

ALASKA LEGISLATURE SPECIAL COMMITTEE / SUBJECT FILES 8672
1505 SCOMM 55: JNT. SPEC. COMM. ON STATE TAX POLICY, 1986-1987, 305

Oil Taxes General

file 14

**ALASKA PETROLEUM REVENUES:
THE INFLUENCE OF FEDERAL POLICY**

Final Report

Prepared for

State of Alaska
Office of the Governor

Prepared by

Matthew Berman, Eric Myers,
Will Nebesky, Karen White, and Teresa Hull
University of Alaska
Institute of Social and Economic Research
707 A Street, Suite 206
Anchorage, Alaska 99501

October 1984

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PREFACE

This report was the product of a joint research effort spanning approximately one year and involving a large number of participants. Although those preparing the report worked simultaneously on many portions of the research, primary responsibility of individual authors is as follows.

Eric Myers drafted the Alaska portion of Chapter II as well as Appendixes B and C. Will Nebesky prepared Appendixes D and E and supporting illustrations for Chapter III as well as edited the entire draft. Karen White prepared a draft of Chapter VI. Teresa Hull prepared the material for Appendix A. Matthew Perman supervised the research for the study, drafted the remainder of the text, including Appendixes F and G, and edited the final report.

The authors would gratefully like to acknowledge the contribution of a number of people. Without the assistance of these generous individuals, it would not have been possible to complete the study. Arlon Tussing initiated the project, providing ideas and information crucial to the progress of the study. Several public servants went far out of their way in order to provide us with needed information. Ed Park of the Division of Oil and Gas and Eric Hansen of the Division of Petroleum Revenue patiently handled numerous requests for data for the state of Alaska. George Clark, director of university lands accounting for the University of Texas System, and several staff members of the Energy Resources section of the General Land Office and the Revenue Estimating section of the Comptroller's Office provided invaluable assistance with data on Texas petroleum production and revenues.

We would also like to acknowledge the contribution of Professors Walter Mead of the University of California and Marlan Blissett of the University of Texas as well as the helpful suggestions of Dr. Charles Logsdon of the Alaska Department of Revenue and Mark Wittow of the Alaska Governor's Office. Lee Gorsuch provided helpful suggestions and encouragement. Cindy Tooke and Catherine Dwyer typed the draft. In fact, nearly the entire Institute staff assisted in one way or another in preparing the report. Final responsibility for errors and omissions, however, remains with the authors.

EXECUTIVE SUMMARY

This report examines the effects of certain federal policies on Alaska oil and gas revenues. Policies examined include price controls, federal excise taxes, limits to state severance taxes, the North Slope export ban, and OCS revenue sharing. Some of the major findings include:

- The federal government collected \$5.2 billion from the Alaska petroleum industry in 1982, mainly from the corporate income tax, Windfall Profits Tax, and payments for OCS leases.
- The federal government may receive over a billion dollars per year by the late 1990s in royalties from OCS oil production. Absence of a federal program sharing these lease revenues departs significantly from the pattern of historical precedents for sharing similar revenues from all other federal lands.
- Federal price controls on Cook Inlet oil cost the state of Alaska \$1 billion in revenues and oil producers \$1.3 billion in profits between 1974 and 1980.
- Lifting the Congressional ban on exporting oil transported through the trans-Alaska pipeline might yield one billion barrels in additional North Slope oil production and \$8.7 billion in state revenues by 2010.

The study focuses on the difference between the value of oil and gas at the wellhead and the cost of producing it, or the economic rent. An analysis of the size and distribution of petroleum economic rent over the past twenty years compares Alaska to Texas, the largest oil-producing state. General conclusions are:

- Federal policies such as wellhead price controls and the Windfall Profits Tax have been much more important than state tax policies in the division of economic rent between oil producers and governments.
- State, even federal, policies have had relatively little effect on shares of economic rent compared to the effects of world energy prices, the discovery of oil, landownership, and the cost of producing and transporting oil and gas to markets.

In addition to the general conclusions, specific findings from the economic analysis comparing the petroleum industry in Alaska to that in Texas include:

- The distribution of petroleum economic rent among taxes, lease payments to landowners, and oil company profits is roughly similar in the two states.
- Texas produces 50 percent more oil and 30 times more gas and collects 50 percent more severance tax revenues than Alaska. However, most Alaska oil production occurs on public lands, providing the state lease payments such as royalties which accrue in Texas mainly to private landowners.
- Although moderate excise tax and royalty rates have little effect on production in a lower-cost region such as Texas, they may increase minimum economic field sizes significantly and reduce exploration effort in high-cost, frontier areas of Alaska.

The report also examines the sensitivity of future Alaska oil production--and, ultimately, future petroleum revenues--to important market and policy factors. The study develops scenarios for probable oil production in the North Slope region, where most of Alaska's known oil reservoirs lie. Key findings of this analysis include:

- A number of large new fields are likely to be brought into production within the next decade on the North Slope, but Alaska onshore production, even including the contribution of these fields, is likely to decline 60-to-70 percent by the year 2000.
- The separate accounting method of corporate income taxation, if ruled legal by the courts, has less adverse impact--per dollar of revenue collected--on future North Slope oil production than severance taxes or other taxes on production.
- While federal and state governments are likely to collect around the same shares of economic rent from future onshore production, federal royalties from the Alaska OCS--none of which are currently shared with the state--may exceed total state petroleum revenues by the late 1990s.

Distribution of Economic Rent

The upheavals in world oil markets which have occurred over the past ten years have caused a huge increase in the potential or actual economic rents associated with energy production. Many recently prominent energy-resource issues are in one way or another related to the division of this economic rent among landowners, governments, and other parties. At both national and state levels,

energy policy has developed around the attempts of various interest groups to capture or allocate the "windfall" economic rent created by the rise in world oil prices.

Figure A shows the distribution of the total value of oil and gas production in Alaska in 1981, the peak year for energy prices. The cost of producing, developing, and exploring for oil and gas amounted to 20 percent of the total value of 14 billion dollars. This left over 11 billion dollars in economic rent, allocated in taxes to governments, in lease payments to landowners, and in profits to producers. Figure A shows that the federal government received 44 percent; the state government, 36 percent; and producers, 20 percent of the economic rent in 1981, with private landowners (Native regional corporations) receiving a minor share.

Figure B shows the same set of comparisons for oil and gas production in Alaska's Cook Inlet region in 1976, the only producing area of the state at that time. Federal wellhead price controls reduced the potential value of regional petroleum production by over 50 percent, as compared to market values for imported oil in 1976. In that year, producers received 39 percent of the remaining economic rent, a much larger share than in 1981.

In order to determine whether the historical pattern of economic rent and its distribution in Alaska is similar to that of other petroleum-producing states, the study developed a parallel analysis for Texas. Unlike Alaska, where nearly all oil and gas production occurs on public lands, approximately 90 percent of production in Texas occurs on lands owned by private corporations and individuals.

Figure C compares the value of oil and gas production in 1981 in Alaska and Texas, showing the shares of exploration and production costs and showing how lease payments, taxes, and profits allocate economic rent to landowners, governments, and producers. Total oil and gas production value was approximately three times as large in Texas as in Alaska in 1981. Although drilling and other petroleum industry costs are much lower in Texas, production is dominated by small, marginal fields. This industry structure results in a 44 percent share for costs in the total value, as opposed to just 20 percent in Alaska. In addition, lease payments such as royalties took a much larger share of the value in Texas, while profits and taxes took relatively smaller shares.¹

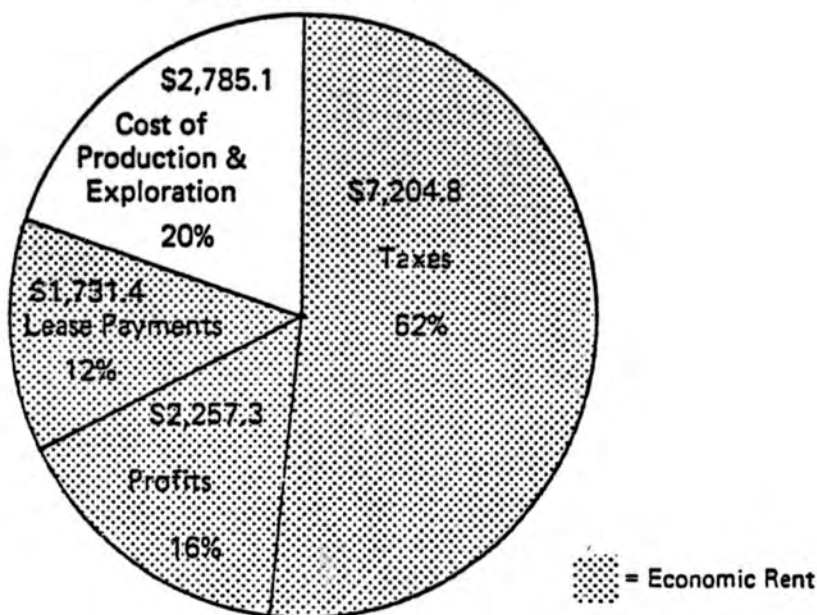
¹The tax category in Figures A, B, and C includes only those taxes paid by the petroleum industry which allocate a portion of the economic rent. Since all industries, not just the oil industry, pay property taxes (except on oil and gas reserves), general sales taxes, and payroll taxes, taxes such as these are included as part of the cost of production, rather than as part of economic rent.

Figure A

**Distribution of Total Value and Economic Rent
for Alaska Oil and Gas Production in 1981**
(millions of dollars)

Total Value of 1981 Production

\$13,978.6 million



Total Economic Rent in 1981

\$11,193.5 million

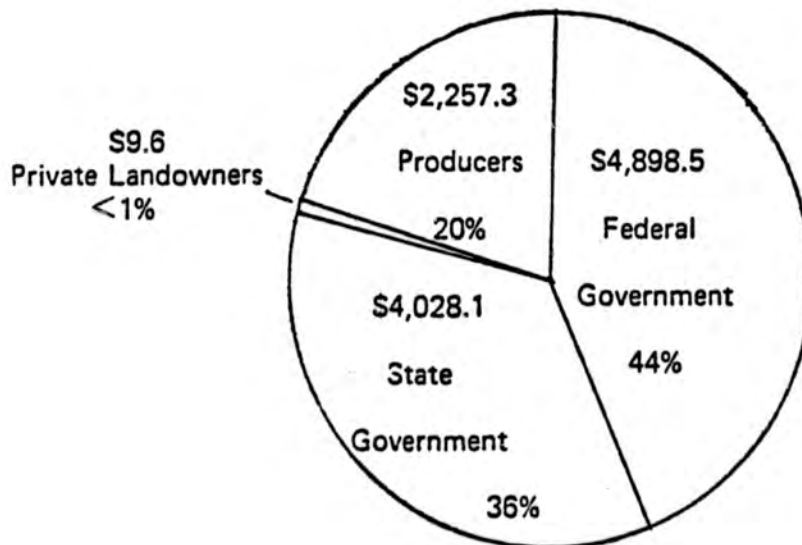
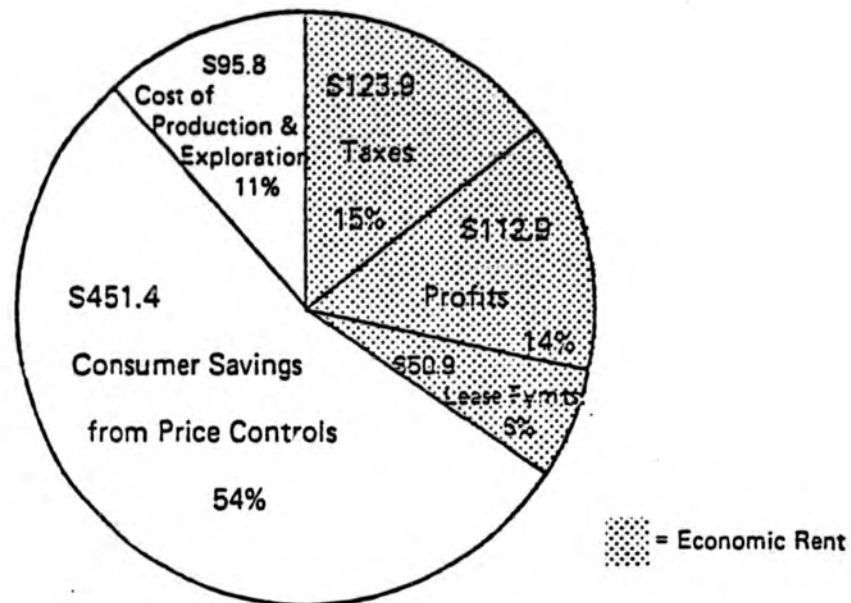


Figure B

Distribution of Total Value and Economic Rent
for Cook Inlet Oil and Gas Production in 1976
(millions of dollars)

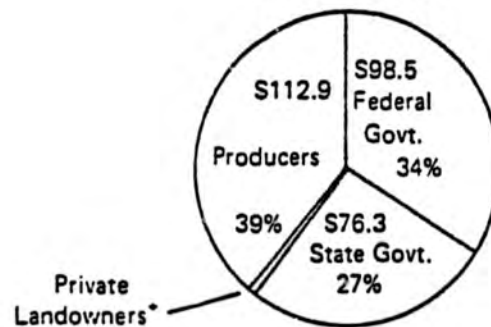
Total Value of 1976 Production

\$834.9 million



Total Economic Rent in 1976

\$287.7 million



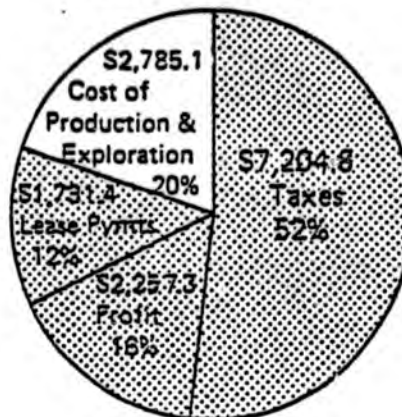
Note: *Negligible

Source: Figure 4.

Figure C
Distribution of Total Value of Oil and Gas Production
for Alaska and Texas in 1981
(millions of dollars)

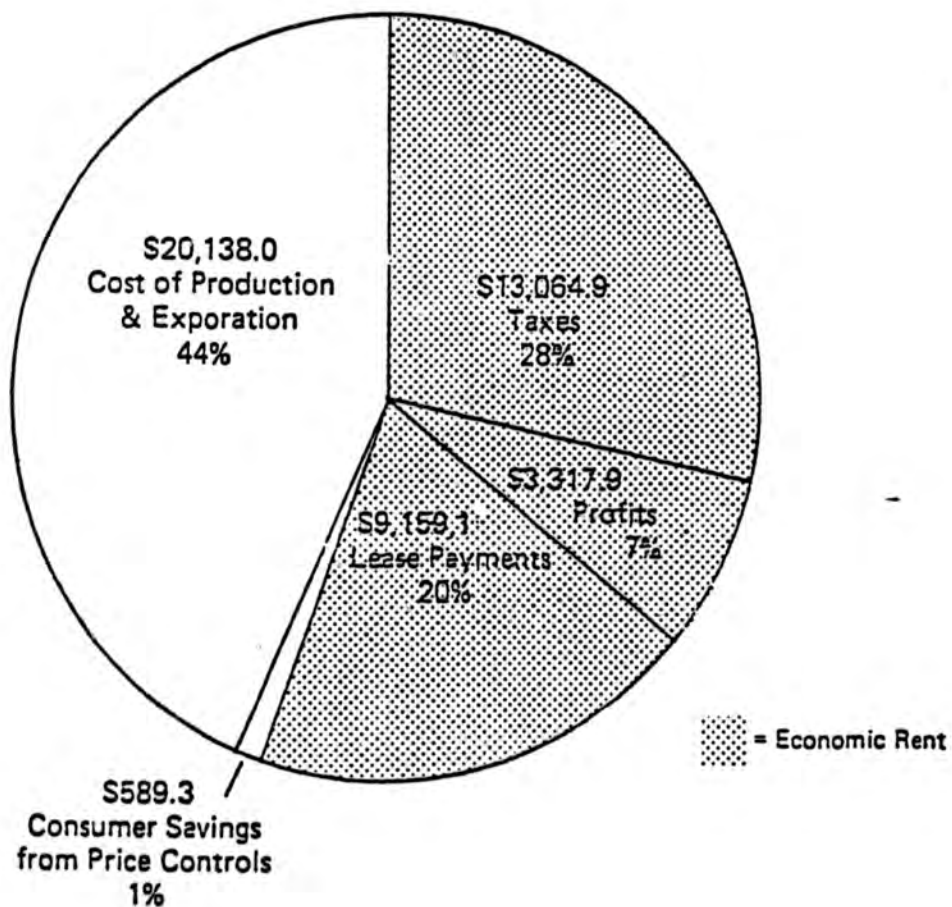
Alaska, All Regions

\$13,978.6 million



Texas Onshore & Offshore

\$46,269.2 million



When one considers the role of private landowners in Texas, however, the final division of economic rent among federal, state, and local governments, private landowners, and producers in 1981 is quite similar in Alaska and Texas. Figure D shows that private landowners in Texas, who own most of the oil and gas deposits in that state, received 21 percent of the economic rent--over 5 billion dollars (after taxes)--in 1981. Texas state government received 11 percent, mostly in severance taxes; and local governments, which tax oil and gas reserves, received another 7 percent. The state of Alaska receives lease payments for the oil and gas it owns, which are comparable to those which private landowners receive in Texas. The combined share of the petroleum economic rent received by state government and private landowners in Alaska was 37 percent in 1981, compared to the 39 percent combined share received by private landowners and state and local government in Texas.

