The Economic Impact of

Oil and Gas Production and Drilling

on the Oklahoma Economy

for

Oklahoma Commission on Marginally Producing Oil and Gas Wells

by

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INTRODUCTION

The oil and gas sector has served as the trademark industry of Oklahoma for much of the past century. Despite the ongoing contraction of the industry, oil and gas exploration and production remain important components of the Oklahoma economy. Along with providing a substantial number of high-paying jobs, oil and gas production generates a large stream of tax revenue to state and local governments. The oil and gas industry also has a substantial indirect impact on other Oklahoma industries due to the quantity of goods and services purchased from firms within the state.

This report evaluates the overall economic impact of oil and gas exploration and production activities on the Oklahoma economy. The report begins by exploring the historical role of the oil and gas industry in the state. Next, the current trends in employment, drilling, and production are examined. Finally, the overall economic impact of oil and gas drilling and production on the state economy is estimated, and forecasts of future activity through 2010 are presented.

HISTORICAL ROLE

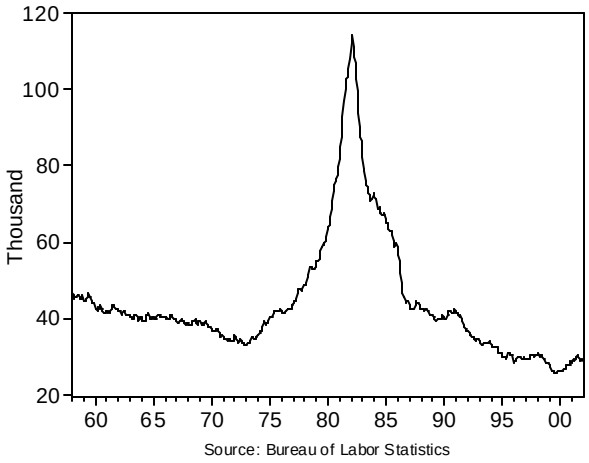
The historical dependence of the Oklahoma economy upon oil and gas production cannot be overstated. Towns throughout Oklahoma owe much of their heritage and current economic clout to the emergence of the industry in the twentieth century.

The influence of oil and gas was never more evident than in the oil boom years of the 1970s and early 1980s as oil and gas companies served as the financial engine behind the expansion of wealth in many Oklahoma cities. The unusual profitability of these companies not only allowed them to pay well above average state wages, but also provided the wherewithal to fund a large number of city development and philanthropic activities.

From 1975 to the height of the boom in 1982, oil and gas companies operating in Oklahoma tripled their payrolls from approximately 40,000 to nearly 120,000 wage and salary employees while riding the wave of high prices in the energy complex (Figure 1). In 1982, 1 in 12 state workers was employed in the oil patch. Perhaps most important, after lagging the nation for decades in per capita personal income, in 1982 the state jumped from a mere 85 percent of the national average to near parity with the nation in relative per capita income.

Unfortunately, the boom is over in Oklahoma, leaving the oil bust of the early 1980s as arguably the defining economic event in Oklahoma the past 50 years. Despite the diminishing role of the industry, the energy sector remains an important and vital element of the state's economy.

FIGURE 1
Oil and Gas Wage & Salary Employment, OK



INDUSTRY TRENDS

The Oklahoma oil and gas industry has undergone dynamic change the past two decades in response to weakening geological and market fundamentals. This section begins by examining the role of oil and gas workers in the state labor force, including trends in total employment and wage levels. The final two sections contain an evaluation of the trends in both crude oil and natural gas production along with Oklahoma's changing role in the national energy infrastructure.

Employment and Wages

More than 2,100 firms were engaged in oil and gas production and drilling in Oklahoma in 2000, ranging in size from one-employee operations to diversified multinational firms.[1] These firms employed an estimated 58,245 persons in 2000, or

[1] Oil and gas production includes SIC Industry Codes 131,132, and 1389. Drilling and exploration include SIC Industry Codes 1381 and 1382.

2.5% of the state workforce. Production jobs far outnumber drilling, with 88 percent, or 51,040 workers, engaged in the production of oil and gas and the remaining 12 percent, or 7,205 workers, employed on the drilling and exploration side.[2] The industry is also unique in its large share of self-employed persons relative to wage and salary employees. As shown in Table 1, the oil and gas workforce consists of an estimated 30,907 self-employed persons (53%) and 27,338 wage and salary employees (47%).

Total oil and gas employment, however, has declined almost continually since 1982, with oil and gas-related jobs contracting at an annual rate of 3.5% in the 1990 to 2000 period. Despite a shrinking industry workforce, oil and gas companies remain a significant source of high-paying jobs for Oklahomans, paying nearly double the average for all industries across the state. Total pay received by oil and gas wage and salary workers reached nearly $1.5 billion in 2000, or $53,151 annually per employee across the industry. Production jobs offered average annual pay of $54,645 in 2000, while exploration and drilling workers earned slightly less at $45,556 annually. As shown in Table 2, these wage rates rank oil and gas as the fourth highest paying of all private 2-digit SIC industries in the state, with energy-related sectors taking three of the top five slots.

[2] Total employment for 2000 is from the Oklahoma State Econometric Model. The ratio of self-employed to wage and salary workers is from IMPLAN 1999 data.

