

# Competition and Performance in Lease Sales and Development in the U.S. Gulf of Mexico OCS Region, 1983–1999

*Wumi Iledare*  
*Center for Energy Studies*  
*Louisiana State University*

# Outline of Presentation

- Overview
- Data & Method of Analysis
- Development Performance Measures
- Closing Remarks
- References & Acknowledgments

# Purpose of the Study

The purpose of this study is to characterize petroleum resource development in the U.S. Gulf of Mexico using physical and economic performance indicators.

# Data & Method of Analysis

- The study is based on 13,964 leases issued from 1983–1999 and developed not later than 2004.
- Variables considered as central in the determination of performance expectations were incorporated in the study.
  - Such variables include
    - water depth,
    - bidding structure and conduct,
    - bonus size,
    - E&P firm type and size,
    - MMS planning area.
- The framework adopted is such that each annual portfolio of leases is treated as a unique but interdependent investment decision by firms at different points in time.

# Data: OCS Lease Ownership & Structure

<b>Rank</b>	<b>Public_Company_Name</b>	<b>Share</b>	<b>Share</b>	<b>Rank</b>
<b>1983</b>		<b>1983</b>	<b>2003</b>	<b>2003</b>
<b>1</b>	BP	17.5	10.7	2
<b>2</b>	ChevronTexaco	10.8	9.7	3
<b>3</b>	ExxonMobil	9.9	8.4	4
<b>4</b>	Shell	6.4	11.9	1
<b>5</b>	Tenneco Oil Company	5.1	0.3	-
<b>6</b>	ConnocoPhillips	4.1	4.0	6
<b>7</b>	Four Star Oil & Gas Company	2.8	0.1	-
<b>8</b>	Placid Oil Company	2.1	0.3	-
<b>9</b>	Unocal Exploration Corporation	2.1	3.2	7
<b>10</b>	Amerada Hess	2.0	2.3	-
<b>11</b>	Aminoil Inc.	1.9	0.0	-
<b>12</b>	Marathon	1.8	1.0	-
<b>13</b>	Total	1.8	1.0	-
<b>14</b>	TXP Operating Company	1.7	0.1	-
<b>15</b>	Anadarko	1.7	2.5	9
<b>16</b>	Odeco Oil & Gas Company	1.6	0.2	-
<b>17</b>	ORYX	1.6	0.0	-
<b>18</b>	PG&E Resources Offshore Company	1.6	0.1	-
<b>19</b>	Kerr-McGee	1.4	2.4	10
<b>20</b>	Santa Fe International	1.4	0.3	-
<b>21</b>	Non-Top 20 Firms	20.56	41.65	

# Lease Ownership & Structure in U.S. GOM: Firm Identity Matters

	1983		2003	
1983Rank	PUB ID	MMS ID	PUB ID	MMS ID
<i>Top 4</i>	44.60	28.80	40.60	16.20
<i>Big 5-8</i>	14.10	16.40	4.60	3.80
<i>Big 9-20</i>	20.70	25.60	13.10	16.50
<i>All Others</i>	20.56	29.19	41.65	63.60
2003Rank				
<i>Top 4</i>	44.60	16.60	40.60	23.60
<i>Big 5-8</i>	6.30	11.60	14.10	11.20
<i>Big 9-20</i>	8.90	10.10	18.80	22.10
<i>All other</i>	40.26	61.63	26.48	43.13

# OCS Lease Ownership & Structure

- Influx of new players in the U.S. OCS:
  - an indication of low barrier to entry
- The region remains very attractive to big firms:
  - Portraying stability and attractiveness
- But company identity matters in lease development:
  - Competition

# Development Performance Measures: Prospectivity Index

- Prospectivity is the multiplicative product of drilled lease ratio (LDR) and the ratio of successful drilled leases (SLDR)
- LDR is number of drilled leases (NDL) divided by leases issued (NLI)
- $SLDR = 1 - \text{Failure Rate (DFR)}$
- $DFR = 1 - SLDR / NDL$