The distribution of economic rent shown in Figure D is for 1981, the peak year for oil prices and economic rent. The study notes that in the period of stable oil prices from 1963-1971, landowners and governments in Texas received one hundred percent of the computed economic rents, leaving none to oil producers. Such was not the case in Alaska, however, with Cook Inlet producers consistently earning significant economic rents even with the low wellhead prices prevailing in the region.

The study goes beyond comparing the size and distribution of economic rent received from oil and gas development in the two states. It analyzes the contribution of various factors to the pattern observed in two major economic divisions of each state, noting that tax rates are only one of several important factors. The analysis shows that four factors are typically more important than state (and even federal) tax systems in determining the distribution of energy revenues among governments, producers, and consumers:

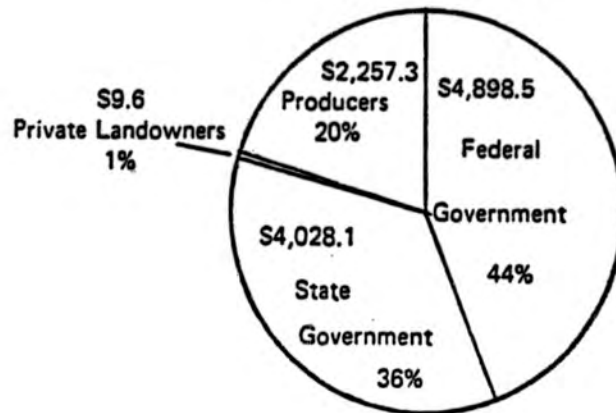
1. Geologic good fortune--the location of accumulations of oil and gas is randomly associated with state political boundaries. Oil companies have also spent billions of dollars over the past 20 years exploring for oil and gas in Alaska outside the producing Cook Inlet and North Slope regions, without a single commercial discovery to date.
2. Ownership of mineral rights--federal or state governments may retain title to subsurface estate, allowing them to receive proprietary lease payments such as royalties from oil and gas production. This is the principal factor explaining regional differences in the shares of economic rent received by federal and state governments and private landowners.

Figure D

**Distribution of Economic Rent from Oil and Gas Production
for Alaska and Texas in 1981**
(millions of dollars)

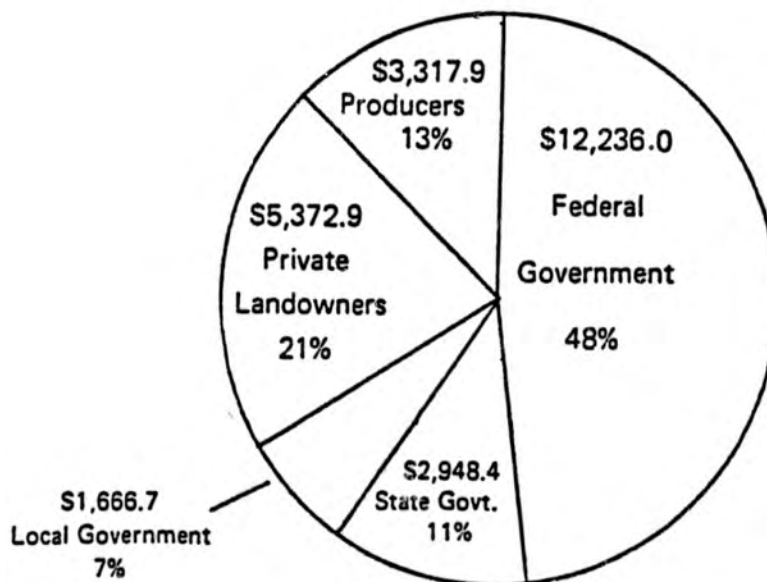
Alaska, All Regions

\$11,193.5 million



Texas Onshore and Offshore

\$25,541.9 million



Source: Figures 2 and 3.

3. Cost environment--exploring for and developing petroleum deposits in frontier regions such as Alaska is much more costly than in onshore areas in other states.
4. Market prices--individual states have little ability to influence markets for their energy products. In addition, federal wellhead price controls on oil and gas during the 1970s reduced total economic rent by around 20 percent in Texas and 40 percent in Alaska's Cook Inlet region.

The market price and cost factors have a severe combined effect on the size of petroleum economic rent in Alaska. If producers in the relatively low-cost Cook Inlet region had been able to benefit from the market prices and costs prevailing in Texas, economic rent would have more than doubled from the levels actually received between 1963 and 1982. On the North Slope, even giant fields such as the Kuparuk reservoir would not have been feasible to develop under oil price levels prevailing in the early 1970s. But, on the other hand, if a geologically similar field were found in Texas, it would have been a bonanza for producers (and governments) even at 1971 world oil price levels, due to Texas's lower development and transportation costs.

Effects of Prices and Policy on Production

Next, the study turns to the analysis of how various methods governments use to collect economic rent may reduce total economic rent, total petroleum production, and ultimately, total petroleum revenue. All methods of collecting economic rent--severance taxes, income taxes, royalties, etc.--affect investment decisions of oil producers to some extent, but some methods have more severe impacts than others.

Severance and other producer excise taxes (and royalties as well) can lead to earlier abandonment of producing fields. But the effect--typically just one more year of production--is relatively minor, adding only a percent or two to cumulative production from the field. This suggests that the Economic Limit Factor in Alaska's severance tax, which reduces the effective tax rate rapidly as production per well declines, has limited ability and high revenue cost for conserving oil and gas from producing fields.

Excise taxes and royalty shares are likely to have a greater impact on potential production from increasing minimum economic field sizes for discoveries in frontier areas. Under economic conditions such as currently prevail on Alaska's North Slope, adding a 30 percent share of combined royalty and severance taxes may cause a five-fold increase in minimum economic field size, from

100-300 million barrels to 0.5-1.5 billion barrels. The study examines recent geological studies to estimate that fields north of the Brooks Range, containing a total of 2-3 billion barrels of oil, may not be feasible to develop because of the combined effects of severance taxes and royalty shares. The study notes that governments should favor lease bonus payments, net profit shares, and income taxes--methods with little or no effect on minimum field sizes or on abandonment of producing fields--over royalty shares and excise taxes for collecting economic rent in frontier areas.

The study then develops a series of scenarios projecting the sensitivity of Alaska petroleum production and revenues over the next two-to-three decades to assumptions about market prices and policy factors. These projections examine feasible production from nine known fields located in the North Slope region, considering multiple development options for four of the nine fields. In addition to the Prudhoe Bay and Kuparuk fields, four new fields--including Milne Point, Endicott River, Lisburne, and Seal Island--appear to be feasible under current economic and policy conditions prevailing on the North Slope. These six fields form a "basecase" projection, producing approximately nine billion barrels between 1983 and 2010.²

Other fields, most importantly, West Sak heavy oil deposits overlying the Kuparuk field, appear to require higher prices (or lower costs) than are currently available. Figure E shows the projected sensitivity of feasible North Slope production from these nine fields, assuming four different levels for the North Slope oil price (price of Prudhoe Bay oil at Pump Station 1 of the trans-Alaska pipeline). The figure shows that if producers anticipate long-run oil prices to fall by around \$7.50 per barrel from the 1984 level (a \$10 North Slope price roughly corresponds to a \$20 world price), cumulative oil recovery would be approximately 2 billion barrels less than in the basecase. If North Slope prices were to rise to \$25 per barrel (in 1984 dollars), or around the historical peak level world oil prices reached in 1981 (after adjusting for inflation), it might be feasible to produce as much as 14 billion barrels.

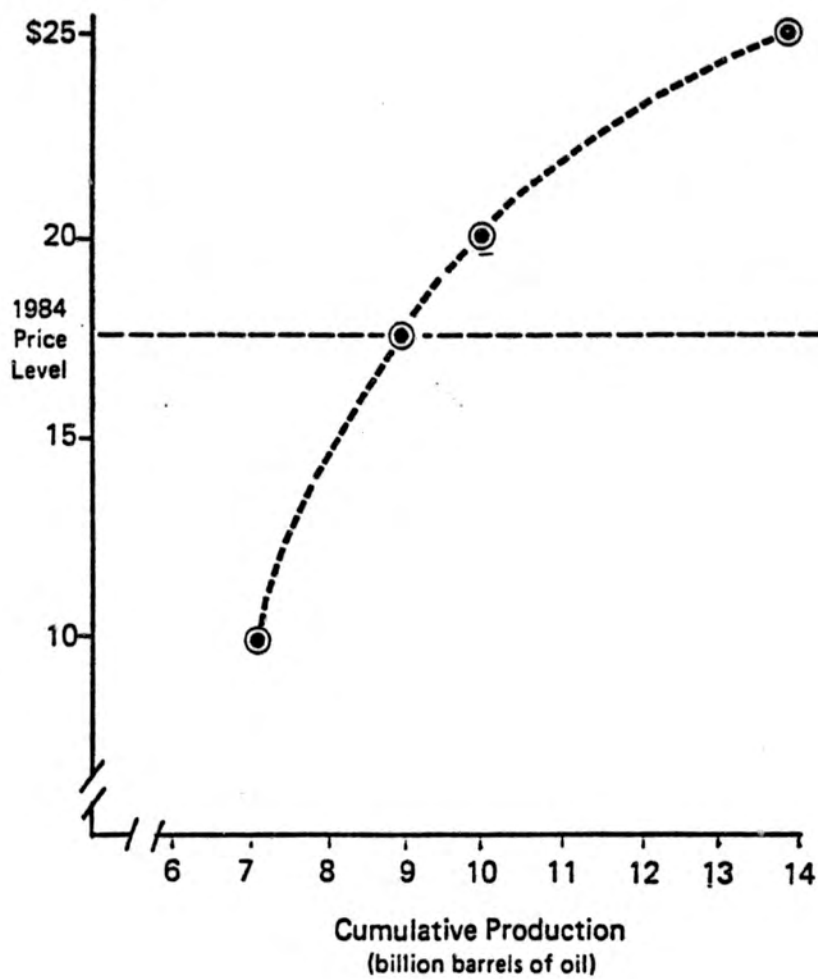
Although Figure E shows the relationship of North Slope petroleum supply to wellhead price, one may also interpret the curve as a potential response of cumulative oil production to policy initiatives which affect the feasibility of production in the same way as market prices. Federal policy measures such as the set of rules judged appropriate for setting pipeline tariffs, the ban on

²As of December 1982, cumulative production on the North Slope from the Prudhoe Bay and Kuparuk fields, according to the Alaska Oil and Gas Conservation Commission, was 2.7 billion barrels.

Figure E

CUMULATIVE PROJECTED NORTH SLOPE OIL PRODUCTION, 1983-2010

Prudhoe Wellhead
Oil Price Level
(1984 \$/barrel)



Source: Tables 37 through 40.

export of oil moved through the trans-Alaska pipeline, and a proposed national severance tax affect oil producers in the same way as would changes in expected market price levels.

Even under the most optimistic scenario, projected North Slope production falls significantly from current levels by the late 1990s. State revenues fall even more rapidly than production, due mainly to lower effective severance tax rates for the more marginal fields--which assume a larger share of production in future years--as compared to Prudhoe Bay. Production from new fields that may be discovered on the federal OCS is likely to offset somewhat the decline in production expected from fields located onshore and on state offshore lands. However, the state of Alaska receives no direct revenues from OCS production under current federal policies.

Figure F shows the projection to 2000 of total state North Slope petroleum revenues under the basecase price assumptions, along with a scenario of royalties derived from U. S. Department of the Interior data, which may accrue to the federal government from production on the Alaska OCS. By the late 1990s federal royalties received from the Alaska OCS may well exceed total state petroleum revenues.

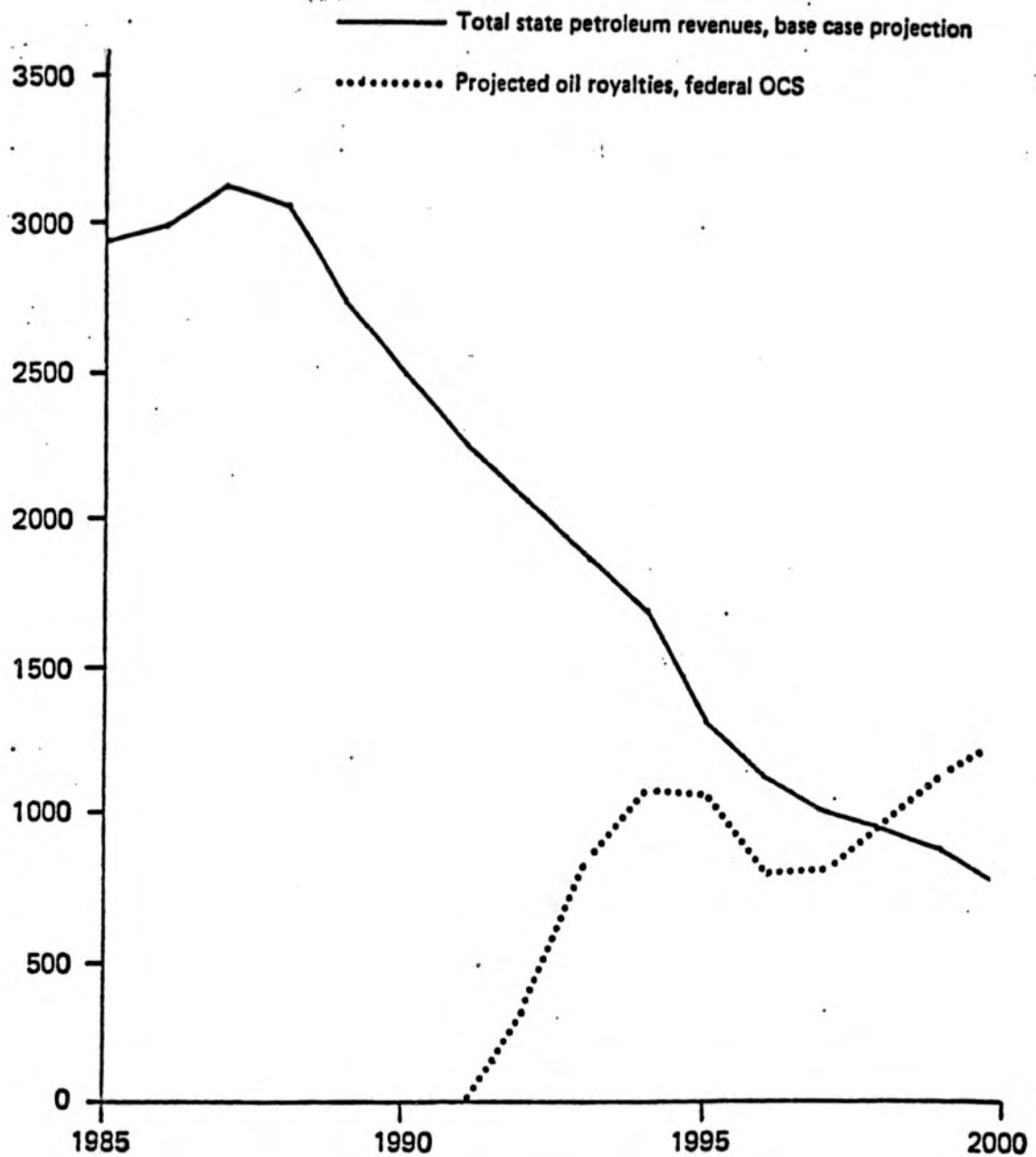
OCS Revenue-Sharing

The final section of the study examines recent efforts in Congress to share federal OCS revenues with the states, placing the OCS revenue-sharing debate in the context of similar debates which have taken place during the past 80 years over management and distribution of the federal lands and their resource wealth. The study analyzes the legislative history of sharing revenues from the federal lands, distinguishing three types of programs for balancing national objectives and local needs:

1. Resource revenues from the public domain, associated with major Congressional initiatives consolidating federal ownership and management of the public domain, share property values realized from resource development on these lands with the states. Examples include the National Forest Revenue Act (1908), the Mineral Leasing Act (1920), and the Taylor Grazing Act (1934).
2. Resource revenues from acquired lands, added to gain local acceptance of major federal land purchase programs, share revenues from resource development of federal acquired lands. Examples include the Bankhead-Jones Farm Tenant Act (1937) and the Mineral Leasing Act for Acquired Lands (1947).

Figure F

Projected Alaska North Slope Petroleum Revenues and OCS Royalties
(million 1984 dollars)



Source: Tables 37,45.

3. Payments in lieu of taxes programs allocate federal funds to local governments whose jurisdiction contains federal lands, compensating for the tax-exempt status of the federal lands and for federal decisions to withdraw some of these lands from development. Examples include the Payments in Lieu of Taxes Act (1976) and subsequent amendments.