Table 1. Oklahoma Oil and Gas-Related Wage and Salary Employment, 2000

Industry Division	Employ-ment	Establish-ments	Total Wages	Average Annual Pay	Average Weekly Wage
SIC 13 Oil and Gas Extraction	27,338	2,146	$1,453,077,000	$53,151	$1,022
SIC 131 Crude Petroleum and Natural Gas	13,801	1,034	888,984,000	64,413	1,239
SIC 132 Natural Gas Liquids	170	24	10,490,000	61,859	1,190
SIC 138 Oil and Gas Field Services	13,367	1,088	553,603,000	41,414	796
SIC 1381 Drilling oil and gas wells	3,249	139	127,230,000	39,156	753
SIC 1382 Oil and gas exploration services	1,242	221	77,362,000	62,288	1,198
SIC 1389 Oil and gas field services, other	8,876	729	349,010,000	39,320	756

Source: Bureau of Labor Statistics ES-202 Covered Employment

Table 2. Highest Paying Oklahoma Industries (2-Digit SIC), 2000

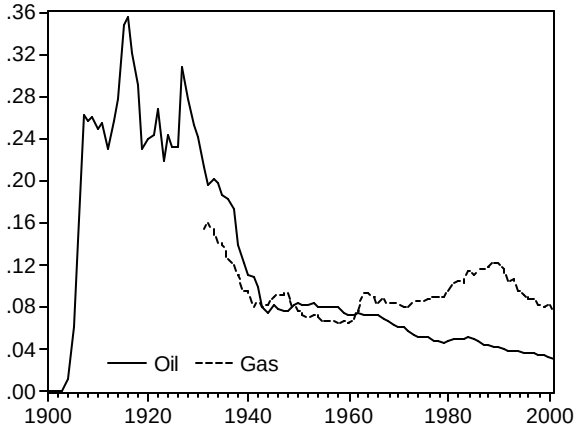
Industry Division	Average Annual Pay	Employment	Total Wages	Establish-ments
1. SIC 62 - Security and Commodity Brokers	$79,187	2,505	$198,344,000	573
2. SIC 46 - Pipelines, Except Natural Gas	66,995	855	57,291,000	37
3. SIC 29 - Petroleum and Coal Products	56,178	4,035	226,682,000	63
4. SIC 13 - Oil and Gas Extraction	53,151	27,338	1,453,077,000	2,146
5. SIC 81 - Legal Services	51,495	9,627	495,768,000	2,237
All Industries	$26,988	1,452,166	$39,191,626,000	89,298
Private Industries	26,617	1,173,312	31,229,958,000	84,082
Government	28,551	278,854	7,961,668,000	5,216

Source: Bureau of Labor Statistics ES-202 Covered Employment

Crude Oil and Natural Gas Production – Oklahoma versus U.S.

Oklahoma production of crude oil and condensate peaked in the 1927-29 period at an average of 250 million barrels per year, as the state's output share exceeded 30 percent of national production (Figure 2). Although the state's share of total domestic energy production has diminished greatly since the early years of the industry, Oklahoma's oil and gas fields remain an important component of the U.S. energy infrastructure.

FIGURE 2
Oklahoma Share of U.S. Oil & Gas Production



Source: Oklahoma Corporation Commission, U.S. Dept. of Energy

Much of the decline occurred in the 1930s when U.S. production began to outstrip the increasingly less productive Oklahoma oil fields, resulting in the state's share falling rapidly from 25% to 8% of national output. Since the early 1940s, Oklahoma's share has diminished at a slower but steady rate to approximately 3 percent of U.S. crude output, the smallest share of national output since 1903.

The state remains a more important player in the natural gas arena, producing within a narrow range of 6-12% of U.S. natural gas output since 1940. Oklahoma's share of the nation's gas output doubled from 6% to 12% in the 1960 to 1990 period, however it has slipped from 12% to 8% the past ten years.

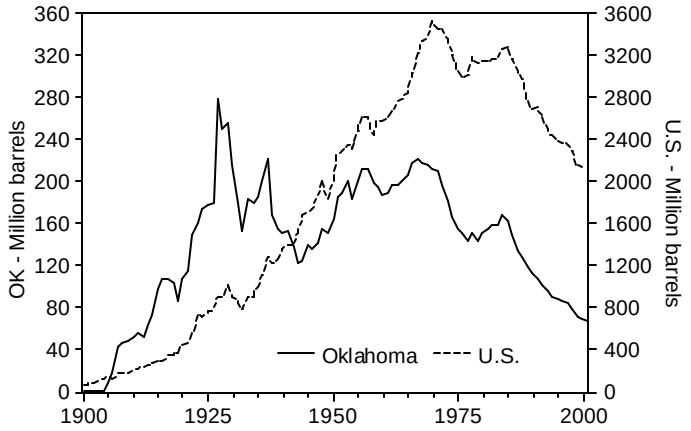
Crude Oil Production Trends

Figure 3 shows the level of Oklahoma and U.S. crude oil and condensate production over the past century. Oklahoma production has failed to keep pace with national output since 1960 and has declined almost without interruption since the late 1960s. Although the boom period was a highly visible economic event, it was reflected mostly in higher market prices, generating only a modest increase in output. The continuing maturation of the state crude oil industry due to weakening fundamentals is evident in recent crude production data, as total production in 2001 reached only 66

million barrels. This reflects a decline rate of 5.4% annually since the most recent production peak in 1984.

Although the state's share of national crude output has declined substantially, the trend in state production now more closely matches the decline rate for the nation. This has produced a slowing in the decline in Oklahoma's share of U.S. crude output since the early 1980s, currently stabilizing near 3% of national output.

FIGURE 3
Crude Oil and Condensate Production, OK & U.S.

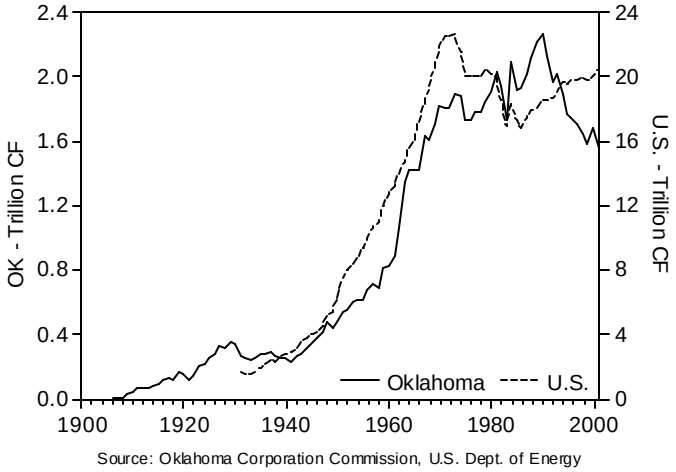


Source: Oklahoma Corporation Commission, U.S. Dept. of Energy

Natural Gas Production Trends

Oklahoma's casinghead and natural gas industry is also showing signs of maturing over the past decade, with production reaching only 1.6 trillion cubic feet (TCF) in 2001 after peaking at 2.26 TCF in 1990. Figure 4 highlights historical levels of natural gas production for Oklahoma and the nation since 1906, including the nearly 30% reduction in state gas output since 1990. While this represents a 3.3% annual decline rate since the 1990 peak, it is not as pronounced as the decline in state crude production in the same period. However, based on current market trends, Oklahoma natural gas production is poised to soon reach historical lows as a share of national output. This persistent downward trend in state gas production makes it

FIGURE 4
Casinghead and Natural Gas Production, OK & U.S.