# Lease Prospectivity Index in the U.S. GOM by Firm Type & Size

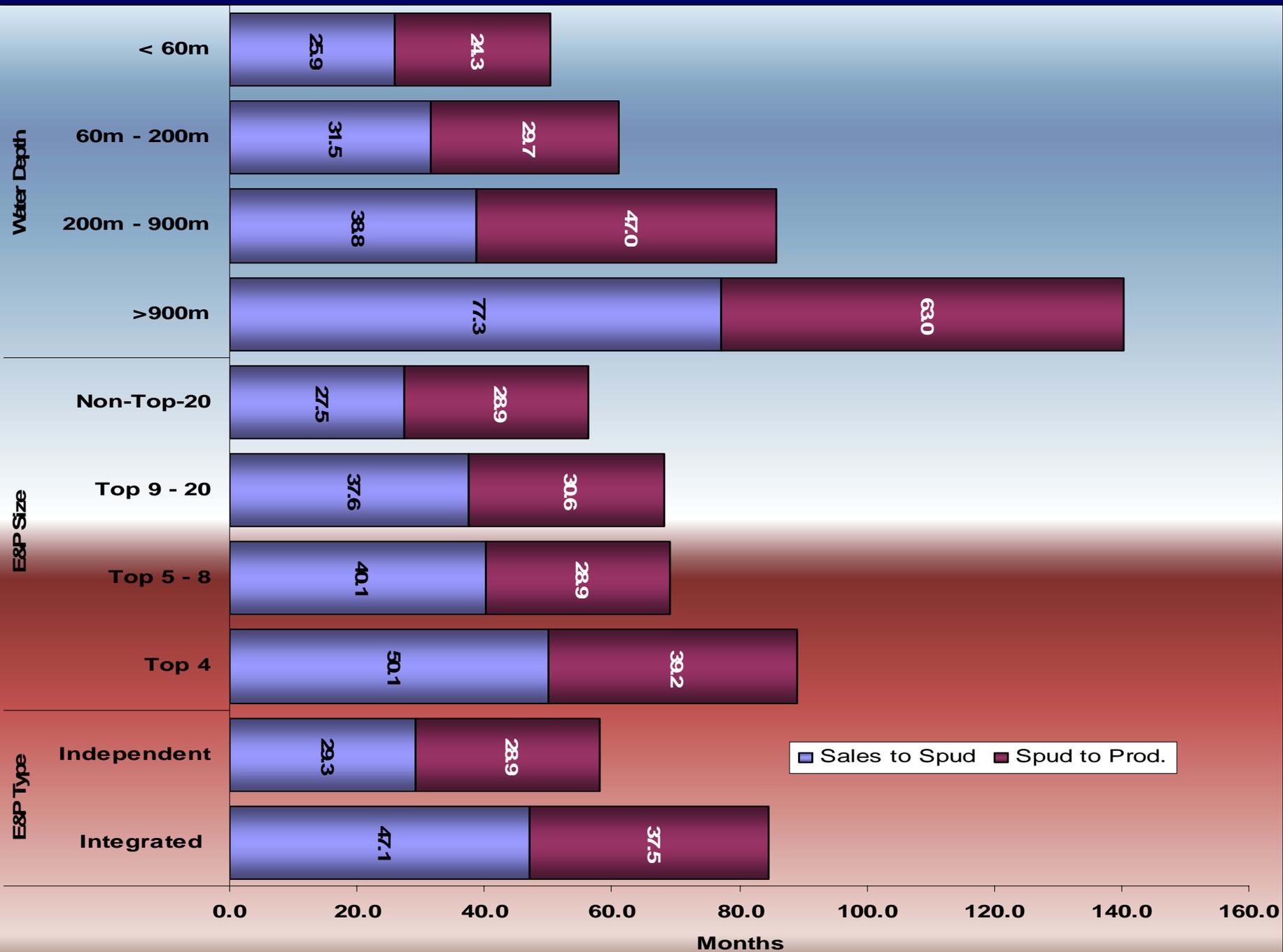
				Lease Prospectivity		
				Drilled	Development	Lease
	Leases			Ratio	Index	DFR
Group/Lease Category	Issued	Drilled	Producible	(%)	(%)	(%)
<b><u>All</u></b>	13,641	3,581	1,553	26.25%	11.38%	56.63%
<b><u>Firm Size</u></b>						
<i>Top4</i>	5,675	907	281	15.98%	4.95%	69.01%
<i>Top5-8</i>	1,937	414	200	21.37%	10.32%	51.69%
<i>Top9-20</i>	2,510	741	334	29.54%	13.30%	54.98%
<i>Top21-last</i>	3,515	1,517	737	43.16%	20.97%	51.40%
<b><u>Firm Type</u></b>						
<i>Independent</i>	6,508	2,339	1,166	35.93%	17.91%	50.15%
<i>Integrated</i>	7,128	1,240	386	17.40%	5.42%	68.87%