These three types of programs have established a long series of precedents, continually broadened and strengthened throughout this century, for sharing resource revenues and user fees from federal lands with state and local governments affected by management of those lands. The federal government shares at least 25 percent of revenues from all the public lands, with the single exception of the OCS. In addition to these funds, the federal government distributes entitlement revenues under the Payments in Lieu of Taxes Act for lands which do not produce resource revenues or user fees.

The recent proposals (that died in the 98th Congress) for sharing OCS revenues are inconsistent both in scope and in magnitude with nearly a century of historical precedents of federal policy toward the public lands. The projection for OCS royalties shown in Figure F suggests that an OCS revenue-sharing program consistent with the other federal programs might yield Alaska \$200 million to \$500 million per year in the late 1990s.

CHAPTER I

INTRODUCTION

This report examines how federal oil and gas policies affect petroleum development and petroleum revenues in Alaska. We examine the dominant features which historically have affected both the amount and the pattern of public revenues collected and distributed. We use as a comparative benchmark the state of Texas, the largest oil-producing state, which differs significantly from Alaska in resource ownership and institutions. In addition, we assess the sensitivity of projected future production and total revenues to such factors as geologic and market risks, revenue collection methods and other public policies. The report also analyzes the possible effects of existing and proposed federal policies on Alaska's share (and by comparison other states' and the federal government's shares) of revenues derived from projected petroleum development.

Purpose for the Study

Interregional and state-federal conflicts over natural resource policy have long been high-profile issues in the western states. The "energy crises" of the 1970s raised several of these conflicts to nationwide status. Rising fuel prices, together with the continuing westward shift of population and industry, have recently led the national media and some public officials to pose these issues in terms of "equity" between the "energy-consuming" states of the Northeast and Midwest, and the "energy-producing" states of the West and Southwest.

In 1976, 213 elected representatives from eighteen northeastern and midwestern states formed a bipartisan political coalition to combat the economic decline of the region. Calling itself the Northeast-Midwest Congressional Coalition, the group advocated for federal legislation which would economically benefit the region. By 1980, it had begun to focus much of its attention on federal energy-related legislation, including promoting federal limits on state severance taxes, opposing decontrol of natural gas prices, and opposing the lifting of an export ban on Alaska oil.

Recent journalistic and political assaults upon the energy-exporting states have concentrated on limiting the authority of states to levy severance taxes on energy commodities. Severance taxes, however, are often only a minor part of the economic rent that is generated in the production of petroleum. It is the division of economic rent among the federal government, state and local governments, and private parties that is currently at issue.

Economic rent, simply defined, is the difference between the market value of a commodity and its resource cost, the value of capital, labor, and materials used in its production. Since it is not necessary to pay any of the economic rent to the suppliers of capital, labor, and materials in order to obtain their services, it is therefore a "windfall" revenue available for division among landowners, governments, and other parties having a nonproducing interest in the resource. Many of the prominent energy-resource issues are, at bottom, struggles over this division. Producer excise taxes (most importantly, state severance taxes and the federal Windfall Profits Tax), local property taxes on mineral reserves, and lease payments such as royalties must all come out of the economic rent.

The debate over wellhead price regulation of natural gas is, likewise, a struggle over potential economic rent which has historically been shifted to consumers. Deregulation would shift this "windfall" consumer benefit back into economic rent, with the rent distributed among producers, private landowners and governments via royalties and taxes, just as occurred with oil price deregulation in 1980.

The upheavals in world energy markets that followed the 1973-74 Arab oil embargo and the 1978-79 Iranian revolution caused a huge increase in potential or actual economic rents associated with the production of energy commodities. One prominent result of these events was a complex redistribution of income and wealth, from energy consumers, energy-intensive industries, and energy-importing regions to energy producers and energy-exporting regions. Another feature was a radical redistribution of relative shares of income and wealth within the energy-producing and energy-consuming sectors. Energy policy took on greater prominence in the 1970s at the federal and state levels as various interest groups maneuvered to capture or allocate the "windfall" economic rent created by rising world oil prices.

The recent rhetoric of energy sectionalism has in large part been a reflection of the growth and redistribution of energy resource rents that took place between 1972 and 1981. The State of Alaska and its citizens were obviously major beneficiaries of this upheaval. The 1980s, however, are likely to be a decade of stable or falling energy prices, shrinking economic rents, and reduced expectations regarding future economic rents. In such a period, an understanding of the issues can (1) put the various current proposals aimed at further redistribution into proper perspective, and (2) assess the degree to which attempts by various levels of government to capture rent might reduce domestic production and state and national economic activity (and ultimately revenue collections). This analysis may also (1) help identify legislative strategies for states such as Alaska that depend disproportionately

on energy resource revenues, and (2) suggest some elements of national policy that would benefit both energy-importing and energy-exporting regions.¹

Objectives of the Study

To review, the basic objective of the study is to examine how federal policies affect the size and distribution of economic rent derived from Alaska oil and gas development, and by comparison petroleum development in other states. Specific objectives of the study are:

- (1) provision of data and analysis needed to review policies to redistribute petroleum revenues in proper perspective
- (2) assessment of the effect that the size of the government shares of economic rents, or the way in which they are collected, may have on production and, indirectly, on revenues
- (3) aid in evaluating the effect of uncertain geologic, market or policy variables on sharing of economic rents among the various parties. This analysis uncovers the economic incentives associated with methods of collecting economic rent that give birth, sustenance and decline to legislative initiatives for redistribution.

We are not in a position (nor is anyone else) to compute the potential losses from future Alaska production up to, say, the year 2010 since we do not know where or how much oil will be discovered by then, how much it will be worth, or how much it will cost to produce. However, we do provide some benchmark estimates to illustrate the size of effects on hypothetical future production relative to the assumed magnitude of the geologic resource.

Basic Methodology

We have chosen in this study to limit our consideration of generation and distribution of petroleum wealth to the extractive process itself. That is, we examine the value of petroleum exploration, development, and operation of oil and gas fields. We ignore, however, the influence of transportation, refining, marketing and other downstream effects.

¹The previous several paragraphs have been adapted from remarks of Arlon Tussing (personal communication, July 10, 1983).

CORRECTION

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HAS BEEN REPHOTOGRAPHED
TO ASSURE LEGIBILITY**

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There are two principle reasons for limiting the scope of the study essentially to wellhead value of petroleum extraction. One is an economic distinction relating to the generation of economic rent. Economic rent (defined simply, as before, to mean the value of a commodity in excess of its cost of production) in downstream activities, such as they might exist, would principally be derived from the exercise of market power by firms in the industry. Economic rent from petroleum production, on the other hand, derives at least in part from the discovery of highly productive natural resources.

The other main reason for limiting the scope of the study to basic petroleum production follows from the first reason. The origin of potential economic rent in the industry provides a rationale for a different approach for public policy toward these "unearned windfalls." Where rent results from market power in transportation or refining, public policy would seek to eliminate such monopoly power by stimulating competition or by stiffening price regulation. Where rent results from fortuitous discovery of particularly valuable natural assets, there is a rationale for public policy to seek to redistribute rather than eliminate such windfalls.

Since the study objective is to assess the influence of federal policies on oil and gas development and revenues, it is important to be able to examine whether effects noted for Alaska are unique to that state, or whether they apply more generally to other petroleum-producing states as well. In order to make this assessment, the study compares the historical pattern of generation and distribution of economic rents from oil and gas production in Alaska to those arising from oil and production in the state of Texas.

Texas is particularly appropriate as a reference point from which to examine the impact of federal policies on Alaska for a number of reasons. Texas has historically been the largest oil-producing state and also has a pattern of government and industry institutions and economic climate for oil development that is dramatically different from Alaska. Unlike Alaska, where nearly all oil and gas production occurs on public lands, approximately 90 percent of production in Texas occurs on private lands. Many of these private lands are owned by individuals. This situation creates both a powerful local constituency affected by government policy toward the petroleum industry and a more decentralized distribution of economic rent derived from petroleum production.

The economic environment for petroleum development in Alaska also differs radically from that of Texas. Alaska's remoteness from major oil-consuming areas causes oil prices in southern coastal Alaska to average about \$3 per barrel lower than prices in Texas while North Slope oil prices average more than \$10 per barrel lower. Since the transportation costs per unit of value are so much larger for gas than for oil, the price difference is even larger for

natural gas. Prices for Cook Inlet gas are less than one-half the average Texas gas price, and North Slope gas is not yet marketable at all.

Cost differentials between the two states further widen the "regional economic gap." Drilling costs are ten to thirty times as high in Alaska as in Texas, where easy road access is available for most well sites. Texas offers easily accessible, available transportation from oil and gas pipelines as well as a vast service industry and other infrastructure.

Thus, because of its major differences in institutions and economic climate, Texas provides a unique opportunity to test hypotheses about distribution of petroleum rents. If a proposition appears to hold for Alaska and Texas at the same time, then there are strong reasons to believe that it has a more general validity for other producing areas in the United States.

Despite the major economic and institutional differences, Texas and Alaska do share two important characteristics. On the one hand, the economies and state treasuries of both states depend strongly upon the health of the petroleum industry. On the other, the two states have large adjacent federal outer continental shelves, with major petroleum potential and major local impacts.

Summary of the Report

The following chapter summarizes oil and gas production, prices, and revenues received by federal and state governments in Alaska and Texas. It provides the basic data needed for deriving any historical analysis of generation and distribution of economic rent from petroleum extraction. The data are summarized by region and by landowner so that one may obtain a clear picture of the pattern as it evolves over time in response to economic fluctuations, geologic factors (such as the discovery of the Prudhoe Bay field on Alaska's North Slope), and political factors which follow. The data summarized in Chapter II show clearly the rising revenues at all levels of government in both Alaska and Texas following the international oil market upheavals of 1972-1981.

Chapter III accounts for the generation and distribution of economic rent from oil and gas production over the past twenty years in Alaska and Texas. This chapter goes beyond Chapter II by examining private shares as well as government shares of petroleum economic rent. It analyzes the degree to which the historical pattern of distribution observed is due to the separate influences of international market pressures, national policy, the regional economic environment, geologic good fortune, and the level of taxation. The analysis illustrates the similarities and differences between the two states by testing several hypotheses about the size

and distribution of economic rent. The results show that no single factor is responsible for the observed pattern; the historical sharing of economic rent resulted from a complex interaction of many factors.

Chapter IV outlines the economics of petroleum exploration, development, and production in Alaska, with some comparisons to Texas. The analysis emphasizes the combined effects of lease terms and tax structure on feasibility of exploration and development by private industry, especially the manner in which risk affects investment decisions of the firm. The chapter provides several examples to illustrate the combined effects of royalty shares and excise taxes on feasibility of Alaska petroleum development.

Chapter V presents some quantitative estimates of the future pattern of economic rents derived from Alaska petroleum development. The purpose is not to forecast actual levels of production and revenues. Rather, the chapter seeks to describe the sensitivity of such activity, particularly on North Slope fields which contain most of the state's known hydrocarbon resources, to market shifts and tax policy. The goal of this chapter is to examine the effect of federal petroleum policy on Alaska production and revenues. We estimate the effects of several hypothetical initiatives, including limiting state severance taxes, extending the Windfall Profits Tax, lifting export restrictions on oil moved through the Trans-Alaska Pipeline, and OCS revenue sharing.

Chapter VI discusses the history of federal legislation on sharing with the states and their local governments revenues received from disposal of natural resources on public lands. The chapter provides a framework for cataloguing the diverse federal revenue-sharing programs. The legislative history demonstrates a consistent pattern of increasing redistribution of federal resource revenues to state and local governments affected by federal resource development. Current proposals in Congress to share a portion of federal Outer Continental Shelf revenues with coastal states, the exception to the rule of federal resource revenue sharing, are not consistent with the historical precedents established over the past 80 years for other federal lands.

The last chapter briefly summarizes the study and the main conclusions reached in Chapters II through VI. It emphasizes the areas in which Alaska and Texas share a common sensitivity to federal policy toward petroleum development. The most significant areas of similarity noted for the two states are (1) the harmful economic and fiscal effects of federal wellhead price regulation and excise taxation of oil and gas production, and (2) the economic and fiscal effects, both beneficial and adverse, of OCS development.

CHAPTER II

HISTORY OF OIL AND GAS PRODUCTION AND REVENUES IN ALASKA, WITH A COMPARISON TO TEXAS

This chapter presents a statistical summary of the historical growth of oil and gas production and revenues in Alaska. We begin by (1) reviewing the history of oil and gas production in the Cook Inlet and the North Slope regions of the state, and (2) the evolution of the markets for this production as evidenced in regional wellhead prices. We then discuss the pattern of growth in revenues received by federal, state, and local governments from Alaska production. We review payments for oil and gas leases on federal and state lands as well as taxes paid to federal, state, and local governments on petroleum exploration and extraction activities.

We have compiled data on actual and estimated production, price, tax, and lease payments by calendar year to the maximum extent feasible. This enables a direct comparison of the size and distribution of all oil and gas revenues across regions, landowners, and political jurisdictions. Supplementary tables in Appendix A provide additional calendar year oil and gas production, price, and revenue data for Alaska regions.

We have used this historical information to examine the distribution of lease and tax revenues received by federal, state, and local governments. The actual distribution of petroleum revenues depends in part on specific provisions for sharing some of this revenue among levels of government. Of particular interest is the manner in which the distribution may have changed in the late 1970s as a result of world market upheaval and the commencement of production from the Prudhoe Bay field.

We then turn to the history of oil and gas production, prices, and government revenues in Texas in order to examine similarities and differences in size and distribution as compared to the pattern observed for Alaska. We note that the pattern in Texas is quite similar to that observed in Alaska, and that the most striking differences are easily explained by institutional factors peculiar to one state or the other.

Petroleum Production and Value in Alaska

Alaska Oil and Gas Production

In 1983, Alaska oil production climbed to a record rate of over 1.7 million barrels per day, while net natural gas production increased to 773 million cubic feet per day. Table 1 shows historical Alaska oil production by field. Table 2 shows annual regional net production of natural gas in Alaska.

TABLE 1
CRUDE OIL PRODUCTION IN ALASKA BY FIELD, 1959-1983
(thousands of barrels)

Year	COOK INLET						NORTH SLOPE		TOTAL ALL FIELDS
	Beaver Creek	Granite Point	McArthur River	Middle Ground Shoal	Swanson River	Trading Bay	Prudhoe ^a Bay	Kuparuk River	
1959	—	—	—	—	187	—	—	—	187
1960	—	—	—	—	578	—	—	—	578
1961	—	—	—	—	6,327	—	—	—	6,327
1962	—	—	—	—	10,259	—	—	—	10,259
1963	—	—	—	—	10,740	—	—	—	10,740
1964	—	—	—	—	11,054	—	—	—	11,054
1965	—	2	1	27	11,099	2	—	—	11,131
1966	—	0	1	2,649	11,711	0	—	—	14,362
1967	—	7,052	749	7,404	12,980	729	—	—	28,913
1968	—	13,131	21,782	14,134	13,619	3,477	—	—	66,144
1969	—	9,183	31,301	10,467	13,151	9,936	60	—	74,098
1970	—	7,522	40,165	12,719	12,408	9,600	320	—	82,735
1971	—	5,577	40,537	11,304	11,466	8,744	324	—	77,952
1972	—	4,663	40,774	9,720	8,896	8,585	130	—	72,769
1973	416	4,767	38,884	10,239	10,064	7,825	127	—	72,322
1974	375	4,237	39,137	9,001	9,765	7,587	525	—	70,627
1975	322	4,361	40,876	8,670	8,754	6,128	723	—	69,833
1976	302	4,471	35,810	8,864	7,591	5,366	995	—	63,398
1977	276	4,711	33,235	7,616	5,981	4,276	113,107	—	169,201
1978	223	4,862	30,223	6,382	4,870	3,567	397,679	—	447,805
1979	211	4,613	25,440	5,423	4,344	2,892	468,412	—	511,335
1980	214	4,394	20,894	4,854	3,724	2,167	555,394	—	591,641
1981	180	3,981	18,022	4,291	2,938	1,666	555,173	1,092	587,342
1982	182	3,467	15,806	3,573	2,992	1,384	559,100	32,406	618,910
1983	170	3,550	13,564	3,381	3,017	1,081	560,884	39,879	625,526

^aValues reflect oil production net of injection, includes production from Lisburne pool.

SOURCE: Alaska Oil and Gas Conservation Commission.

TABLE 2
ALASKA NET NATURAL GAS PRODUCTION^a
(billions of cubic feet)

<u>Calendar Year</u>	<u>Statewide Production</u>	<u>North Slope Production^b</u>	<u>Cook Inlet Production</u>
Before 1971	329.7	6.4	323.3
1971	155.6	1.4	154.2
1972	148.0	1.4	146.6
1973	136.7	1.4	135.3
1974	144.5	2.8	141.7
1975	156.6	3.8	152.8
1976	157.2	5.9	151.3
1977	187.4	27.7	159.7
1978	214.4	37.0	177.4
1979	226.5	43.3	183.2
1980	230.1	51.6	178.5
1981	247.0	53.7	193.3
1982	260.4	65.8	194.6
1983	282.2	72.6	209.6

^aValues reflect total casinghead gas and dry gas production net of injection.