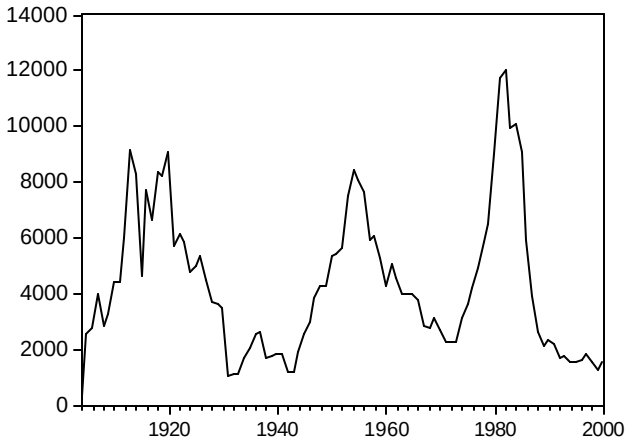
Source: Oklahoma Corporation Commission, U.S. Dept. of Energy

unlikely that Oklahoma will keep pace with total U.S. natural gas output, which has increased 1.3% annually since the 1986 trough in production.

Oil and Gas Drilling Activity

Drilling activity in Oklahoma is continuing its third major cycle of growth and decline this century, as illustrated in Figure 5. In its current phase, the industry is experiencing nearly 20 years of declining well completions. After reaching an all time peak of more than 12,000 new wells in 1982, drilling has declined steadily to an average of 1,563 new wells annually in the 1994 to 2000 period. The 1,264 wells completed in 1999 represent the slowest pace of drilling since 1943.

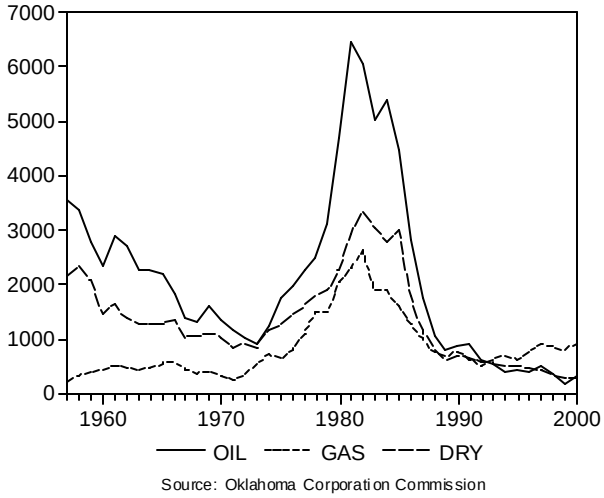
FIGURE 5
Total Well Completions, OK



Source: Oklahoma Corporation Commission

The mix of wells being drilled in Oklahoma has also undergone an important shift since the 1981-82 peak in exploration that reflects the diminishing role of crude oil production and the increasing emphasis on natural gas. As shown in Figure 6, since 1993 the trend has moved in favor of natural gas exploration, with gas well completions exceeding oil well completions by more than three to one in 1999 and 2000. Oil wells, which comprised more than 50% of total drilling activity (6,453 wells) in 1981, declined to less than 20% of drilling activity (400 wells per year) in the 1994 to 2000 period. Conversely, the 927 natural gas wells completed in 2000 represent more than 60% of the total wells drilled.

FIGURE 6
Well Completions by Type, OK



Source: Oklahoma Corporation Commission

The percentage of dry wells has also dropped to historically low levels in

recent years. Dry wells as a percentage of total well completions fell below 20% in 2000 and averaged a mere 21.5% of total completions in the 1997 to 2000 period. These results compare favorably with the average of 33% dry wells in the 40 years ended in 1996.

ECONOMIC IMPACT

Oklahoma oil and gas production and drilling has a far-reaching influence across the state economy. Oil and gas firms hire a large number of workers at an attractive pay scale and purchase a large quantity of inputs to production from other Oklahoma firms. These linkages create measurable economic multiplier effects, which provide estimates of the amount of total state economic activity supported by the oil and gas sector. These economic impacts are detailed in the following section, along with an estimate of the tax revenue generated for state and local governments.

Linkages to Other Oklahoma Industries

Oklahoma's oil and gas companies purchase a substantial quantity of goods and services from other Oklahoma-based firms. Table 3 provides an estimate of the purchases made by firms engaged in production and drilling activities within the state. Total inputs required by oil and gas companies were estimated at $3.757 billion in 1999, with 67.5%, or $2.54 billion, purchased from Oklahoma-based suppliers and the remaining 32.5% provided by producers either in other states or outside the U.S.

On the production side, purchases totaled $3.37 billion in 1999, of which an estimated 70%, or $2.32 billion, was supplied by Oklahoma based firms. Industries with the strongest link to the production side include oil and gas production ($780.9 million), maintenance and repair of oil and gas wells ($721.0 million), real estate ($381.7 million), utilities ($128.8 million), professional services ($34.4 million), finance and insurance ($29.3 million), chemicals and allied products ($29.0 million), transportation services ($28.3 million), wholesale trade ($28.1 million), and construction ($28.1 million).

