available to the government and ultimately to the people, in whose trust the resources are held.

## VI. CONCLUSION

Among the motives leading Congress to amend the 1953 OCS Lands Act was a belief that under the prevailing cash bonus bidding system with a fixed royalty payment, the government was receiving "fair market value" for its oil and gas leases, and big oil companies were enjoying an unfair advantage in the lease sale market because the system was basically uncompetitive. Recent research evaluating the record of bidding and production shows that the opposite is true. Competition for the 839 leases issued from 1954 through 1962 was so intense that the rate of return to the lessees was only 9.5 percent *before taxes*.<sup>68</sup> This is substantially below the 19.2 percent average before-tax rate of return on equity earned by U.S. manufacturing firms in a comparable period of time. Further, analysis of this data has shown that there is no significant relationship between firm size and the amount of the winning bid on these 839 leases.<sup>69</sup>

Because the 1978 amendments mandate use of bidding systems other than the customary cash bonus bid with a fixed royalty, less efficient systems will be used for between 20 percent and 60 percent of all leases issued in the next five years. The effect of lower levels of leasing efficiency is that less economic rent will be available to the government. Additional administrative costs imposed on lessees under each of the alternative systems will lower the residual value of the oil and gas resources, causing payments to the government to be lower than under bonus bidding; at the same time, government costs of administration will be higher.

New planning and regulatory requirements introduced in the 1978 amendments will have the same dual effects of lowering lease payments to the government and increasing government payments out of these lower rents. The ultimate burden of this lost efficiency will be borne by the public. In money terms, the loss of government revenues must be made up in either (1) lower levels of government

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68. *See supra* note 50.

69. *See supra* note 48.



services, or (2) increased taxes. In real terms, if more resources are devoted to lease sale administration by both lessees and government, then the standard of living of the people must decline, or grow at a lower rate than necessary. While the motivation of Congress in amending the OCS Lands Act may well have been a desire to improve the public welfare by means of additional regulation and planning for OCS oil and gas development, the result will most likely be a reduction in the speed and efficiency of such development and a loss of real income by all Americans.