^bNorth Slope production equals production from South Barrow, East Barrow, Prudhoe Bay, and Kuparuk fields.

SOURCE: Alaska Oil and Gas Conservation Commission.

Prior to the start-up of commercial production from Prudhoe Bay in mid-1977, Alaska oil and gas development was essentially limited to the Cook Inlet region. Although exploration has taken place in other areas of the state, the only field to have produced outside the Cook Inlet or North Slope regions is the small Katalla field, east of Cordova. This field produced a total of 154,000 barrels of oil during the first three decades of the 20th century. Alaska oil and gas production may be summarized regionally as follows.

Cook Inlet: Commercial oil and gas production from the Cook Inlet area began in 1959 with the Swanson River field, located on the Kenai National Wildlife Refuge. In the 1960s, offshore discoveries on state-leased lands added four major oil fields as well as substantial gas reserves. By 1977, cumulative oil production from the Cook Inlet region had reached approximately 740 million barrels. From a peak production rate of over 210,000 barrels per day in 1970, oil production from the Cook Inlet region declined to 170,000 barrels per day in 1976, and to 68,000 barrels per day in 1983.

Of the five major Cook Inlet oil fields, just one--McArthur River--has produced nearly 500 million barrels, or over one-half of all the oil produced in the region. The Swanson River field, with a cumulative production of 200 million barrels, is the second largest. Except for production from the Swanson River and the small Beaver Creek field also located on the federal wildlife refuge, all Cook Inlet oil production has occurred on state lands. Barring an unexpected discovery, oil production in the region is unlikely to reverse the trend of decline since around 90 percent of original known oil reserves of the region has been depleted.¹

Net gas production from the Cook Inlet region, shown in Table 2, remained relatively constant between 1971 and 1977 at roughly 150 billion cubic feet (bcf) per year. Since 1977, however, increased demand in the Anchorage market has caused annual production to increase to over 200 bcf in 1983. Four major fields account for nearly all regional gas production: McArthur River, Kenai, Beluga River and North Cook Inlet. Two of these fields, Kenai and Beluga River, have multiple private (Cook Inlet Region, Inc.), federal, and state ownership, while the other two lie wholly under state tidelands. Unlike the situation with oil, substantial gas reserves in Cook Inlet remain undeveloped.

North Slope: Oil production started on the North Slope at Prudhoe Bay in 1969 with approximately 60,000 net barrels produced in field development tests, as shown in Table 1. Commercial production at Prudhoe began in June of 1977. The Kuparuk River field was brought into commercial production at the end of 1981, and pilot project production of the Lisburne oil pool at Prudhoe Bay occurred in 1982 and 1983.

The two major oil and gas fields (Prudhoe Bay and Kuparuk River) on the North Slope occur entirely on lands leased by the State of Alaska. The only other producing fields on the North Slope are the East Barrow and South Barrow gas fields, owned and operated by the U. S. Department of the Interior. Initially developed to provide energy for a federal research facility in the Barrow area, Congress has approved a bill (PL 98-366) to transfer operation of the fields to the North Slope Borough.

In the absence of a feasible transportation system to export markets, net North Slope gas production has been limited to local uses. The East and South Barrow fields have produced approximately 17 bcf for use in the Barrow vicinity.²

The remainder of North Slope gas production has been consumed by production-related uses at Prudhoe and Kuparuk, including fuel for pump stations along the Trans-Alaska Pipeline.

Value of Alaska Oil and Gas Production

The total value of production can be measured at the wellhead by product of marketed production and the wellhead price. Consistent estimates of wellhead values require a consistent definition for measuring both the prices and the quantities. Since nearly all Alaska production occurs on public lands, one consistent method is to use accounting procedures that public land managing agencies employ for royalties. Another consistent method for measuring marketed production and prices is that employed by the state for assessing severance taxes.

These two methods used by public agencies may yield different results for both prices and quantities. Both are subject to dispute, litigation, and revision over time but are preferred to other sources because of the greater amount of information available in the public domain. Although discrepancies in production data are slight, severance tax and royalty price differences may be large for state leases, even after correcting for the deduction of certain field costs from state royalties. This occurs because of the special contracts often used by the state for selling royalty oil and gas in kind.

We have chosen to make maximum use of the information contained in both the severance tax wellhead production and price conventions and the royalty accounting data. Where available, we use royalty data to measure and value the government royalty shares of Alaska oil and gas production and severance tax data to measure and value the private shares. Where royalty and tax data are unavailable in the earlier years, we have relied on industry sources to fill in the gaps.

Tables 3 and 4 present annual regional marketed production of Alaska oil and gas, respectively. The regional series for marketed

oil production corresponds closely to the net production data by field presented in Table 1. The difference in the two sets of figures reflects a minor difference in definition (marketed production includes gas condensate, a negligible amount historically in Alaska) and a difference in timing of recording of production (there is a delay of a month or two in recording of marketed production).

Regional marketed gas production, shown in Table 4, is significantly lower than net wellhead production presented in Table 2. The major source of this discrepancy is gas vented or flared, which is produced but not marketed. Marketed production also does not include large amounts of gas used for field fuel (since 1976), mainly on the North Slope. Total marketed production of Alaska natural gas reached 200 bcf in 1982, or about 77 percent of net production.

Table 5 presents weighted average annual wellhead prices calculated for marketed production of oil and gas by Alaska region. Cook Inlet oil prices remained nearly constant at around \$3 per barrel until the 1973-74 events occurring in the Middle East. The average price rose slowly under federal price controls during the 1970s to around \$6 per barrel in 1979. After full oil price decontrol in 1981, Cook Inlet oil prices rose to \$30 per barrel in 1981, declining to around \$28 in 1982.

Federal price controls had little direct effect on North Slope oil. Weighted average Prudhoe Bay oil prices, as measured at Pump Station No. 1 of the Trans-Alaska Pipeline, were initially comparable to Cook Inlet prices. Decontrolled North Slope oil prices rose sooner than Cook Inlet prices during the 1979-81 international oil market upheaval, but did not rise as far, remaining \$7 to \$8 lower in 1981 and 1982. This difference is due mainly to the pipeline tariff from Prudhoe Bay to Valdez, but lower quality crude and excess supply in the West Coast oil market are contributing factors.

Average prices for Cook Inlet natural gas, as shown in Table 5, have remained low, ranging from 12 cents to 66 cents per thousand cubic feet (mcf) between 1959 and 1982. North Slope gas from the Prudhoe Bay and Kuparuk reservoirs has been priced according to ceiling prices allowed under the 1978 Natural Gas Policy Act, averaging around \$1.70 per mcf.

Table 6 shows the time series of total value of oil and gas production in the Cook Inlet region, divided into the government royalty shares of oil and gas and the private share. The actual government royalty share has been around one-eighth of the oil. (Federal and state royalty shares amounted to one-eighth of gross production but the prices paid for the government and the private shares may vary.) The effective royalty rate for gas has been somewhat lower because of the production from private lands.

TABLE 3
ALASKA MARKETING OIL PRODUCTION BY REGION, 1959-1982^a
(millions of barrels)

	<u>Cook Inlet</u>	<u>North Slope</u>	<u>Total</u>
1959	0.187	0.	0.187
1960	0.559	0.	0.559
1961	6.327	0.	6.327
1962	10.259	0.	10.259
1963	10.740	0.	10.740
1964	11.059	0.	11.059
1965	11.128	0.	11.128
1966	14.358	0.	14.358
1967	29.126	0.	29.126
1968	66.204	0.	66.204
1969	73.953	0.	73.953
1970	83.616	0.	83.616
1971	79.494	0.	79.494
1972	72.893	0.	72.893
1973	72.323	0.	72.323
1974	70.603	0.	70.603
1975	69.834	0.	69.834
1976	63.398	0.	63.398
1977	56.445	112.756	169.201
1978	50.452	398.167	448.619
1979	43.053	467.000	510.053
1980	36.280	555.613	591.893
1981	31.867	556.479	588.346
1982	27.867	591.515	619.382

^aIncludes lease condensate.

SOURCE: 1959-1976: American Petroleum Institute.

1977-1982: Sum of taxable production for Alaska severance taxes (Alaska Department of Revenue, Division of Petroleum Revenue) and royalty production (Alaska Department of Natural Resources, Division of Oil and Gas, and U.S. Department of Interior, Minerals Management Service).

TABLE 4
ALASKA MARKETED NATURAL GAS PRODUCTION BY REGION,
1959-1982

(billions of cubic feet)^a

	<u>Cook Inlet</u>	<u>North Slope</u>	<u>Total</u>
1959	0.133	0.	0.133
1960	0.246	0.	0.246
1961	0.631	0.	0.631
1962	2.184	0.	2.184
1963	4.498	0.	4.498
1964	6.238	0.	6.238
1965	7.255	0.	7.255
1966	11.267	0.	11.267
1967	14.438	0.	14.438
1968	17.343	0.	17.343
1969	50.864	0.	50.864
1970	111.576	0.	111.576
1971	121.618	0.	121.618
1972	125.596	0.	125.596
1973	131.007	0.	131.007
1974	128.935	0.	128.935
1975	160.270	0.	160.270
1976	166.072	0.	166.072
1977	153.014	1.956	154.970
1978	163.499	7.182	170.681
1979	168.355	8.973	177.328
1980	160.388	10.894	171.282
1981	176.685	11.559	188.244
1982	186.974	12.977	199.951

^a1959-1976: includes gas used on lease for fuel. 1977-1982: excludes gas used on lease for fuel.

SOURCE: 1959-1976: American Petroleum Institute (represents gross production net of reinjection and gas vented and flared).

1977-1982: Sum of taxable production for Alaska severance taxes (Alaska Department of Revenue, Division of Petroleum Revenue) and royalty production (Alaska Department of Natural Resources, Division of Oil and Gas, and U.S. Department of Interior, Minerals Management Service).

TABLE 5
ALASKA WEIGHTED AVERAGE ANNUAL WELLHEAD PRICES
BY REGION, 1959-1982

	OIL		GAS	
	(Dollars per Barrel)		(Dollars per Thousand Cubic Feet)	
	<u>Cook Inlet</u>	<u>North Slope</u>	<u>Cook Inlet</u>	<u>North Slope</u>
1959	1.58	0.	0.12	0.
1960	2.2	0.	0.122	0.
1961	2.79	0.	0.204	0.
1962	3.04	0.	0.214	0.
1963	3.04	0.	0.247	0.
1964	3.04	0.	0.276	0.
1965	3.06	0.	0.248	0.
1966	3.06	0.	0.248	0.
1967	3.13	0.	0.25	0.
1968	2.82	0.	0.253	0.
1969	2.9	0.	0.259	0.
1970	3.01	0.	0.246	0.
1971	3.24	0.	0.147	0.
1972	3.23	0.	0.147	0.
1973	3.62	0.	0.149	0.
1974	4.92	0.	0.17	0.
1975	5.22	0.	0.302	0.
1976	5.03	0.	0.389	0.
1977	5.259	6.131	0.394	1.066
1978	5.588	5.024	0.491	1.194
1979	6.053	10.479	0.657	1.751
1980	10.062	16.728	0.544	1.843
1981	30.053	23.175	0.591	1.748
1982	27.793	19.686	0.591	1.699

SOURCE: 1959-1976: American Petroleum Institute.

1977-1982: Weighted average of taxable and royalty shares. Sum of taxable production for Alaska severance taxes (Alaska Department of Revenue, Division of Petroleum Revenue) and royalty production (Alaska Department of Natural Resources, Division of Oil and Gas, and U.S. Department of Interior, Minerals Management Service).

TABLE II.6.
VALUE OF OIL AND GAS PRODUCED FROM ALASKA'S
COOK INLET REGION, 1963-1982
(millions of dollars)

	<u>Government Royalty Shares</u>		<u>Private Royalties and Nonroyalty Production</u>	<u>Total Value</u>
	<u>Oil</u>	<u>Gas</u>		
1963	4.018	0.103	29.640	33.761
1964	4.213	0.037	31.091	35.341
1965	4.161	0.088	31.602	35.851
1966	5.349	0.354	41.027	46.730
1967	9.088	0.426	85.260	94.774
1968	22.226	0.768	168.089	191.083
1969	25.646	1.093	200.899	227.637
1970	30.864	2.045	246.223	279.132
1971	37.449	2.024	235.965	275.438
1972	34.256	2.197	217.454	253.907
1973	37.314	2.243	241.772	281.329
1974	49.539	2.545	317.202	369.285
1975	47.637	5.038	360.260	412.935
1976	43.809	6.13	333.554	383.493
1977	34.557	6.709	315.782	357.048
1978	35.241	7.643	319.394	362.278
1979	33.438	9.602	328.245	371.285
1980	39.509	11.079	401.725	452.313
1981	116.026	18.349	927.675	1,062.050
1982	97.755	17.236	770.014	885.005

SOURCE: Columns 1 and 2: U.S. Department of Interior, Minerals Management Service and Alaska Department of Natural Resources, Division of Oil and Gas; Column 4: product of production from Tables 2, 4, and price from Table 5; Column 3: difference between Column 4 and sum of Columns 1 and 2.

Total annual value of Cook Inlet petroleum rose from \$30 million in the early 1960s (from the Swanson River field) to over \$200 million in 1969 with the development of the offshore fields. In spite of the oil production decline, rising oil prices and gas sales caused the value to increase steadily until it reached a peak of one billion dollars in 1981.

North Slope oil and gas values are summarized in Table 7. It is clear from the royalty shares (approximately one-eighth of the value for both oil and gas) that gas sales do not contribute a significant share of the value. Total North Slope petroleum wellhead value rose with the wellhead price and expanding production to nearly \$13 billion in 1981, falling to \$11.7 billion in 1982.

Alaska Oil and Gas Revenues

Government revenues derived from oil and gas production include all lease payments to public landowners for the rights to explore for and produce oil and gas and all taxes on petroleum exploration and production. In Alaska, revenues have primarily accrued to the federal and state governments, while a relatively small portion of the revenue has been collected by local governments. Except for a portion of several gas fields underlying the former Kenai and Tyonek Indian Reservations, all producing oil and gas properties in the state are owned by either the federal or state government. Pursuant to the Alaska Native Claims Settlement Act, Cook Inlet Region, Inc., acquired the leases on the Indian lands.

Lease Payments

Forms of payment for Alaska oil and gas leases on public lands may include cash bonus bids, rental payments, oil and gas royalties, and net profit shares. Although there are many active leases in Alaska containing net profit shares, historically none has yet produced any commercial value of oil or gas. The size and distribution of lease revenues depends upon which lands are considered more valuable by industry at the time of disposal as well as upon where oil or gas may be found. The terms of the lease may also greatly affect when the public landowner receives revenues as well as the total amount received. We pursue this topic further in Chapter IV.

Table 8 shows payments received for oil and gas leases on federal lands in Alaska from 1971 to 1982. Because of different administrative policies and jurisdictional issues governing federal oil and gas lands, it is appropriate to divide federal oil and gas acreage into onshore property and OCS lands.³

Historically, most federal lease payment revenues have come in the form of bonus bids for OCS lease sales, as shown in Table 8.

TABLE II.7.
VALUE OF OIL AND GAS PRODUCED FROM ALASKA'S
NORTH SLOPE REGION, 1977-1982
(millions of dollars)

	<u>Government Royalty Shares</u>		<u>Nonroyalty</u>	<u>Total</u>
	<u>Oil</u>	<u>Gas</u>	<u>Production</u>	<u>Value</u>
Before				
1977	0.	0.	0.	0.
1977	78.731	0.263	614.389	693.383
1978	223.709	1.084	1,783.977	2,008.770
1979	582.271	1.373	4,325.846	4,909.490
1980	1,115.64	1.826	8,196.694	9,314.160
1981	1,570.99	2.168	11,343.442	12,916.600
1982	1,423.18	2.599	10,240.721	11,666.500

SOURCE: Columns 1 and 2, Alaska Department of Natural Resources, Division of Oil and Gas; Column 4: product of production from Tables 2, 4, and price from Table 5; Column 3: difference between Column 4 and sum of Columns 1 and 2.

TABLE 8
PAYMENTS FOR ALASKA FEDERAL LEASES, CALENDAR YEAR 1971-1982
(thousands of current dollars)

REVENUE SOURCE	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
<u>Onshore Leases</u>												
Bonus Bids ^a	0	0	0	0	0	0	0	0	0	0	0	53,299
Rentals ^a	213	355	289	338	314	286	6	4	1	291	6	5,215
Oil Royalties ^b	4,857	3,753	5,143	7,740	6,136	5,224	4,191	3,443	3,599	4,752	11,418	10,920
Gas Royalties ^b	1,127	1,235	1,189	1,310	2,010	2,401	2,580	3,593	4,013	6,245	9,748	13,210
<u>OCS Leases^c</u>												
Bonus Bids	0	0	0	0	0	559,837	398,471	0	488,691	109,751	4,576	2,056,000
Rentals	0	0	0	0	0	1,230	2,834	2,834	2,321	2,230	1,879	3,240
Oil Royalties	0	0	0	0	0	0	0	0	0	0	0	0
Gas Royalties	0	0	0	0	0	0	0	0	0	0	0	0

^aSource: Bureau of Land Management, Data Processing.