Table 3. Inputs Used in Oklahoma Oil and Gas Production and Drilling, 1999

	Production		Drilling	
OKLAHOMA INPUTS: ($Millions)				
Farms	$0.020	0.00%	$0.000	0.00%
Ag Services	0.100	0.00%	0.000	0.00%
Oil And Gas Production	780.910	7.75%	0.000	0.00%
Non-Metal Mining	0.000	0.00%	0.040	0.01%
Construction	28.050	0.28%	0.000	0.00%
Maintenance And Repair Oil And Gas Wells	720.990	7.15%	0.000	0.00%
Wood Products	0.010	0.00%	0.330	0.05%
Printing And Publishing	0.030	0.00%	0.000	0.00%
Chemicals And Allied	28.970	0.29%	31.270	4.34%
Petroleum Products	18.860	0.19%	20.000	2.77%
Rubber Products	0.000	0.00%	0.010	0.00%
Stone, Glass And Clay	1.100	0.01%	6.510	0.90%
Primary Metals	0.910	0.01%	0.330	0.05%
Fabricated Metal	1.330	0.01%	3.060	0.43%
Industrial Machinery	12.420	0.12%	10.900	1.51%
Oil Field Machinery	9.380	0.09%	0.000	0.00%
Electrical Equipment	1.710	0.02%	5.140	0.71%
Transportation Equipment	0.070	0.00%	0.040	0.01%
Scientific Instruments	0.100	0.00%	0.000	0.00%
Transportation Services	28.310	0.28%	30.710	4.26%
Communications	8.240	0.08%	3.390	0.47%
Utilities	128.820	1.28%	3.700	0.51%
Wholesale Trade	28.060	0.28%	24.190	3.36%
Retail Trade	4.380	0.04%	0.700	0.10%
Eating & Drinking	6.800	0.07%	3.070	0.43%
Finance And Insurance	29.290	0.29%	11.650	1.62%
Real Estate	381.700	3.79%	5.370	0.75%
Hotels And Lodging Places	6.930	0.07%	2.650	0.37%
Personal Services	0.150	0.00%	0.000	0.00%
Business Services	25.810	0.26%	14.860	2.06%
Automotive Services	5.620	0.06%	2.150	0.30%
Repair Services	0.540	0.01%	0.000	0.00%
Recreation Services	1.230	0.01%	0.000	0.00%
Legal Services	26.390	0.26%	2.170	0.30%
Education Services	0.590	0.01%	0.000	0.00%
Non-Profit Organizations	1.340	0.01%	0.430	0.06%
Professional Services	34.420	0.34%	29.290	4.06%
State & Local Non-Ed Government	0.120	0.00%	0.000	0.00%
Oklahoma Input Demand	$2,323.750	23.05%	$211.980	29.40%
IMPORTED INPUTS:				
Imported Input Demand - U.S.	922.466	9.15%	159.561	22.13%
Imported Input Demand - Foreign	122.865	1.22%	16.605	2.30%
Total Imported Inputs	$1,045.331	10.37%	$176.166	24.43%
VALUE ADDED:				
Employee Compensation	1,468.881	14.57%	124.829	17.31%
Proprieter's Income	938.277	9.31%	88.601	12.29%
Other Property Income	3,624.752	35.96%	97.724	13.55%
Indirect Business Taxes	678.523	6.73%	21.687	3.01%
Total Value Added	$6,710.433	66.58%	$332.841	46.16%
TOTAL INPUTS	$10,079.514	100.00%	$720.987	100.00%

Source: IMPLAN Input-Output Model

Purchases related to drilling activity are significantly less, totaling $388.1 million, with Oklahoma based purchases making up 55% of the total. The strongest linkages to drilling activities are found in chemicals and allied products ($31.3 million), transportation services ($30.7 million), professional services ($29.3 million), wholesale trade ($24.2 million), petroleum products ($20.0 million), business services ($14.9 million), and industrial machinery ($10.9 million).

Multiplier Effects

The inter-relationships between the oil and gas industry and other state industries create measurable economic "multiplier" effects that can be estimated using the technique of input-output analysis.[3] The economic impact of an industry can be described using common measures of activity such as output, employment, and total value added (measured as the sum of employee compensation, proprietor's income, other property income, and indirect business taxes).

In estimating the economic impact, the actual level of economic activity in the oil and gas industry is deemed the "direct" effect, which in turn generates what are referred to as "indirect" and "induced" effects. The indirect effect is the economic activity in other industries resulting from the direct purchases of goods and services by the oil and gas sector described in Table 3. Induced effects reflect the economic activity resulting from new household spending out of employee compensation received as part of the direct and indirect effects.

Table 4 provides a summary of the estimated economic impacts, or the overall economic activity across the state supported by oil and gas production. The impacts are determined separately for both production and drilling activities and measured in 3 ways: (1) total economic impact, (2) impact per $1 million of final production, and (3) impact per 1,000 jobs in the industry.

Panel A of Table 4 contains estimates of the total impact of oil and gas production on output, employment, and value added in Oklahoma. Production activity within the state generated approximately $10 billion in output 1999 while simultaneously

[3] The IMPLAN input-output model is used to estimate the economic impact multipliers. All estimates are in constant 1999 dollars, representing the most recent year in which these data are available.

Table 4. Economic Impact of Oklahoma Oil and Gas Production and Drilling, 1999

A. Total

	Production				Drilling			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Output ($ Million)	$10,080	$3,128	$3,003	$16,210	$721	$297	$289	$1,307
Total Employment	51,040	25,341	44,817	121,198	7,205	2,981	4,311	14,498
Value Added: ($ Million)								
Employee Compensation	$1,469	$562	$891	$2,923	$125	$75	$86	$286
Proprieter's Income	938	267	171	1,377	89	23	16	128
Other Property Income	3,625	818	539	4,982	98	49	52	199
Indirect Business Taxes	679	180	176	1,035	22	12	17	51
Total Value Added	$6,710	$1,827	$1,778	$10,316	$333	$160	$171	$614

B. Per $1 Million in Final Output

	Production				Drilling			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Output	$1,000,000	$310,296	$297,895	$1,608,191	$1,000,000	$412,617	$400,635	$1,813,252
Total Employment	5.1	2.5	4.4	12.0	10.0	4.1	6.0	20.1
Value Added:								
Employee Compensation	$145,729	$55,795	$88,434	$289,959	$173,136	$103,852	$118,934	$395,923
Proprieter's Income	93,088	26,537	16,944	136,569	122,889	32,031	22,788	177,708
Other Property Income	359,616	81,131	53,494	494,241	135,541	68,058	71,944	275,543
Indirect Business Taxes	67,317	17,839	17,507	102,664	30,080	17,148	23,546	70,774
Total Value Added	$665,750	$181,302	$176,381	$1,023,432	$461,647	$221,090	$237,212	$919,949

C. Per 1,000 Jobs

	Production				Drilling			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Output	$197,481,904	$61,277,773	$58,828,899	$317,588,574	$100,067,624	$41,289,571	$40,090,622	$181,447,817
Total Employment	1,000	497	878	2,375	1,000	414	598	2,012
Value Added:								
Employee Compensation	$28,778,916	$11,018,523	$17,464,201	$57,261,641	$17,325, 352	$10,392,253	$11,901,474	$39,619,078
Proprieter's Income	18,383,108	5,240,516	3,346,211	26,969,834	12,297,163	3,205,301	2,280,370	17,782,835
Other Property Income	71,017,592	16,021,810	10,564,169	97,603,571	13,563,295	6,810,412	7,199,254	27,572, 960
Indirect Business Taxes	13,293,890	3,522,960	3,457,401	20,274,251	3,010,058	1,715,998	2,356,144	7,082,199
Total Value Added	$131,473,506	$35,803,810	$34,831,981	$202,109,296	$46,195,868	$22,123,963	$23,737,242	$92,057,072

Source: IMPLAN Input-Output Model

supporting an additional $6.13 billion of indirect and induced output of goods and services in other industries. Drilling activity contributed $721 million in direct output along with $586 million in indirect and induced output. The multiplier effects for employment indicate that the 58,245 workers in the production and drilling sectors support an additional 77,451 jobs outside the oil and gas industry, or a total of 135,696 jobs statewide. Total value added in the production process reached $6.71 billion for oil and gas production and $4.65 billion for drilling in 1999, leading to additional multiplier effects of $3.61 billion and $4.62 billion in value added for production and drilling, respectively.

The multiplier effects as measured in the more familiar terms of economic impact per $1 million in final output and per 1,000 jobs are shown in Panels B and C of Table 4. In panel B, the estimated economic impact multipliers indicate that each $1 million in production of oil and gas supports an additional $608,191 of total output of goods and services, while $1 million in drilling activity generates $813,252 of indirect and induced output across Oklahoma. Total compensation of $534.8 million paid to both wage and salary and self-employed production and drilling workers supports an additional $465.3 million in earnings to state workers in other industries. The economic impact per 1,000 jobs is shown in Panel C of Table 4. Each 1,000 production jobs supports an additional 1,375 state workers, while 1,000 drilling jobs generate 1,012 induced and indirect jobs.

The impact multipliers also allow the modeling of the case of further contraction of jobs in the industry. The estimates indicate that the loss of 1,000 production jobs results in a direct decline in compensation to wage and salary and self-employed workers of $47.2 million, along with an indirect and induced ripple effect that eliminates an additional 1,375 jobs and further reduces earnings across the state by $37.1 million. The loss of 1,000 drilling jobs has a smaller estimated impact but nonetheless directly reduces state payrolls by $29.6 million. The indirect and induced effects result in the loss of 1,017 supported jobs along with indirect and induced payroll declines in other industries totaling $27.8 million.

Gross Production Tax Revenue

The oil and gas sector is unique among other state industries in the high level of tax revenue generated directly and indirectly for state and local governments. The largest source of revenue is the state Gross Production Tax on oil and gas and is shown in Table 5 by type of production for the fiscal years 1984 to 2001.

Gross production taxes generated an average of $417 million annually in revenue for the state for the 15 years ended in 2001[4]. The makeup of the tax stream has changed from a mostly equal contribution from both oil and gas in the early 1980s to a reliance on casinghead and natural gas for more than 70% of gross production receipts the past 10 fiscal years.

Table 5. Oklahoma Gross Production Tax Revenue by Source

Fiscal Year	Crude Oil & Condensate			Casinghead & Natural Gas			Total Gross Production Tax
	Crude Oil	Condensate	Total	Casinghead	Natural Gas	Total	
1984	303,610,624	23,282,382	326,893,006	69,315,575	286,539,964	355,855,539	682,748,545
1985	285,473,251	22,727,068	308,200,319	75,260,424	290,832,698	366,093,122	674,293,441
1986	220,297,216	16,415,608	236,712,824	65,289,347	223,601,402	288,890,749	525,603,573
1987	130,995,815	11,181,736	142,177,551	43,934,332	162,086,429	206,020,761	348,198,312
1988	143,652,768	12,127,090	155,779,858	41,771,695	173,863,443	215,635,138	371,414,996
1989	120,026,206	10,606,847	130,633,053	40,016,904	192,274,066	232,290,970	362,924,023
1990	130,393,838	11,974,790	142,368,628	38,017,117	210,394,767	248,411,884	390,780,512
1991	159,744,240	14,218,995	173,963,235	37,662,524	187,549,636	225,212,160	399,175,395
1992	125,422,115	10,392,340	135,814,455	34,998,589	171,935,840	206,934,429	342,748,884
1993	113,919,143	9,792,408	123,711,551	40,285,091	218,136,204	258,421,295	382,132,846
1994	85,854,529	7,838,261	93,692,790	37,593,247	215,310,536	252,903,783	346,596,573
1995	91,280,919	8,678,270	99,959,189	30,152,379	152,314,290	182,466,669	282,425,858
1996	95,712,814	9,374,852	105,087,666	32,639,317	173,739,159	206,378,476	311,466,142
1997	110,279,904	10,718,323	120,998,227	41,341,575	228,492,466	269,834,041	390,832,268
1998	81,882,770	7,231,552	89,114,322	35,136,525	218,482,287	253,618,812	342,733,134
1999	40,767,333	2,595,494	43,362,827	26,727,682	173,355,457	200,083,139	243,445,966
2000	115,612,320	4,996,480	120,608,800	30,238,673	262,310,789	292,549,462	413,158,262
2001	134,151,635	4,937,874	139,089,509	51,965,175	513,358,319	565,323,494	704,413,003

Source: Oklahoma Tax Commission

[4] The reported revenues are reduced somewhat by the temporary reduction in oil severance tax rates enacted in fiscal year 1999 in response to low market prices for oil and inflated by the temporary spike in natural gas prices in fiscal year 2001.