^bRoyalty values based on volume of production. Includes contributions made to the ANCSA Alaska Native Fund.
Source: U.S. Department of Interior, Minerals Management Service.

^cSource: U.S. Department of Interior, Minerals Management Service.

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Bonus bids from competitive federal onshore lease sales were limited to the recent sale program for the National Petroleum Reserve on the North Slope. Royalty payments from onshore production in the Cook Inlet Region accounts for the next largest revenue stream, with lease rentals providing a small share of revenue. As described below, payments for federal onshore leases shown in Table 8 have been shared with the state of Alaska.

In contrast to federal lease payments, the major portion of state lease payments for the period 1971-1982, shown in Table 9, have come from oil and gas royalties associated with production from the Prudhoe Bay field. The largest sum in bonus bids came in 1969 with the \$900 million North Slope sale held after the Prudhoe discovery. The single large bonus bid figure in Table 9 reflects the State of Alaska's share of the joint federal-state Beaufort Sea sale held in 1979.

Oil and Gas Taxes

Taxes levied on exploration and production of oil and gas include excise taxes on production, property taxes on tangible property such as drilling equipment and production facilities or on oil and gas reserves, and taxes on income earned from production.

State Taxes: The State of Alaska has raised revenues from five different oil and gas taxes. These include conservation taxes, severance taxes, corporate income taxes, property taxes, and a temporary reserves tax. Table 10 shows total revenues raised by these five Alaska oil and gas taxes for the period 1971-1982.

The Alaska State Oil and Gas Regulation and Conservation Tax was enacted in 1973 and applies only to oil production [AS43.57]. It is a nonescalating tax of one-eighth of a cent per barrel. The conservation tax exists primarily as a mechanism to charge to industry the cost of regulatory activities of the Alaska Oil and Gas Conservation Commission.

The Alaska State Oil and Gas Properties Production Tax is a severance tax levied upon the producer of oil from each lease or property. The tax has been revised numerous times over the years.⁵ Currently, it is based on either the percentage-of-value amount or the cents-per-barrel amount, whichever is greater, multiplied by an economic limit factor [AS43.55]. The percentage-of-value amount remains 12.25 percent of the value of the production for a property coming into production after June 30, 1981, for its first five years of production. Thereafter, and for all other production including Prudhoe Bay, the percentage-of-value amount has been 15 percent since July 1, 1981. The cents-per-barrel amount equals \$0.60 per barrel of crude oil and \$0.80 per barrel for all other taxable oil.

TABLE 9
PAYMENTS FOR ALASKA STATE LEASES, CALENDAR YEAR 1971-1982
(thousands of current dollars)

<u>REVENUE SOURCE</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Bonus Bids ^a	456	2,883	25,949	1,041	0	0	0	0	567,549	12,387	5,824	61,270
Rentals ^b	3,048	2,984	2,537	3,605	3,424	2,777	2,683	2,189	2,069	5,541	6,610	3,245
Oil Royalties ^c	19,540	22,230	25,500	32,760	33,860	32,700	109,100	255,500	612,100	1,150,000	1,676,000	1,510,000
Gas Royalties ^c	897	962	1,054	1,235	3,028	3,729	4,392	5,134	6,962	6,660	10,770	6,630

^aSource: Alaska Department of Natural Resources, "Competitive Oil and Gas Leasing of State Lands" (7/21/83). Includes eleven sales (24, 25, 26, 27, 28, 29, 29B, 30, 31, 32, 33).

^bSource: Alaska Oil and Gas Conservation Commission (1971-1980); Alaska Department of Natural Resources, Division of Administrative Revenue Unit (1981, 1982).

^cRoyalty values calculated on the basis of production volume and wellhead price. Source: Alaska Department of Natural Resources, Division of Oil and Gas.

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TABLE 10
ALASKA STATE OIL AND GAS TAXES^a, CALENDAR YEAR 1971-1982
(thousands of current dollars)

REVENUE SOURCE	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Conservation Tax ^b	0	0	0	71	77	79	63	163	247	308	626	341
Severance Tax ^c	11,410	12,340	10,890	22,090	27,560	25,900	52,590	149,100	256,800	829,600	1,492,000	1,566,000
Oil	10,790	11,690	10,210	21,330	25,860	24,420	51,290	144,000	246,600	819,700	1,480,000	1,558,000
Gas	620	650	680	760	1,700	1,486	1,298	5,064	10,190	9,900	11,740	7,800
Corporate Income Tax ^c	0	0	0	0	0	0	0	0	474,400	693,200	822,700	318,600
Property Tax ^d	0	0	0	9,179	12,052	24,238	46,327	58,540	69,982	77,432	95,165	123,666
Reserves Tax ^c	0	0	0	0	0	223,100	270,600	0	0	0	0	0

^aincludes local government shares of property taxes on petroleum production and exploration property.

^bSource: Alaska Oil and Gas Conservation Commission (1971-1980), represents taxes due; Alaska Department of Revenue, Cumulative Statement of Revenue Collected, monthly statements (1981-1982), represents taxes paid.

^cSource: Alaska Department of Revenue, Cumulative Statement of Revenue Collected (monthly statements).

^dFigures shown reflect gross taxes for production and exploration property. Includes municipal and local government credits. Values calculated as two percent (20 mills) of historical assessed value by property type. Source: Alaska Department of Revenue, Division of Petroleum Revenue, Petroleum Property Assessor, and Alaska Department of Community and Regional Affairs, Alaska Taxable.

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The economic limit factor is a provision that arbitrarily reduces the effective tax rate as the production rate per well declines, so that at the "economic limit" the effective tax rate is zero. The lower bound for the economic limit is set presumptively by statute at 300 barrels per day per well for oil and 3,000 mcf per day for gas.⁶

The severance tax is also levied on gas production calculated as the greater of either \$6.4 cents per thousand cubic feet of taxable gas, or ten percent of the gross value of taxable production calculated at the point of production, multiplied by an economic limit factor. Alaska severance tax revenue has climbed from \$11 million in 1971 to \$1.5 billion in 1981 and 1982. Ninety-five to ninety-nine percent of the total severance tax collections have come from oil.

Alaska has a corporate income tax with a marginal tax rate of 9.4 percent [AS43.20]. Between 1979 and 1981, the state collected a special income tax based on the corporate income derived from oil and gas production within Alaska rather than on income apportioned to Alaska under conventional interstate apportionment formulas [AS43.21]. Since July 1, 1981, there is a special apportionment formula for oil and gas production and transportation activities. Approximately \$2 billion collected under the separate accounting method is under litigation.

The state Oil and Gas Exploration, Production and Pipeline Transportation Property Tax is levied at 20 mills annually on the full and true value of all taxable property [AS43.56]. Reserves are not included in the definition of taxable property. First-class cities and boroughs may also levy taxes on oil and gas properties. In this case, the state reimburses the local governments for the tax collected at the local mill rate, up to 20 mills. Following our convention of defining oil and gas value at the wellhead, we exclude property taxes on petroleum transportation property in the figures in Table 10. Property taxes on production and exploration property rose to over \$120 million by 1982.

In 1975, the Alaska Legislature established a temporary Oil and Gas Reserves Ad Valorem Tax on the value of oil and gas "in-place" [AS43.58]. Revenues collected with this tax measure were credited against future severance tax payments from Prudhoe Bay. The reserves tax raised, or more correctly, borrowed one-half billion dollars before commercial production began from that field in 1977.

Federal Taxes: Federal taxes on oil and gas development in Alaska include the Windfall Profits Tax and the corporate income tax. The federal Windfall Profits Tax is an excise tax on production of crude oil levied since 1980 as part of the deregulation of domestic oil prices. The rate structure is complex, and effective ad valorem rates range from zero to around 50 percent

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of wellhead value. Taxpayers (oil producers) may deduct state severance taxes (up to 15 percent). State royalty shares are not taxed but the tax is collected for accounting purposes from federal royalty shares.⁷

Table 11 contains estimates of federal Windfall Profits Tax and corporate income tax paid on Alaska oil and gas production. These estimates are derived from the analysis contained in Chapter III. Windfall Profits Taxes were nearly \$2.9 billion for 1981 and half that amount in 1982. Corporate income taxes were negative until 1978 (net tax loss from deductions for exploration and development expenses, mainly on the North Slope), then rose to around \$2 billion in 1980.⁸

Distribution of Oil and Gas Revenues

Although the state and federal governments collect all oil and gas lease payments and taxes in Alaska, local governments have also benefited from sharing of the petroleum property tax. The federal government also shares 90 percent of onshore federal lease payments (except 50 percent of lease payments on the National Petroleum Reserve [NPRA]) with the State of Alaska. However, as noted above, federal Windfall Profits Tax is subtracted from federal oil royalties before sharing with the state.

Table 11 shows the final distribution of oil and gas revenues among the major taxing authorities and lease holding interests. This table reflects the sharing of federal onshore lease revenues with the State of Alaska as well as the sharing of state petroleum property taxes with local governments. For comparison, lease rentals and royalties from former Indian reservation lands now belonging to Cook Inlet Region, Inc., are also shown in Table 11.

A summary of the distribution of oil and gas revenues from Table 11 appears in Table 12. This table shows that, on a very broad level, the total revenue streams accruing to the federal and state governments have been around the same magnitude. Larger state revenues from royalties and severance taxes have been offset by larger federal corporate income taxes, bonus bids, and, recently, by the Windfall Profits Tax. However, federal revenues have increased more rapidly than state revenues since 1980. By 1982, federal revenues, even after sharing onshore lease payments with the state, were nearly 50 percent higher than combined state and local petroleum revenues.

Oil and Gas Production and Revenues in Texas

This section examines oil and gas production by ownership, analyzing the distribution of lease revenues and taxes based on production among federal, state, and local governments. Texas has historically been the largest oil producing state, with Alaska moving into second place after the Prudhoe Bay field came into

TABLE 11
DISTRIBUTION OF ALASKA OIL AND GAS REVENUES
CALENDAR YEAR 1971-1982
(thousands of current dollars)

Revenue Recipient and Revenue Source	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Federal Government^a												
Bonuses-Federal Lands	0	0	0	0	0	559,837	398,471	0	488,691	109,751	4,576	2,082,650
Rentals-Federal Lands	21	36	29	34	31	1,259	2,835	2,834	2,331	2,259	1,800	3,762
Royalties-Federal Lands	598	499	633	905	815	763	677	704	761	1,010	1,514	1,857
Windfall Profits Tax ^e	0	0	0	0	0	0	0	0	0	762,600	2,896,700	1,463,500
Corporate Income Tax ^e	-133,000	-144,200	-59,100	-90,300	-291,800	-453,600	-383,700	23,900	736,500	1,857,900	1,993,800	1,698,100
State Government												
Bonuses-Federal Lands ^b	0	0	0	0	0	0	0	0	0	0	0	26,650
Bonuses-State Lands	456	2,883	25,949	1,041	0	0	0	0	567,549	12,387	5,824	61,270
Rentals-State Lands	3,048	2,984	2,537	3,605	3,424	2,777	2,683	2,189	2,069	5,541	6,610	3,245
Rentals-Federal Lands ^b	192	320	260	304	283	257	5	4	1	262	5	4,694
Royalties-State Lands	20,437	23,192	26,554	33,995	36,888	36,429	113,492	260,634	619,062	1,156,660	1,686,770	1,516,630
Royalties-Federal Lands ^b	5,386	4,489	5,699	8,145	7,331	6,863	6,094	6,332	6,851	9,092	13,618	16,715
Conservation Tax	0	0	0	71	77	79	63	163	247	308	624	341
Severance Tax	11,410	12,340	10,890	22,090	27,560	25,900	52,590	149,100	256,800	829,600	1,492,000	1,566,000
Property Tax	0	0	0	4,950	6,812	13,401	29,545	42,486	36,751	40,871	23,893	30,224
Reserves Tax	0	0	0	0	0	223,100	270,600	0	0	0	0	0
Special Corporate Income Tax	0	0	0	0	0	0	0	0	474,400	693,200	822,700	318,600
Local Government^c												
Property Tax - NSB	0	0	*	2,223	2,863	8,151	14,168	13,736	31,914	34,864	69,803	92,080
Property Tax - KPB	2,200	2,264	2,250	1,996	2,377	2,686	2,563	2,274	1,281	1,672	1,440	1,334
Yakutat	0	0	0	0	0	0	55	44	36	27	28	28
Cook Inlet Region, Inc.^d												
Rents and Royalties	2	*	*	*	*	*	*	*	*	*	9,600	*

See notes on following page.

Notes for Table 11.

*Not available.

- Less than 0.5.

^aValues for bonuses from Table 8. Note that federal OCS revenues are not presently shared with the state. Values for federal share of bonus and rental payments reflect ten percent of the payments collected from onshore lands as provided by the Alaska Statehood Act (includes contributions paid into the Alaska Native Fund), except 50 percent of revenue from the National Petroleum Reserve Alaska (1982 only).

^bNinety percent of the value of federal rentals and royalties (net of windfall profits tax) as provided for by the Alaska Statehood Act (includes payments made into the Alaska Native Fund), except 50 percent of NPRA revenues. Property Taxes from Table A.11. Other tax values from Table 3.

^cProperty tax values shown reflect local government shares of petroleum property taxes as provided for by AS 43.56.

^dEstimated value of rental and royalty payments from federally leased onshore lands in Cook Inlet selected by CIRI. 1971 figure for Kenai Indian Reservation.

^eEstimated as described in Chapter III, shown in Tables E.1, E.2, E.3. We deducted from actual state corporate income tax 46 percent of the difference between actual state corporate tax collections and those calculated in Chapter III using model HISTOIL. HISTOIL estimates of state corporate income tax in millions of current dollars for the period 1978-1982, respectively, are \$6.6, \$207.9, \$479.3, \$278.6, and 0. Windfall profits tax charged to federal royalties, as per statute. Negative corporate profits tax figures reflect net reduction in federal tax receipts from deductible Alaska industry expenditures.

TABLE 12
SUMMARY OF THE DISTRIBUTION OF ALASKA OIL AND GAS REVENUES^a
CALENDAR YEAR 1971-1982
(millions of dollars)

	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Federal Government	-132.4	-143.7	-58.4	-89.4	-291.0	108.2	18.2	27.4	1,228.3	2,733.6	4,898.5	5,249.9
State Government	40.9	46.2	71.9	74.2	82.4	308.8	475.1	460.9	1,963.7	2,747.9	4,052.1	3,597.7
Local Government ^b	*	*	*	4.2	5.2	10.8	16.8	16.1	34.2	36.6	71.3	93.4

*Not available.

^aSource: Table 11.

^bShare of oil and gas property taxes on production and exploration property paid to local governments.

X

production in the late 1970s. The two states combined account for over 50 percent of domestic U.S. oil production. In contrast to Alaska, Texas is also a very large producer of natural gas. The Gulf of Mexico offshore from the coasts of Texas and Louisiana is one of the largest gas producing provinces of the United States. Although there are many differences in the political economy of oil and gas between Alaska and Texas, the two states share both an economic dependence and a fiscal dependence on the industry.

Texas Oil and Gas Production

Tables 13 and 14 show historical production of oil and gas in Texas since 1954, respectively, separating federal Outer Continental Shelf (OCS) production from that within Texas state jurisdiction. Texas state submerged lands extend three leagues (approximately 10 miles) offshore rather than the usual three miles, following the legal history of the original Spanish territory claimed by the state. Oil and gas production from the remaining federal OCS was correspondingly smaller until leases from the more remote OCS began coming into production in the late 1970s.

Over the period 1954-1982, total Texas oil production fluctuated from approximately 900 to 1,200 million barrels per year. This surpasses current Alaska production by around 50 to 100 percent. Since the peak production year in 1972 of 1,265 million barrels, annual production has declined to around 900 million barrels. OCS oil production has expanded rapidly since 1977, reaching 17 million barrels a year by 1982.

Texas natural gas production rose from around 6 trillion cubic feet a year in the 1950s to 9.5 trillion cubic feet in the early 1970s, although the peak year for Texas natural gas production was also 1972. Total annual gas production has remained over 7 trillion cubic feet until 1982, with declining onshore production offset by expanding OCS production. The share of marketed production in the total has risen from around 85 percent in the 1950s to 95 percent in recent years as a consequence of rising market prices. As a point of contrast with oil, offshore areas in the Gulf of Mexico make a significant contribution to Texas natural gas production. Combined federal and state offshore production exceeded one trillion cubic feet by 1982.⁹

Value of Texas Oil Production

This study examines the distribution of revenues from oil and gas development net of transportation, refining, etc. Thus, it is necessary to estimate weighted average wellhead values for oil and gas production in Texas. As in Alaska, two consistent definitions can be applied systematically throughout the state's diverse oil and gas fields: (1) the royalty in-value price and (2) the definition of value for severance tax purposes. In Texas, the severance tax base

TABLE 13
TEXAS OIL PRODUCTION
(million barrels)

<u>Year</u>	<u>State Jurisdiction</u>	<u>Outer Continental Shelf</u>	<u>Total^a Petro- leum Liquids Production</u>
1954	954	0	974
1955	1,002	-	1,053
1956	1,079	-	1,108
1957	1,058	-	1,074
1958	910	0	940
1959	944	0	972
1960	892	0	927
1961	895	0	939
1962	894	-	943
1963	915	-	978
1964	929	-	990
1965	933	-	1,058
1966	1,000	1	1,057
1967	1,074	3	1,120
1968	1,088	3	1,133
1969	1,107	3	1,152
1970	1,208	2	1,250
1971	1,182	2	1,223
1972	1,263	2	1,302
1973	1,257	2	1,295
1974	1,225	1	1,262
1975	1,186	1	1,222
1976	1,154	1	1,190
1977	1,101	1	1,138
1978	1,041	2	1,074
1979	979	4	1,018
1980	931	11	977
1981	898	14	945
1982	877	17	925

-Negligible production (less than 0.5 million barrels).