Table 6 highlights the distribution of gross production taxes the past two fiscal years. The production tax on oil currently is allocated by the legislature in the indicated proportions to fund a range of infrastructure (22.84%) and educational (77.16%) initiatives. A minor portion of the production tax on natural gas is allocated to county highway repair (7.14%) and local school districts (7.14%), while the majority is distributed to the state's general revenue fund (85.72%).

Table 6. Distribution of Oklahoma Gross Production Tax Receipts

Gross Production Tax on Oil

Fund	Allocation %	FY-2000	FY-2001
To Counties for Highways	7.14	8,611,468	9,930,991
To Local School Districts	7.14	8,611,468	9,930,991
County Bridge & Road Improvement Fund	4.28	5,162,057	5,953,031
Water Resources Board Fund	4.28	5,162,057	5,953,031
Common Education Technology Fund	25.72	31,020,583	35,773,822
Higher Education Capital Fund	25.72	31,020,583	35,773,822
Tuition Scholarship Fund	25.72	31,020,583	35,773,822
Total	100.00	$120,608,800	$139,089,509

Gross Production Tax on Natural Gas

Fund	Allocation %	FY-2000	FY-2001
General Revenue Fund	85.72	250,773,399	484,595,299
To Counties for Highways	7.14	20,888,032	40,364,097
To Local School Districts	7.14	20,888,032	40,364,097
Total	100.00	$292,549,462	$565,323,494

Source: Oklahoma Office of State Finance, Oklahoma Tax Commission

Other Tax Revenue

The total amount of tax revenue attributable to Oklahoma's oil and gas industry extends beyond the direct revenue paid by the industry through the gross production tax. Other direct taxes paid as a result of oil and gas related activity must be considered in measuring the full economic impact of the industry and are detailed in Table 7.

Total estimated tax revenue generated as a result of oil and gas production and drilling activity in Oklahoma totaled $750.3 million in fiscal year 2000. The gross production tax is the largest single source, representing 55% of the total. The next largest category is sales and use tax receipts, representing 22.5% of the total and generating an estimated $169.0 million in revenue to state ($100.5 million) and local ($68.5 million) governments. The remaining tax revenue sources include the corporate income tax ($17.8 million), motor vehicle taxes ($42.1 million), and personal income taxes ($108.2 million). Because these taxes support a broad array of government-provided goods and services, further contraction of the industry will result in reductions in these important revenue streams and force any resulting shortfall to be made up from alternative sources.

Table 7. Estimated OK Tax Revenues Attributable to Oil and Gas Production and Drilling
(Fiscal Year 2000)

	Tax Revenue	% of Total
Gross Production Tax:		
Oil	$115,612,320	15.41%
Condensate	4,996,480	0.67%
Natural Gas	262,310,789	34.96%
Casinghead Gas	30,238,673	4.03%
Total Gross Production Tax	413,158,262	55.07%
Personal Income Tax	108,171,797	14.42%
Corporate Income Tax	17,849,406	2.38%
Motor Vehicle Tax	42,112,520	5.61%
Sales and Use Tax:		
State	100,462,336	13.39%
Local	68,523,932	9.13%
Total Sales and Use Tax	168,986,268	22.52%
Total Tax Revenue	$750,278,251	100.00%

Source: Oklahoma Office of State Finance, Oklahoma Tax Commission, Oklahoma State Econometric Model, IMPLAN Input-Output Model

FORECASTS OF OIL AND GAS ACTIVITY THROUGH 2010

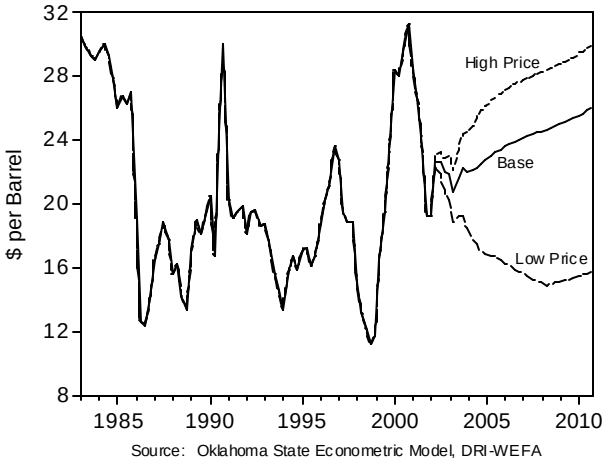
This section presents forecasts of Oklahoma crude oil and natural gas production for the period 2002 to 2010 developed using the Oklahoma State Econometric Model, a large-scale econometric forecasting model developed and maintained by the College of Business Administration at Oklahoma State University. The Model provides information on the probable performance of the Oklahoma economy in upcoming years.

The following three forecast scenarios are presented for both oil and gas production: (1) a base case projection using DRI-WEFA's[5] long-range energy price forecast, (2) an optimistic case based on historically high energy prices, and (3) a pessimistic case based on historically low energy prices. The scenarios are generated by alternating the price series and resolving the Model forecasts through 2010.

Energy Price Scenarios

The three price scenarios for crude oil and natural gas are shown in Figures 7 and 8. The base forecasts for both crude oil and natural gas are derived using the March 2002 energy price forecast of DRI-WEFA. For crude oil in Figure 7, the base case price increases gradually from the current level of approximately $23/barrel to more than $26/barrel by the end of 2010. The high price scenario for crude follows the same growth pattern as the base case, but reaches $29.50/barrel by 2010. This price level represents the 95th percentile of the historical range of crude oil prices in the 1983 to 2001 period. The low price scenario represents a decline to the 5th percentile of the same historical range by the end of 2007, followed by a return to the upward trend of the base case through 2010.