^aTotal includes lease condensate (not included in state production figures).

SOURCE: State jurisdiction - Texas Railroad Commission.

Federal jurisdiction - U.S. Department of the Interior,
Minerals Management Service.

Total Production - Basic Petroleum Data Book, Vol. III,
No. 3 (September 1983), American Petroleum Institute.

TABLE 14
TEXAS NATURAL GAS PRODUCTION
(billion cubic feet)

	<u>State Jurisdiction</u>	<u>Outer Continental Shelf</u>	<u>Total Marketed Production^a</u>
1954	5,511	0	4,551
1955	5,740	0	4,731
1956	6,005	0	5,000
1957	6,037	-	5,156
1958	6,050	0	5,178
1959	6,422	0	5,719
1960	6,675	0	5,893
1961	6,794	0	5,964
1962	6,906	0	6,080
1963	7,214	0	6,205
1964	7,554	0	6,490
1965	7,855	0	6,637
1966	8,098	42	6,954
1967	8,337	100	7,189
1968	8,613	110	7,495
1969	8,963	127	7,853
1970	9,450	133	8,358
1971	9,571	127	8,551
1972	9,603	147	8,658
1973	9,341	149	8,514
1974	8,907	160	8,171
1975	8,052	123	7,486
1976	7,708	93	7,192
1977	7,565	87	7,051
1978	7,077	232	6,548
1979	7,116	512	7,175
1980	6,998	625	7,252
1981	6,733	730	7,050
1982	6,036	858	6,441 ^b

-Negligible production (less than 0.5 billion cubic feet).

^aMarketed production defined as gross production net of gas injection and quantity vented or flared.

^bISER estimate, published series not available.

SOURCE: State jurisdiction - Texas Railroad Commission.

Federal jurisdiction - U.S. Department of the Interior,
Minerals Management Service.

Total Production - Basic Petroleum Data Book, Vol. III, No. 3
(September 1983), American Petroleum Institute.

allows certain field cost deductions not permitted for state royalty accounting, but the overall difference in price is small for most fields.¹⁰

Unlike Alaska, however, most production occurs on private property, so no royalty data exist for estimating weighted-average wellhead prices. Consequently, the severance tax base provides the best standard for production on private lands. Table 15 presents estimates of total petroleum liquids values with public royalty shares separated into federal OCS, federal onshore, and two major state land categories, and with private shares divided into federal OCS and Texas state jurisdiction. Petroleum liquids include crude oil and natural gas liquids, or condensate, from gas wells. Disaggregated, as in Table 15, the state nonroyalty value estimate should correspond to the base for the state severance tax, while the sum of the state and federal OCS nonroyalty shares (and, technically, the federal royalty shares) include the tax base for the federal Windfall Profits Tax.

Total value of oil and condensate climbed from 9.6 to 32.5 billion dollars between 1975 and 1982, with most of the change occurring after decontrol of oil prices in 1979. State royalty shares of oil and condensate have been roughly evenly divided between the two major land-managing agencies, the General Land Office and the University of Texas System. Aided by an increase in offshore production, state and federal royalty shares have increased from 0.6 percent to 1.1 percent of the total. It is immediately obvious from the figures in Table 15 that federal onshore production does not play a significant role in Texas oil production and revenues.

Value of Texas Gas Production

Table 16 contains estimates of the value of natural gas production, divided into public royalty and private production. The methodology for preparing this table is as discussed above with respect to oil in Table 15. Total estimated value of Texas natural gas production grew from \$4 billion in 1975 to \$14 billion in 1981, averaging around 40 percent of the oil values. The increase in the value of gas has been more gradual than that of oil, however, due to the nature of interstate gas price regulation and long-term contracts prevailing in the industry. Federal and state royalty shares are a more significant fraction of gas production than of oil, rising from 2.3 percent of total production in 1975 to 4.3 percent by 1981. The proportion of gas production allocated for government royalties in Texas is undoubtedly still growing, reflecting the increasing importance of the publicly-owned offshore resources of the Gulf of Mexico.

TABLE 15
VALUE OF PUBLIC AND PRIVATE PRODUCTION
OF OIL AND CONDENSATE IN TEXAS BY CALENDAR YEAR
(million dollars)

Year	Public Royalty Shares					Private Royalties and Nonroyalty Production		
	Federal OCS	Federal Onshore	General Land Office	University of Texas	Total	Federal OCS	State Jurisdiction	Total
1975	1.6	0.1	25.3	33.5	60.4	8.1	9537.5	9545.6
1976	1.8	0.1	27.9	36.2	66.0	9.0	9720.1	9729.1
1977	1.5	0.2	33.8	37.5	72.9	7.6	9648.4	9656.0
1978	3.9	0.1	43.9	41.7	89.6	19.5	9944.9	9964.4
1979	7.2	0.2	52.3	53.1	112.9	36.0	12700.7	12736.7
1980	33.1	0.4	86.8	87.3	207.6	165.7	21065.1	21230.8
1981	73.1	0.7	146.5	128.5	348.8	365.5	31745.0	32110.5
1982	93.3	0.6	141.8	122.4 ^a	358.1	466.5	27744.9	28211.4

TABLE 16
VALUE OF PUBLIC AND PRIVATE PRODUCTION
OF NATURAL GAS IN TEXAS BY CALENDAR YEAR
(million dollars)

Year	Public Royalty Shares					Private Royalties and Nonroyalty Production		
	Federal OCS	Federal Onshore	General Land Office	University of Texas	Total	Federal OCS	State Jurisdiction	Total
1975	5.8	0.1	58.0	29.1	93.0	28.9	3939	3967.9
1976	4.9	0.1	91.9	34.3	131.1	24.2	5372	5396.2
1977	8.7	0.1	132.4	37.9	179.1	43.4	6669	6712.4
1978	47.7	0.1	138.3	33.5	219.6	238.3	6838	7076.3
1979	149.7	0.1	158.1	33.7	341.6	748.3	8482	9230.3
1980	217.5	0.2	249.2	36.8	503.7	1087.6	10335	11422.6
1981	301.9	0.2	261.4	43.3	606.8	1510.1	11938	13448.1
1982	383.3	0.4	243.6	37.8 ^a	665.1	1915.7	12314	14229.7

^aextrapolated from first eight months.

SOURCES: Federal figures computed from data from U.S. Department of the Interior, Minerals Management Service. State royalty figures from state of Texas General Land Office, Energy Resources and the University of Texas System, University Lands Accounting Office. State nonroyalty production from State of Texas, Comptroller of Public Accounts, Revenue Estimation.

Lease Payments to Landowners in Texas

All revenues from state oil and gas leases in Texas can be grouped in one of four categories: (1) lease bonus payments, (2) lease rental payments, (3) oil royalties, and (4) gas royalties. Net profit shares, working interests, and other forms of participation are not used for state leases. Federal law permits net profit share bidding for OCS leases, but there were no producing net profit share leases as of 1982. The federal government also assesses minimum royalties for OCS tracts which are deductible from royalty payments, but these are of little quantitative significance.

Federal Leases: Federal leases may be divided into two categories, Outer Continental Shelf and Onshore. Table 17 shows federal lease revenues by type from OCS leases since 1954. The total fluctuates considerably from year to year, reflecting the high proportion of bonus bids in the total. Royalties have risen from negligible quantities to over \$400 million per year since 1977, while bonuses peaked at \$2.6 billion in 1981. Average annual lease payments for the Texas federal OCS in the years 1979-1982 were \$1.65 billion. None of this revenue is shared with Texas state and local governments.

When Texas entered the United States, it retained its public domain as state land. Thus, there has never been a federal public domain in Texas. Over the years, the federal government has acquired significant acreage of Texas land for such purposes as national forests, national parks, and military reservations. Some of this acquired land in Texas contains oil and gas deposits, although the total amount produced is small. Table 18 shows onshore federal lease payments from 1954 to 1981. Although oil and gas have been produced in every year, combined royalties never reached one million dollars during this period.

Texas federal onshore production is divided fairly evenly between military lands and national grasslands. Lease revenue from military lands is not shared with state and local governments. Although national grasslands are administered by the national forests, which share 25 percent of receipts with the state, the 25 percent share of grassland revenues is distributed directly to the county of origin. Thus, the federal government shares a very small annual stream of onshore lease revenues with Texas local governments but not with the state government.

State Leases: The state of Texas had a very limited tax base when it joined the United States. The new state sold its lands for revenue or traded them for various public services, including military service and building the state capital. Approximately 3 million acres remain in state fee title ownership today, of which approximately two-thirds is endowed to the University of Texas. The state land grant to the University has proven fortuitous to the recipients--over 20 percent of the 2 million acres of west Texas rangeland is now under productive oil and gas lease.

TABLE 17
PAYMENTS FOR TEXAS FEDERAL OFFSHORE LEASES BY CALENDAR YEAR
(million dollars)

<u>Year</u>	<u>Bonus Payments</u>	<u>Rental Payments</u>	<u>Minimum Royalties</u>	<u>Oil Royalties</u>	<u>Gas Royalties</u>	<u>Total</u>
1954	23.357	0.289	0	0	0	23.646
1955	8.437	0.537	0	0.001	0	8.975
1956	0	0.696	0	0.007	0	.703
1957	0	0.29	0.001	0.003	0	.294
1958	0	0.236	0	0	0	.236
1959	0	0.064	0	0	0	.064
1960	35.732	0.763	0.017	0	0	36.512
1961	0	0.679	0.019	0	0	.698
1962	0.558	0.502	0.021	0.002	0	1.083
1963	0	0.424	0.036	0.027	0	.487
1964	0	0.369	0.035	0.002	0	.406
1965	0	0.337	0.09	0.002	0	.429
1966	0	0.003	0	0.444	1.15	1.597
1967	0	0.244	0.003	1.488	2.85	4.585
1968	593.899	1.727	0.004	1.665	3.01	600.305
1969	0	1.642	0	1.592	3.41	6.644
1970	0	1.358	0.029	1.326	3.47	6.183
1971	0	1.073	0.268	1.044	3.33	5.715
1972	0	0.602	0.232	1.095	4.13	6.059
1973	1537.5	1.724	0.302	1.18	4.63	1545.336
1974	1494.12	3.571	0.302	1.613	5.28	1504.886
1975	345.396	5.722	0.216	1.59	5.78	358.704
1976	68.493	5.429	0.285	1.779	4.86	80.846
1977	356.102	5.443	0.423	1.515	8.68	372.163
1978	589.248	5.144	0.697	3.858	47.65	646.597
1979	639.636	4.01	0.9	7.203	149.69	801.439
1980	1417.96	3.797	0.928	33.143	217.45	1673.278
1981	2649.63	4.448	0.912	73.084	301.92	3029.994
1982	609.178	3.994	0.932	93.323	383.33	1090.757

^aIncludes entire western Gulf of Mexico (area-wide lease sales).

SOURCE: U.S. Department of the Interior, Minerals Management Service.

TABLE 18
PAYMENTS FOR FEDERAL ONSHORE LEASES IN TEXAS BY CALENDAR YEAR
(million dollars)

<u>Year</u>	<u>Bonus Payments</u>	<u>Rental Payments</u>	<u>Oil Royalties</u>	<u>Gas Royalties</u>	<u>Total</u>
1954	*	*	0.009	0.008	0.018
1955	*	*	0.009	0.008	0.017
1956	*	*	0.093	0.012	0.106
1957	*	*	0.147	0.031	0.179
1958	*	*	0.107	0.024	0.132
1959	*	*	0.089	0.018	0.106
1960	*	*	0.105	0.033	0.138
1961	*	*	0.275	0.156	0.431
1962	*	*	0.203	0.121	0.323
1963	*	*	0.177	0.095	0.270
1964	*	*	0.303	0.104	0.407
1965	*	*	0.283	0.116	0.401
1966	*	*	0.245	0.121	0.365
1967	*	*	0.197	0.13	0.326
1968	*	*	0.168	0.068	0.236
1969	*	*	0.119	0.089	0.207
1970	*	*	0.104	0.086	0.190
1971	*	*	0.125	0.08	0.206
1972	*	*	0.126	0.088	0.213
1973	*	*	0.112	0.137	0.249
1974	*	*	0.132	0.07	0.202
1975	*	*	0.105	0.129	0.234
1976	*	*	0.125	0.057	0.182
1977	*	*	0.173	0.117	0.29
1978	*	*	0.143	0.113	0.255
1979	*	*	0.190	0.126	0.315
1980	1.261	*	0.389	0.158	0.549
1981	*	*	0.685	0.185	0.870
1982	1.251	*	0.590	0.359	0.949

*Not available.

SOURCE: U.S. Department of the Interior, Minerals Management Service, and Bureau of Land Management.

Remaining state lands are managed by the Texas General Land Office (GLO). Although the GLO manages less than one million acres of fee title lands, the agency controls about 13.5 million acres of subsurface estate. In addition to small amounts of miscellaneous categories, the state subsurface domain includes 5 million acres of submerged lands (including beneath the Gulf of Mexico out to three leagues from the coastline) and 6 million acres of upland subsurface rights of "Relinquishment Act" lands. Lands in the latter category were state lands for which the GLO retained subsurface rights when disposing of the surface estate.

Although the GLO aggressively manages its offshore and upland fee properties, the agency purposefully takes a passive role with Relinquishment Act leases. The surface owner, not the GLO, takes the initiative to lease the mineral rights. Although the GLO requires the lease payments to be some combination of bonus payments, rental payments, and royalties, the surface owner is free to negotiate the specific terms. In exchange for performing the service of agent for the state (and for retaining political support for the GLO and its elected commissioner), the surface owner retains a 50 percent share of all lease payments. Thus, for every dollar of bonus, rental, and royalty paid to the GLO from Relinquishment Act leases, private owners received an equal share. In 1982, the state's share of Relinquishment Act royalties was around \$100 million.

Although all Texas state lease terms specify a combination of bonuses, rentals, and royalties, royalty rates may differ widely from lease to lease even in the same producing area. Around 20 years ago, the GLO raised the standard royalty share from one-eighth to one-sixth. The share increased to one-fifth for new leases in 1974 and to one-fourth for leases sold since 1979. Royalty shares on University lands followed the same upward trend, lagging a year or so behind the GLO. In addition, the GLO has held a number of royalty bid sales in recent years on submerged lands.

Table 19 shows bonus receipts for Texas state lease sales since 1959 by the major categories of state land. All lease revenues from over 99 percent of all subsurface acreage managed by the GLO, including submerged lands, are dedicated to the Permanent School Fund. This fund is an endowment for public primary and secondary education whose annual earnings are distributed to local school districts on the basis of school-age population. Lease bonuses have averaged around \$80 million per year since 1974. The GLO collected around \$10 million per year prior to 1974, although the yearly total fluctuates considerably depending on exploration trends.

Rental payments for Texas state leases are shown in Table 20. Although data are not available for the special funds category, one should recall that this category comprises less than 1 percent of GLO lands. Not counting the negligible amount from the special

TABLE 19
BONUS PAYMENTS FOR TEXAS STATE LEASES BY FISCAL YEAR
(million dollars)

<u>General Land Office</u>						
<u>Year</u>	<u>Offshore</u>	<u>Other School Lands</u>	<u>Special Funds</u>	<u>Total GLO</u>	<u>University of Texas</u>	<u>State Total</u>
1959	0	5.436	0.208	5.644	*	*
1960	0.258	7.413	0.207	7.878	*	*
1961	3.229	11.21	0.233	14.672	*	*
1962	0.297	5.486	0	5.783	*	*
1963	2.617	6.974	0	9.591	*	*
1964	2.435	8.29	0.724	11.449	*	*
1965	53.115	9.64	0.03	62.785	*	*
1966	18.223	12.39	0.105	30.718	*	*
1967	3.641	4.168	0.006	7.815	*	*
1968	1.252	7.43	0.094	8.776	*	*
1969	1.838	6.183	0	8.021	*	*
1970	5.995	5.688	0.102	11.785	*	*
1971	4.326	5.631	0.046	10.003	*	*
1972	1.36	3.967	0.013	5.34	*	*
1973	3.701	10.441	0.14	14.282	*	*
1974	32.982	18.503	0.463	51.948	11.398	63.346
1975	5.32	11.612	0.655	17.587	8.043	25.63
1976	6.198	12.883	0.023	19.104	15.403	34.507
1977	41.343	19.871	0.363	61.577	13.582	75.159
1978	49.808	25.252	0.64	75.7	18.423	94.123
1979	34.578	16.889	0.009	51.476	10.723	62.199
1980	34.733	33.122	1.905	69.76	0.253	70.013
1981	37.467	58.333	6.628	102.428	98.132	200.56
1982	*	*	0.946	71.4	19.371	90.771

*Not available.

SOURCE: State of Texas, General Land Office, Energy Resources, and University of Texas System Administration.

TABLE 20
RENTAL PAYMENTS FOR TEXAS STATE LEASES BY FISCAL YEAR
(million dollars)

<u>General Land Office</u>						
<u>Year</u>	<u>Offshore</u>	<u>Other School Lands</u>	<u>Special Funds</u>	<u>Total GLO¹</u>	<u>University of Texas</u>	<u>State Totals^a</u>
1959	0.144	1.95	*	2.094	*	*
1960	0.098	2.051	*	2.149	*	*
1961	0.069	2.258	*	2.327	*	*
1962	0.127	2.609	*	2.736	*	*
1963	0.177	1.81	*	1.987	*	*
1964	0.525	2.7	*	3.225	*	*
1965	0.755	3.549	*	4.304	*	*
1966	3.163	2.942	*	6.105	*	*
1967	3.711	3.133	*	6.844	*	*
1968	2.684	2.35	*	5.034	*	*
1969	1.492	1.956	*	3.448	*	*
1970	0.618	1.596	*	2.214	*	*
1971	0.726	1.361	*	2.087	*	*
1972	0.963	1.453	*	2.416	*	*
1973	0.92	1.371	*	2.291	*	*
1974	1.066	1.686	*	2.752	0.477	3.229
1975	2.935	2.571	*	5.506	0.698	6.204
1976	3.223	2.574	*	5.797	0.56	6.357
1977	2.405	2.795	*	5.2	1.116	6.316
1978	4.776	2.344	*	7.12	1.403	8.523
1979	7.319	3.477	*	10.796	2.337	13.133
1980	10.293	2.665	*	12.958	2.55	15.508
1981	13.048	3.738	*	16.786	2.954	19.74
1982	*	*	*	19.355	2.558	21.913

*Not available.

^aExcluding special funds.

SOURCE: State of Texas, General Land Office, Resource Management,
and University of Texas System Administration.

funds lands, state rental payments have climbed from \$3 million per year in 1974 to over \$20 million per year. About 15 percent of the total comes from University lands, reflecting the share of these lands in the total state acreage.

Table 21 shows oil and gas royalty payments from the University lands and from the same three categories of GLO lands. The relative shares in the total for the GLO lands and University lands of oil royalties and gas royalties are shown as well in Tables 15 and 16, respectively.

Total oil and gas royalties for GLO lands have grown more than tenfold during the past ten years while University lands royalties have increased by a factor of five. Total state royalties reached one-half billion by 1981. The relative share of the University lands in the total has declined from around 40 percent to around 30 percent over the past ten years. Tables 15 and 16 show clearly that the shift is due to the increasing role of state gas production, mostly from submerged lands with a relatively high royalty share, in total royalty collections.

Taxes on Oil and Gas Production in Texas

State Taxes: The state of Texas levies production taxes on oil and gas which are analogous to the Alaska oil and gas severance taxes. The state also collects a regulation tax of 3/16 cent per barrel of oil produced to finance the oil and gas activities of the Railroad Commission, the state regulatory agency in Texas whose portfolio includes oil and gas conservation. The regulation tax is similar to Alaska's 1/8 cent-per-barrel conservation tax, and yields between 1.8 and 2 million dollars per year in revenues. Texas has no state income tax.

The sales tax provides a major source of revenue in Texas. However, since all industries pay this tax, we shall not consider it here as a tax on oil and gas development.¹¹ The Texas severance tax is assessed at 4.6 percent of wellhead value for oil (or 4.6 cents per barrel, whichever is greater) and 7.5 percent of wellhead value for gas. Condensate is taxed at the lower oil tax rate. Royalty shares accruing to public landowners are exempt from taxation, as is the case in Alaska.

Table 22 shows oil and gas production taxes for oil and for natural gas since 1960. By 1981, the annual revenue stream surpassed the \$2 billion mark, with gas revenues accounting for around 40 percent of the total. As one would expect from the ad valorem rates, this amounts to around 5 percent of total oil and gas production value excluding public royalty shares.

TABLE 21
TOTAL OIL AND GAS ROYALTY PAYMENTS FROM
TEXAS STATE LEASES BY FISCAL YEAR
(million dollars)

<u>General Land Office</u>						
<u>Year</u>	<u>Offshore</u>	<u>Other School Lands</u>	<u>Special Funds</u>	<u>Total GLO</u>	<u>University of Texas</u>	<u>State Total</u>
1971	4.917	24.306	*	30.877	*	*
1972	5.235	23.452	*	*	*	*
1973	4.646	23.844	0.205	28.695	*	*
1974	7.67	35.138	0.659	43.467	32.562	76.029
1975	19.066	50.053	0.71	69.829	57.492	127.321
1976	29.327	75.738	0.789	105.854	69.684	175.538
1977	40.448	111.552	0.92	152.92	75.284	228.204
1978	63.684	120.27	0.736	184.69	76.251	260.941
1979	58.576	123.769	0.705	183.05	73.906	256.956
1980	155.28	154.341	1.108	310.729	115.381	426.11
1981	168.559	210.518	1.584	380.661	154.546	535.207
1982	*	*	0.003	404.661	172.991	577.652

*Not available.

SOURCE: State of Texas, General Land Office, Energy Resources, and University of Texas System, University Lands Accounting Office.

TABLE 22
TEXAS STATE TAXES ON OIL AND GAS RECEIVED BY FISCAL YEAR
(million dollars)

<u>Year</u>	<u>Oil & Condensate^a Production Tax</u>	<u>Natural Gas Production Tax</u>	<u>Total</u>
1960	124.538	52.233	176.771
1961	122.389	57.895	180.284
1962	122.586	60.199	182.785
1963	123.794	64.051	187.845
1964	126.723	66.476	193.199
1965	126.596	72.495	199.091
1966	133.027	74.185	207.212
1967	142.516	78.323	220.839
1968	158.044	81.868	239.912
1969	156.245	84.408	240.653
1970	172.601	96.377	268.978
1971	194.824	108.809	303.633
1972	192.988	114.38	307.368
1972	209.895	124.902	334.797
1974	347.161	171.068	518.229
1975	404.764	259.57	664.334
1976	431.315	364.588	795.903
1977	428.484	474.318	902.802
1978	437.206	517.844	995.05
1979	466.663	554.354	1021.017
1980	785.691	734.247	1519.938
1981	1290.95	901.931	2192.881
1982	1316.79	1057.06	2373.85

^aIncludes regulation tax of 3/16 of a cent per barrel of oil produced.

SOURCE: State of Texas, Comptroller of Public Accounts, Revenue Estimation.

Table 23 shows that Texas state revenues from oil and gas leases and production taxes totaled \$3 billion in 1981. Although the share of royalties in the total revenue stream has been increasing steadily, mainly from offshore gas, production taxes still account for 70 percent of the total.

Federal Taxes: Since its inception in 1980, the federal Windfall Profits Tax has provided the largest flow of public revenue from Texas oil and gas production. Data are not directly available for Windfall Profits taxes collected from production in each state. We provide, in Table 24, estimates for the federal Windfall Profits Tax and the federal corporate income taxes calculated as described below in Chapter III. The two taxes combined collected over \$9 billion in 1981 according to these estimates.¹²

Local Taxes: Local governments in Texas collect taxes on oil and gas production and exploration property, along with other kinds of real property. Texas also permits ad valorem taxation of oil and gas reserves at "fair market value." The reserves tax base is actually the estimated present value of revenue net of excise taxes and extraction costs.¹³ Table 24 shows our estimates of the sum of property and reserves taxes received by Texas local governments. Local government taxes on oil and gas production rose from around two-thirds of a billion dollars in 1974 to \$2 billion in 1981, approximately the same as state oil and gas taxes.¹⁴

Distribution of Texas Oil and Gas Revenues

Table 24 shows the complete distribution of Texas oil and gas revenues to federal, state, and local governments. Federal lease revenues have fluctuated between one and three billion dollars recently as a result of some enormous bonus bids for leases in the Gulf of Mexico on top of royalty payments now exceeding \$400 million per year. This represents a change of several orders of magnitude from as recently as the early 1970s, when the total federal lease payments were only \$6 million per year.

The federal government shares virtually none of all these billions of lease revenues with Texas state and local governments. The state receives no shared federal revenues, and counties share between \$50,000 and \$500,000 total per year from onshore federal leases in Texas national grasslands. According to Table 24, the federal government collected a total of \$15.7 billion in Windfall Profits taxes between 1980 and 1982 from oil production in Texas. Thus, the federal government consistently received a larger share of revenue from Texas oil than the combined total shares of the state and local governments. The figures in Table 24 would show an even larger federal share in recent years except for the large income tax deductions and investment credits estimated for recent exploration and development, especially on the federal OCS.

TABLE 23
TOTAL TEXAS STATE OIL AND GAS REVENUES,
BY FISCAL YEAR
(million dollars)

<u>Year</u>	<u>Production Taxes</u>	<u>Royalty Payments</u>	<u>Bonus and Rental Payments</u>	<u>Total</u>
1971	303.633	30.877 ^a	12.09 ^a	346.6 ^a
1972	307.368	*	7.756 ^a	*
1973	334.797	28.695 ^a	16.573 ^a	380.065 ^a
1974	518.229	76.029	66.575	660.833
1975	664.334	127.321	31.834	823.489
1976	795.903	175.538	40.864	1012.305
1977	902.802	228.204	81.475	1212.481
1978	995.05	260.941	102.646	1358.637
1979	1021.017	256.956	75.332	1353.305
1980	1519.938	426.11	85.521	2031.569
1981	2192.881	535.207	220.3	2948.388
1982	2373.85	577.652	112.684	3064.186

^aExclude: University of Texas.

SOURCE: See Tables 19, 20, 21, and 22.

TABLE 24
DISTRIBUTION OF TEXAS PUBLIC OIL AND GAS REVENUES, 1974-1982
(million dollars)

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
<u>Federal Government</u>									
Onshore Lease Payments ^a	0.2	0.2	0.1	0.2	0.2	0.2	1.3	0.5	1.6
OCS Lease Payments ^b	1,504.9	358.7	80.8	372.2	646.6	801.4	1,673.3	3,030.0	1,090.8
Windfall Profits Tax ^c	0	0	0	0	0	0	2,514.6	7,752.5	5,459.8
Corporate Income Tax	<u>2,389.7</u>	<u>2,613.1</u>	<u>2,825.1</u>	<u>2,928.9</u>	<u>2,501.0</u>	<u>3,921.7</u>	<u>1,629.9</u>	<u>1,453.0</u>	<u>1,320.0</u>
Total, Federal Government	3,894.8	2,972.0	2,906.0	3,301.3	3,147.8	4,723.3	5,819.1	12,236.0	7,872.2
 <u>State Government^d</u>	 660.8	 823.5	 1,012.3	 1,212.5	 1,358.6	 1,353.3	 2,031.6	 2,948.4	 3,064.2
 <u>Local Government</u>									
Federal Lease Payments ^a	0.1	0.1	-	0.1	0.1	0.1	0.4	0.2	0.5
Property and Reserves Taxes ^c	<u>669.3</u>	<u>795.7</u>	<u>873.1</u>	<u>916.1</u>	<u>865.7</u>	<u>1,169.3</u>	<u>1,681.6</u>	<u>2,060.0</u>	<u>1,835.5</u>
Total, Local Government	669.4	795.8	873.1	916.2	865.8	1,169.4	1,682.0	2,060.2	1,836.0

-negligible, less than \$0.5 million.

^aTable 19, assuming 25 percent of federal acquired lands leases shared with local government.

^bTable 18.

^cISER estimates described in Chapter III, sum of onshore and offshore, Appendix E, Tables E.4 and E.5.

^dTable 23.

Summary and Conclusions

In 1981, Alaska and Texas collected approximately the same amount of revenue from oil and gas production. Although Texas produced 50 percent more oil and 30 times more gas, Alaska was fortunate to have nearly all of its production occur on state-leased lands or from federal onshore leases sharing 90 percent of the revenues with the state. While lease payments were three times higher in Alaska than in Texas, Texas received much larger oil and gas production tax revenues. Even though the effective Alaska severance tax rate for oil is three times the Texas rate, the higher wellhead prices and the much larger quantity of taxable production make up the difference. In addition, Texas annually collects a billion dollars in gas production taxes, and its local governments collect at least this amount in property and reserves taxes.

Oil and gas revenues have risen much faster than the rate of inflation in both states, but for different reasons. In Alaska, production from the Prudhoe Bay was primarily responsible for the tremendous leap in state revenues in the late 1970s, but rising prices and tax rates also contributed. In Texas, on the other hand, production of both oil and gas was declining during the 1970s. The nearly tenfold revenue gain resulted completely from rising prices accompanying world market fluctuations and loosening federal price controls.

Although Texas gained a windfall with oil deregulation in 1979-80, the state windfall was small relative to that of the federal government. The federal government was in an excellent position to collect the economic rent generated in Texas by the sudden increase in U.S. oil and gas prices. It collected over \$25 billion between 1980 and 1982 from the Windfall Profits Tax, the corporate income tax, and from bonus bids from recent leasing of massive areas of the Outer Continental Shelf. The federal OCS appears to be the likely source for most discoveries of large oil and gas fields in both states. This comparative examination of the historical pattern of production and revenues suggests that it is the federal government, not the states, that has recently recovered its historically dominant position in collecting resource revenues from oil and gas.

ENDNOTES

¹Alaska Oil and Gas Conservation Commission, Statistical Report, 1983.

²Ibid.

³Although all offshore property was federal prior to Alaska statehood, submerged lands within three miles of shore became state property in 1959. Since there was no offshore leasing in Alaska prior to statehood, one may speak of the federal Outer Continental Shelf as offshore submerged lands beyond the three-mile limit.

⁵The tax was initially enacted in 1955 by the territory at a rate of 1 percent of value. See AS43.55.01.

⁶The economic limit factor for oil production equals:

$$(1 - [PEL/TP]) \exp (460 \times WD/PEL)$$

where: PEL = monthly production rate at the economic limit;

TP = total production during the month for which the tax is to be paid;

WD = Total number of well days for which the tax is to be paid; and

"exp" indicates that the expression following is an exponent.

The economic limit factor (ELF) for gas production equals:

$$1 - PEL/TP.$$

⁷See Appendix D for more detail regarding the rate structure of the federal windfall profits tax.

⁸O.S. Goldsmith and J.P. Rowe, Federal Revenues and Spending in Alaska, ISER, April 1982, estimate for federal fiscal year 1981 for Prudhoe Bay only a windfall profit tax of \$2.6 billion and a corporate income tax of \$2.96 billion. Our corporate income tax estimates include large deductions for exploration and development work on the North Slope in addition to Prudhoe Bay.

⁹Texas state production of 247 billion cubic feet in 1982, from Texas Railroad Commission.

¹⁰Personal communication with Director of University Lands Accounting Office, University of Texas System. Note: This is the reverse of the case of Alaska, in which field costs may be deducted from royalties but not severance taxes.

¹¹Sales taxes paid directly by the oil and gas production and exploration industry were estimated at \$106.2 million in 1982, approximately 5 percent of severance tax revenue collected that year. See "The Petroleum Industry and the Texas Sales Tax," Texas Comptroller of Public Accounts, Revenue Estimating, April 1983.

¹²This compares with an estimate of \$10 billion for the windfall profits tax in 1981 and an increase of \$4 billion in corporate income tax payments between 1979 and 1981 in Peter Mieszkowski and Eric Toder, "Taxation of Energy Resources" Chapter 2 in C. McLure and P. Mieszkowski, ed., Fiscal Federalism and the Taxation of Natural Resources, Lexington Books, 1983, p. 65-92. Mieszkowski overestimates the windfall profits tax by assuming all 1981 oil is Tier I and Tier II and does not include increased exploration and development deductions from corporate taxable income.

¹³See Mieszkowski and Toder, op cit., page 73-74.

¹⁴The estimate includes \$1.355 billion in reserves taxes for 1982, or just over 3 percent of gross production value. This is between the two estimates reported in Mieszkowski and Toder, p. 82.

CHAPTER III

ECONOMIC RENT FROM PETROLEUM DEVELOPMENT AND ITS DISTRIBUTION IN ALASKA AND TEXAS, 1963-1982

Introduction

The preceding chapter discussed the size and historical distribution of petroleum lease and tax revenues in Alaska and Texas among federal, state, and local governments. In this chapter, we go one step further to examine the generation and distribution of petroleum economic rent. As discussed in Chapter I, economic rent is defined as the excess of the value of a commodity above its cost of production.