FIGURE 7
Crude Oil and Condensate Price Scenarios

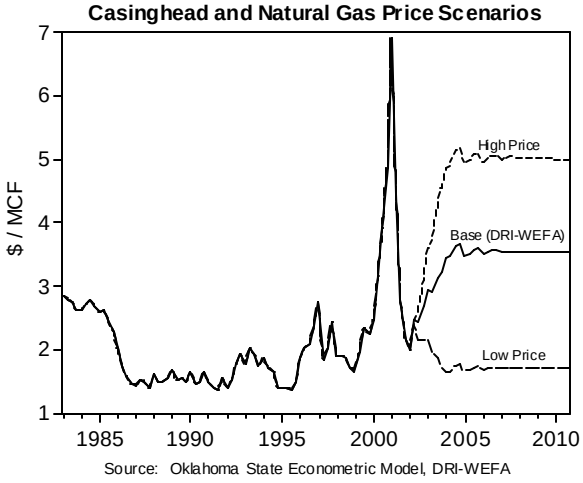


Source: Oklahoma State Econometric Model, DRI-WEFA

[5] DRI-WEFA, Lexington, MA, provides forecasts of regional, national, and international economic conditions. These forecasts serve as inputs into the Oklahoma State Econometric Model.

Base case natural gas prices, shown in Figure 8, increase to $3.65/MCF by the end of 2004 and then remain constant with only seasonal variation through 2010. The high price scenario for natural gas follows the same growth trend as the base case but reaches $5.00/MCF by the end of 2004 and then remains constant with only seasonal variation through 2010. $5.00/MCF represents the 95th percentile of the historical price range in the 1983 to 2001 period. The low price scenario calls for gas prices to fall to $1.50/MCF by the end of 2004, the approximate average price for natural gas in the 1987 to 1995 period of historically low gas prices, and then remain constant with only seasonal variation through 2010.

FIGURE 8
Casinghead and Natural Gas Price Scenarios



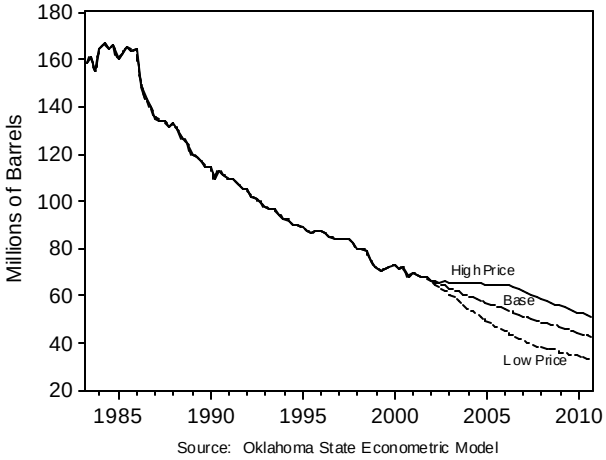
Source: Oklahoma State Econometric Model, DRI-WEFA

Crude Oil and Condensate Production – 2002 to 2010

Figure 9 highlights the three forecast scenarios through 2010 for crude oil and condensate production along with actual output levels since 1983. The base forecast for crude oil suggests a continuation of the current decline in output, with crude production falling approximately 35% to $42.5 million barrels annually by 2010. This output level equates to an expected decline rate of nearly 5.0% annually through 2010, a small improvement over the 5.4% annual decline rate experienced since 1984.

Under the high price scenario of nearly $30/barrel, the annual decline rate moderates temporarily to 0.7% through 2004 and then resumes a 4.0%

FIGURE 9
Forecast of OK Crude Oil and Condensate Production



Source: Oklahoma State Econometric Model

decline rate as the rate of growth in prices slows through 2010, reaching a total production level of 51.02 million barrels per year in 2010. The high price crude oil output forecast is 20% above the base case in 2010.

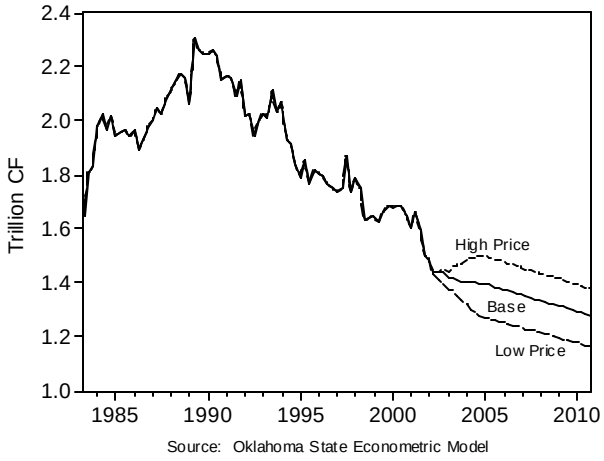
Conversely, under the low price scenario, the decline rate accelerates to 7.5% annually in the period 2002 to 2010, with total production falling to only 33.07 million barrels in 2010. This output level is 22% below the base case forecast in 2010.

Casinghead and Natural Gas Production – 2002 to 2010

The forecast scenarios for natural gas production are shown in Figure 10 and present a somewhat less severe contraction than that predicted for crude oil. The base case forecast, with gas prices rising to $3.65/MCF by year-end 2004, calls for a 17% decline in gas production from 1.56 trillion cubic feet (TCF) in 2001 to 1.29 TCF in 2010. This reflects a base case decline rate of 2.3% through 2010, an improvement relative to the 3.3% decline rate experienced since the 1990 peak in production.

The high price scenario of $5.00/MCF provides a more favorable outlook, with total output falling to 1.38 TCF in 2010, a level 7% above the base case forecast. Production under the high price scenario manages to increase at an annual rate of 0.2% through 2004, then reverses course and returns to approximately the same decline rate as the base case in 2005 once the price increase is fully digested by the industry.

FIGURE 10
Forecast of OK Casinghead and Natural Gas Production



Source: Oklahoma State Econometric Model

The low price scenario, based on gas prices declining to approximately $1.50/MCF, results in total output of only 1.17 TCF in 2010. Under this scenario, output declines 5.0% annually through 2004, then returns to approximately the same decline rate as the base case in 2005 once the price decline is absorbed by the industry. This results in a natural gas output level 9.3% below the base case forecast in 2010.