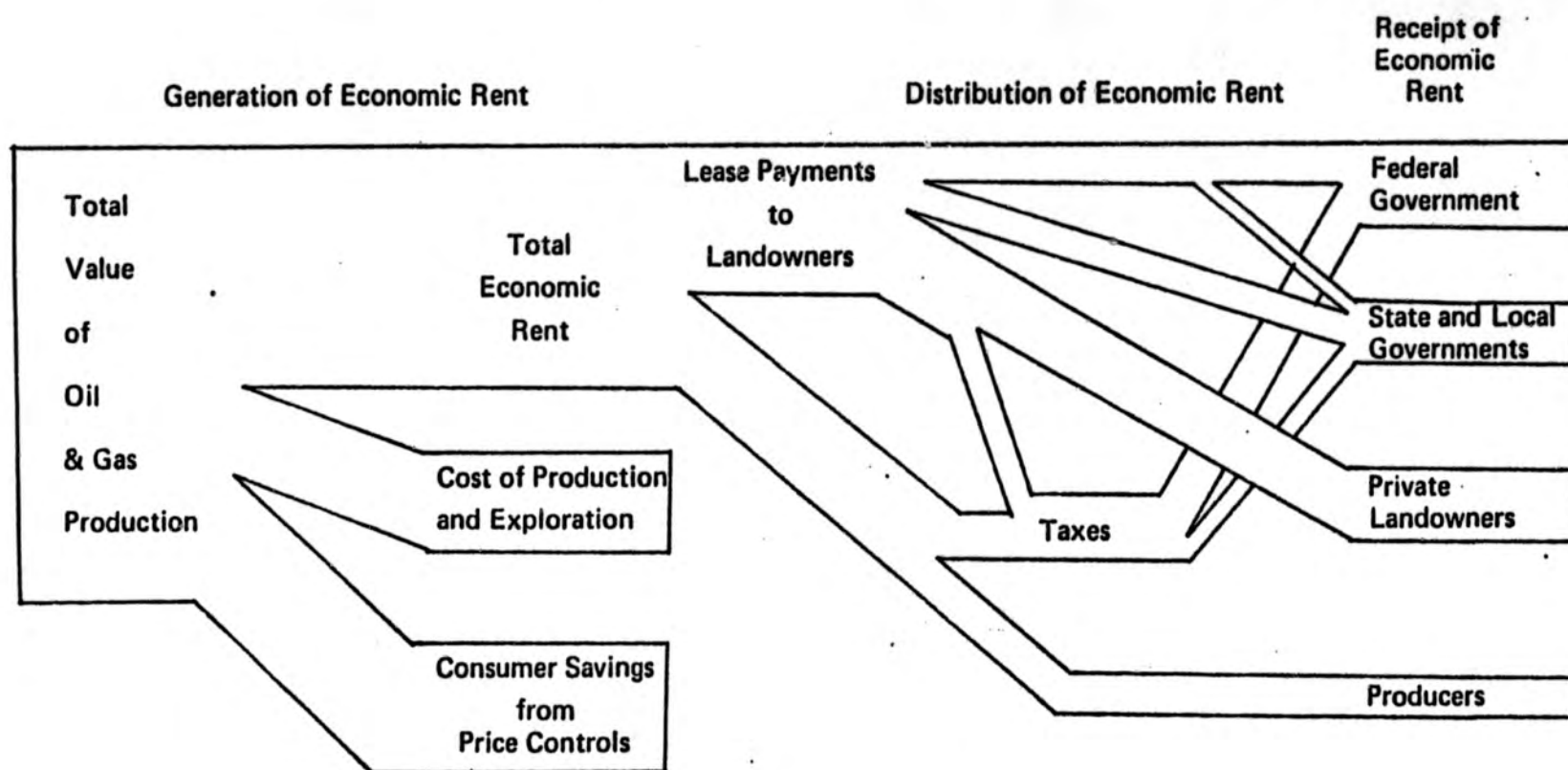
Historical accounting of economic rent generated from oil and gas production requires analysis of several additional factors beyond the accounting of public revenues. Economic rent, like sales or income, is a flow of value from one place to another. The relationship between economic rent and government revenues is most easily illustrated with reference to the flowchart, Figure 1. The total value of oil and gas production derives from the equilibrium of supply and demand in the markets for energy resources.

Moving from left to right along the flowchart, the total value may be divided into two portions--production costs and the residual, economic rent. Figure 1 shows, as well, the potential reduction in total value and in economic rent caused if direct controls are in effect on oil or gas prices. The cost of production in the accounting framework of the flowchart includes capital and operating costs for exploration, development, and operation of oil and gas fields. It does not include lease payments to landowners and taxes on production or economic rent.

Figure 1 shows how lease payments and taxes redistribute the total economic rent among landowners and governments. Some federal lease payments are shared with state and local governments, as discussed in Chapter II. In addition, private landowners typically pay taxes to state and local governments from payments they receive for oil and gas leases on their lands. After the complex pattern of distribution of economic rent has run its course, the residual not allocated to landowners and governments remains with the producing firms and their stockholders.

In Chapter II, we presented historical accounts of all public lease payments and major taxes paid on oil and gas production and exploration. Our task in this chapter is to examine distribution of economic rent, so we wish to include only those taxes that we consider to be paid out of economic rent. Other taxes would be considered part of the cost of production.

Figure 1. Generation and Distribution of Economic Rent from Oil and Gas Production



One can decide whether or not a particular tax is usually paid out of economic rent by hypothesizing a private owner operating a producing oil or gas field, earning no more than the competitive return on exploration and development costs, and paying the same taxes paid on average by nonpetroleum activities. Since all investments must pay these taxes and in the long run earn at least this competitive rate of return, there are no economic rents. Total taxes from this hypothetical oil field should be considered part of the cost of production, and are not paid from economic rent. General sales taxes, real property taxes, and income taxes are in this category.

Income taxes are also paid out of economic rent when profits exceed the competitive cost of capital. As a practical matter, it is difficult to distinguish which portion of income taxes would be paid if there were no economic rents. We have chosen to include as a portion of economic rent the entire amount of income taxes. This somewhat overstates both the total economic rent and the federal government share. However, the federal tax advantages historically received by the oil and gas industry, including the depletion allowance and the ability to expense intangible drilling costs and other exploration costs, means that firms have paid lower income taxes on their oil and gas operations than on other activities at the competitive rate of return.

Approach

The intent of this chapter is not to replicate the historical accounting of revenues analyzed in Chapter II, but rather to understand how economic rent is generated and distributed under a variety of economic conditions in two different states, Alaska and Texas. For historical comparative purposes, we divide Alaska into three regions. These are the two producing regions, Cook Inlet and the North Slope, and a third region containing the rest of the state, including the federal OCS. We split Texas into two large divisions, onshore and offshore (including the federal OCS).

The purpose of the comparative analysis is to go beyond a simple accounting of the distribution of the economic rents estimated to have been received over approximately the past twenty years. We seek to understand what factors have principally been responsible for the observed pattern of size and distribution. To the extent possible, we would like to have quantitative estimates of their importance in explaining differences observed over time and among the regions.

We propose to analyze the contribution of the following five factors to the regional pattern of distribution. While these factors do not exhaust all influences on the generation and distribution of economic rent, we believe these are likely to

dominate all other factors. Foremost among these factors is geologic luck. Simply stated, accumulations of oil and gas are found in some regions and not in others. Even among producing regions, there is a wide variation in average productivity at any given point in time.

Another important factor is landowner luck. The state of Alaska was able to select the Prudhoe Bay area under its Statehood Act entitlement. In Texas, however, most production occurs on privately-owned lands. A third and fourth factor strongly affecting the size of regional economic rent are the prices of oil and gas and the extraction cost environment of the regions. Finally, lease terms and taxation, or more broadly, government policy toward the industry, may play a significant part. Regulation may increase costs as well, but we consider this as part of the cost environment for the purpose of the regional comparative analyses.

An important aspect of our approach is the use of a number of "counterfactual hypotheses" to help us analyze the historical picture. A test of a counterfactual hypothesis employs one or more assumptions known to be factually inaccurate in order to analyze how the outcome of a history might have depended upon that particular factor. It asks the question, "How might the actual historical pattern have differed if everything had been the same except for one or maybe two factors?"

Methodology

The methodology consists of a model, a set of data and base case assumptions to run the model, and a number of counterfactual hypotheses. We have developed a historical accounting model, HISTOIL, in order to define and tabulate the regional distribution of economic rent.

The accounting structure of the model follows exactly the flowchart of Figure 1. The model includes a cost, lease payment, and tax structure, and adds up discounted real cash flows from the beginning to the end year of simulation. Costs included in the accounting framework include all capital and operating costs for exploration and development of oil and gas fields. They do not include overhead costs for a central management headquarters. One should interpret financial results accordingly as the effects of an incremental investment in oil and gas exploration and development. Appendix D contains a complete description and documentation of the model HISTOIL.

As is the case with any accounting model, results using the model are a reflection of the data and assumptions put in to the model. We have analyzed available historical data on oil and gas exploration, development and operating costs from a large number of sources, including federal and state publications, special studies,

and private industry. Appendix B compiles and analyzes historical industry costs in Alaska. Appendix C examines the historical timing in Alaska between the beginning of exploration of an area, discovery of oil or gas, and commencement of commercial production. Specific assumptions regarding the actual values assumed for cost and timing parameters for the historical accounting analysis are included in Appendix D.

The counterfactual hypotheses we test examine directly address the five important factors enumerated above which determine regional size and distribution of petroleum economic rent. Once again, these are (1) geologic good fortune, (2) landownership boundaries, (3) price of oil and gas, (4) cost environment for industry operations, and (5) government policy. We are particularly concerned in this study with the fifth factor. How important have state tax structures and federal policy decisions been in explaining the size and distribution of economic rent as compared to geologic factors, landownership boundaries, and the price of oil? We address the relative contribution of these factors by estimating how the historical pattern observed for Alaska and Texas would have differed if one or more factors had not been the same.

In order to estimate what we consider to be the sensitivity of the historical pattern to the history of a particular factor, we make the assumption that the historical oil and gas production would not have changed in response to the new factors unless the scenario was obviously infeasible. Such an assumption is surely inaccurate, as changing conditions raising the profitability of oil and gas production would have stimulated production, and vice versa. But with this reasoning, we can say that our estimates of how the size of economic rent might have differed represent a lower bound estimate since they do not include the effect (which would be in the same direction) upon production.

Another problem with developing counterfactual assumptions comes with the treatment of bonus bids. These are fixed costs once acreage has been leased. However, firms would have altered their bids had they expected the altered historical pattern. There is no feasible way to re-estimate the total regional pattern of bonus bids under each new scenario, so we assume no change in bonus payments. In essence, this assumption means that the altered course of events, had it actually occurred, would have been unanticipated by industry. We display bonus bids and rental payments separately in our results so that the reader may view directly how this assumption might have affected the reported results.

We examine the hypothetical effects on the regional size and distribution of petroleum economic rent of seven separate counterfactual assumptions.

Public landownership: Unlike the Texas offshore region and the Alaska regions, in which essentially all production occurs on public lands, over 90 percent of onshore Texas production comes from private lands. We examine how distribution of economic rent might have differed in Texas if all oil and gas had been found on public lands. We assume a one-eighth royalty share on oil and gas and the same ratio of bonus and rental payments to total royalties each year as occurred on public lands. The hypothetical public lease payments calculated in this scenario also provide benchmark estimates for lease payments received historically from private landowners in Texas.¹

Price deregulation: This scenario assesses the effects of federal controls on oil and gas production. We assume removal by 1976 of price controls on natural gas, pricing all Texas production at the decontrolled intrastate market price. Oil wellhead prices for this scenario equal the average cost of imported oil from 1974 to 1980.²

Oil price freeze, 1976 levels: An alternative federal policy to either the early price deregulation scenario or to the actual course of events would be a continuation through 1982 of wellhead price controls, maintaining the average wellhead prices of oil and gas at the real 1976 price levels. For oil, this scenario might also be thought of as a counterfactual market assumption of no real market price increase since 1976.

Oil price freeze, 1971 levels: This scenario maintains real wellhead prices at the levels prevailing in 1971, before the assertion of market power by OPEC. This scenario is better thought of as a counterfactual market price hypothesis, since it would have been almost impossible for federal controls to keep the average price that low given the historical supply-demand relationships.

Regional economic parameters: The regional economic scenario involves replacing the market prices of oil and gas and certain of the cost parameters in one producing region with those which prevailed historically in another region. This provides an opportunity to test the degree to which the size and distribution of economic rent might depend upon the regional costs and distance from centers of market demand. We include only drilling costs and operating costs among the cost variables replaced in this scenario, so results of this case underestimate the total effect of regional cost differences.

Regional tax policy: There are essentially three tax regimes prevailing in the regions analyzed in this study. Petroleum production from lands within state jurisdiction in Alaska and Texas are subject to the respective state tax systems as well as federal Windfall Profits and corporate income taxation. Production from the federal OCS (a large portion of the Texas Offshore region) is

subject only to federal taxation. We examine how application of a tax system prevailing in another region would have affected the distribution of regional economic rent.

Regional tax policy with market and cost parameters: This is simply a combination of the two other scenarios, replacing the price and cost environment of one region and its tax structure with the market parameters and tax structure of another.

Generation and Distribution of Economic Rent--Base Case Results

Tables 25 and 26 show the tabulation of total petroleum economic rent and its distribution for Alaska's Cook Inlet and North Slope regions over approximately the past twenty years. Table 27 shows the summary for other Alaska, essentially a tabulation of industry expenditures for exploration which has so far been unsuccessful. Tables 28 and 29 present the analogous tabulation of economic rent and its distribution for offshore and onshore Texas, respectively. More detailed results of the base case simulation of the model HISTOIL for each of the five regions are contained in Appendix E, Tables E.1 through E.5.

Cook Inlet, Alaska: Table 25 shows that the cumulative economic rent from oil and gas development in Alaska's Cook Inlet region, discounted to 1982 and expressed in 1982 dollars, was around 12 billion dollars.³ This constitutes 56 percent of the total revenue over this period. During the 1970s, regional economic rent averaged \$200 million to \$300 million per year. After decontrol of domestic oil prices, the total economic rent shot upward to \$900 million in 1981, despite declining production.

Royalties and excise taxes took roughly 22 to 25 percent of the economic rent in the 1970s, but with the advent of the federal Windfall Profits tax this share rose to over 60 percent. Bonus and rental payments constituted a relatively small portion of the rent and were not significant at all after 1973, accounting for 7 percent of the cumulative discounted economic rent for the twenty-year period.

Partly because of low effective excise tax rates, Cook Inlet production has been highly profitable according to the figures in Table 25. Roughly equal flows of income taxes and the producers' (after-tax) share consistently averaged around \$100 million per year, or nearly 40 percent each of total economic rent. This pattern is not altered by using after-tax profits instead of after-tax economic rents. Economic rents in the accounting framework of Tables 25 through 29 treat investment expenditures as cash flows, while they are depreciated in nominal dollars for the profits definition. Using a 10 percent real discount rate, producers have received a cumulative value of \$4 billion in 1982 dollars, or 12.4 percent of total capital invested (including bonus and rental payments) in oil and gas exploration and development in the Cook Inlet region.

TABLE 25
DISTRIBUTION OF ECONOMIC RENT FROM OIL AND GAS PRODUCTION
COOK INLET BASECASE
(millions of current dollars)

	Total Oil and Gas Revenue	Total Economic Rent	Royalties & Excise Taxes	Lease Bonus & Rental Payments	Income & Reserves Taxes	After-Tax Producers' Economic Rent	After-Tax Producers' Profits	Cumulative After-Tax Rate of Return
<u>CUMULATIVE, 1963-1971</u>	1730.7	561.6	261.1	112.4	69.1	119.0	143.1	0.116
1972.....	253.9	196.8	50.3	4.0	69.1	75.4	63.4	0.119
1973.....	281.3	214.2	51.8	27.1	74.1	61.2	91.4	0.122
1974.....	369.3	296.7	76.8	2.3	101.5	116.2	122.9	0.125
1975.....	412.9	324.3	79.8	1.2	113.5	129.8	139.1	0.127
1976.....	383.5	287.7	76.1	1.0	97.7	112.9	115.6	0.127
1977.....	357.0	273.3	73.2	0.7	94.8	104.6	93.2	0.127
1978.....	362.3	258.8	59.9	0.6	99.4	98.9	96.0	0.126
1979.....	371.3	261.7	56.7	0.5	103.4	101.1	94.3	0.126
1980.....	452.3	342.5	123.7	1.7	108.4	108.8	102.6	0.125
1981.....	1062.0	924.7	594.6	7.5	156.2	166.4	167.3	0.125
1982.....	885.0	723.4	467.4	4.6	113.8	137.5	146.6	0.124
<u>CUMULATIVE DISCOUNTED CASH FLOW, 1963-82 (IN 1982 DOLLARS)</u>	22073.6	12382.3	4601.4	871.9	3211.4	3697.6	3940.4	0.124
<u>CUMULATIVE, 1963-1982 WITH PARTIAL CAPITAL RECOVERY</u>		12562.1		1392.4		3356.9		

SOURCE: OUTPUT FILE HISTOIL COOK BASECASE