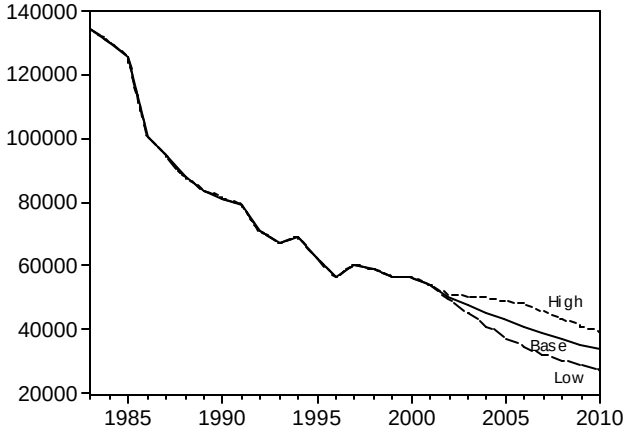
Economic Impact of Production Forecasts

The economic impact of the forecasts for oil and gas production on the state economy is estimated in this section. The joint impact of changes in both oil and gas production is modeled under three scenarios. The first assumes that both base case price forecasts from the prior section are realized. The remaining two scenarios examine the best and worst case outcomes where either the two high price scenarios or the two low price scenarios occur simultaneously.

The direct impact is measured as the expected change in total oil and gas employment that is suggested by the forecasts for oil and gas production in the prior section. The employment forecasts are formed in two stages. First, a linear regression of total oil and gas employment on both oil and gas production levels in the 1984 to 2001 period is estimated. Forecasts of employment in the 2002 to 2010 period are then formed using the estimated regression equation along with the forecasts of oil and gas production. Indirect and induced employment effects are then estimated using the economic impact multipliers from Table 4.

Figure 11 illustrates the expected path of total oil and gas employment for the three scenarios. The variation in the impact of the three cases on oil and gas employment is substantial. Under the base case scenario of a 35% decline in annual crude output to 42.5 million barrels and a 17% reduction in annual natural gas output to 1.29 TCF, a 42% decline in total oil and gas employment to 33,671 workers is expected by 2010, a loss of approximately 24,574 direct jobs. Assuming all other influences are held constant, an additional 32,438 indirect and induced jobs would be eliminated in other areas of the state economy.

FIGURE 11
Total Oil and Gas Employment by Forecast Scenario



Source: Oklahoma State Econometric Model, Bureau of Economic Analysis

The outcome is more positive under the high price scenario as employment is projected to decline to 39,181, or a loss of 33% of the current industry workforce. These 19,064 lost jobs provide support for an additional

25,164 jobs across the state. The low price scenario produces a contraction much more severe than the base case as 53% of oil and gas jobs are eliminated, leaving only 27,370 workers in the industry in 2010. These lost jobs would potentially impact an additional 40,755 jobs statewide.

SUMMARY

Oklahoma's oil and gas industry has long played a prominent role in the state's economy. The success of the early oil and gas industry spawned rapid and sustained economic development throughout most areas of the state. Although the explosive growth of the industry enjoyed through the oil boom has since transitioned to the gradual decline of a maturing industry, oil and gas exploration and drilling continue to exert an important influence on state economic activity.

This influence is felt despite the diminishing productivity of Oklahoma's oil and gas fields. The state continues to produce 8% of the nation's natural gas and 3% of the nation's crude oil and will remain an important component of the national energy infrastructure for decades. The influence of natural gas is likely continue to increase in importance relative to crude oil.

The industry likewise remains a significant source of jobs, providing employment for more than 58,000 self-employed and wage and salary workers in 2000, or 2.5% of the state workforce. These workers earned total income of more than $2.6 billion in 2000. These jobs, however, have been shrinking at a rate of 3.5% annually in the 1990 to 2000 period. The economic impact of the job losses is particularly troubling because oil and gas wage and salary workers continue to rank among the highest paid workers statewide, earning an average of more than $53,000 annually in 2000.

Because the industry provides a large number of jobs at above-average wage rates, the performance of the oil and gas industry will continue to some degree to govern the fortunes of the overall state economy. This is due in large part to the strong linkages the industry has with other industry sectors within the state. Oklahoma's oil and gas companies purchased an estimated $2.5 billion in goods and services from Oklahoma-based suppliers in 1999. These inter-relationships create multiplier effects

that have a significant indirect impact on the overall state economy. Measured in terms of employment and income, the state's 58,245 oil and gas workers support an estimated 77,451 additional jobs outside the oil and gas industry with total earnings of $2.1 billion.

The industry also generates a large amount of tax revenue for state and local governments. The most important of these tax streams is the gross production tax, generating an average of more than $400 million annually to state government over the past fifteen fiscal years. Other taxes generated directly by oil and gas concerns pushed total estimated tax revenue to state and local governments above $750 million in fiscal year 2000.

Forecasts of future production suggest a continuing slow contraction of Oklahoma oil and gas output. Base case forecasts suggest a 35% decline in annual crude production to 42.5 million barrels and a 17% reduction in annual natural gas output to 1.29 TCF by 2010. The multiplier effects of the base case reductions are projected to result in the loss of nearly 25,000 direct oil and gas jobs, along with more than 32,000 indirect jobs statewide by 2010.

SUMMARY OF THE ECONOMIC IMPACT
OF THE OKLAHOMA OIL AND GAS INDUSTRY

- 3% of the nation's domestic crude oil and 8% of the nation's domestic natural gas is produced in Oklahoma
- 2,100 firms are engaged in oil and gas production and drilling statewide
- Oklahoma's oil and gas producers employ more than 58,000 workers, or 2.5% of the total state workforce
- Oil and gas concerns generated $2.6 billion in income for self-employed and wage and salary workers in 2000
- Oil and gas wage and salary jobs paid more than $53,000 per year in 2000, approximately double the pay of the average private sector job in Oklahoma
- The state oil and gas industry purchased an estimated $2.54 billion in inputs from Oklahoma-based suppliers in 1999
- Oklahoma's 58,000 oil and gas workers support an estimated 77,000 additional jobs in other industries in Oklahoma
- Oil and gas producers paid more than $400 million annually in gross production taxes on average the past 15 years
- The oil and gas industry and its employees generated approximately $750 million in total direct tax revenue to state and local governments in fiscal year 2000