# Lease Prospectivity Index in U.S. GOM by Water Depth and Bonus Size

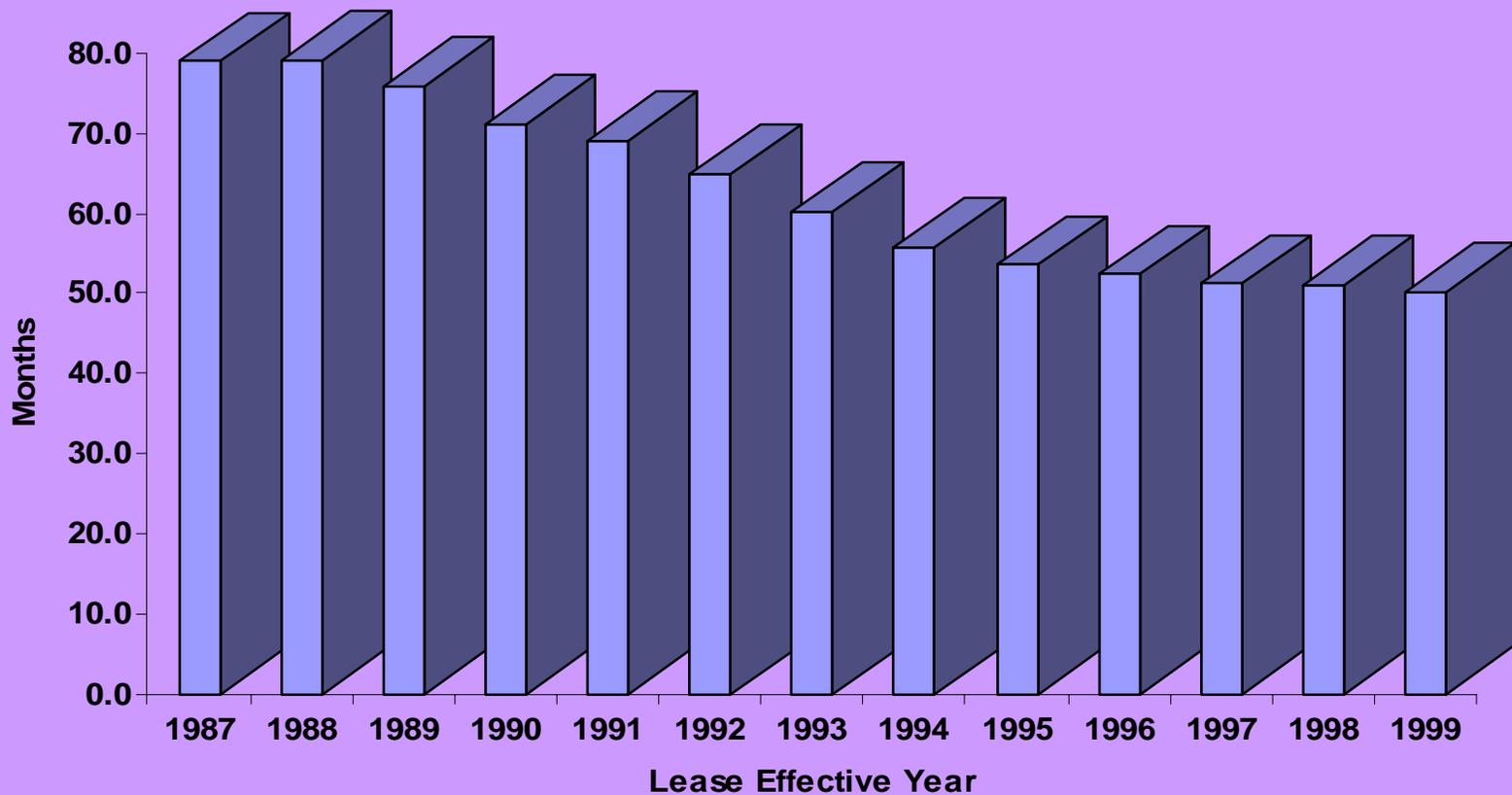
Group/Lease Category	Leases Issued	Leases		Lease Prospectivity		
		Drilled	Producible	Drilled Ratio (%)	Development Index (%)	Lease DFR (%)
<b>All</b>	13,641	3581	1553	26.25%	11.38%	56.63%
<b>Water Depth</b>						
<i>Depth ≤ 60m</i>	5365	2116	1018	39.44%	18.97%	51.89%
<i>60m &lt; Depth ≤ 200m</i>	2183	768	313	35.18%	14.34%	59.24%
<i>200m &lt; Depth ≤ 900m</i>	2143	430	141	20.07%	6.58%	67.21%
<i>Depth &gt; 900m</i>	3950	267	81	6.76%	2.05%	69.66%
<b>Bonus Size</b>						
<i>Bonus ≤ \$200,000</i>	3528	419	190	11.88%	5.39%	54.65%
<i>Bonus ≤ \$400,000</i>	3249	521	220	16.04%	6.77%	57.77%
<i>Bonus ≤ \$1,000,000</i>	2749	747	324	27.17%	11.79%	56.63%
<i>Bonus &gt; \$1,000,000</i>	3768	1877	817	49.81%	21.68%	56.47%

# Expeditious Development Index in the U.S. GOM

- The index reflects the perception of lease owners regarding lease economic potential
  - Three measures:
    - Time between sales and spud (months)
    - Time between sales and production
    - Time between spud and production
- The timing of lease sales is quite important
  - Rig availability impact
  - Crude oil and natural gas price dynamics

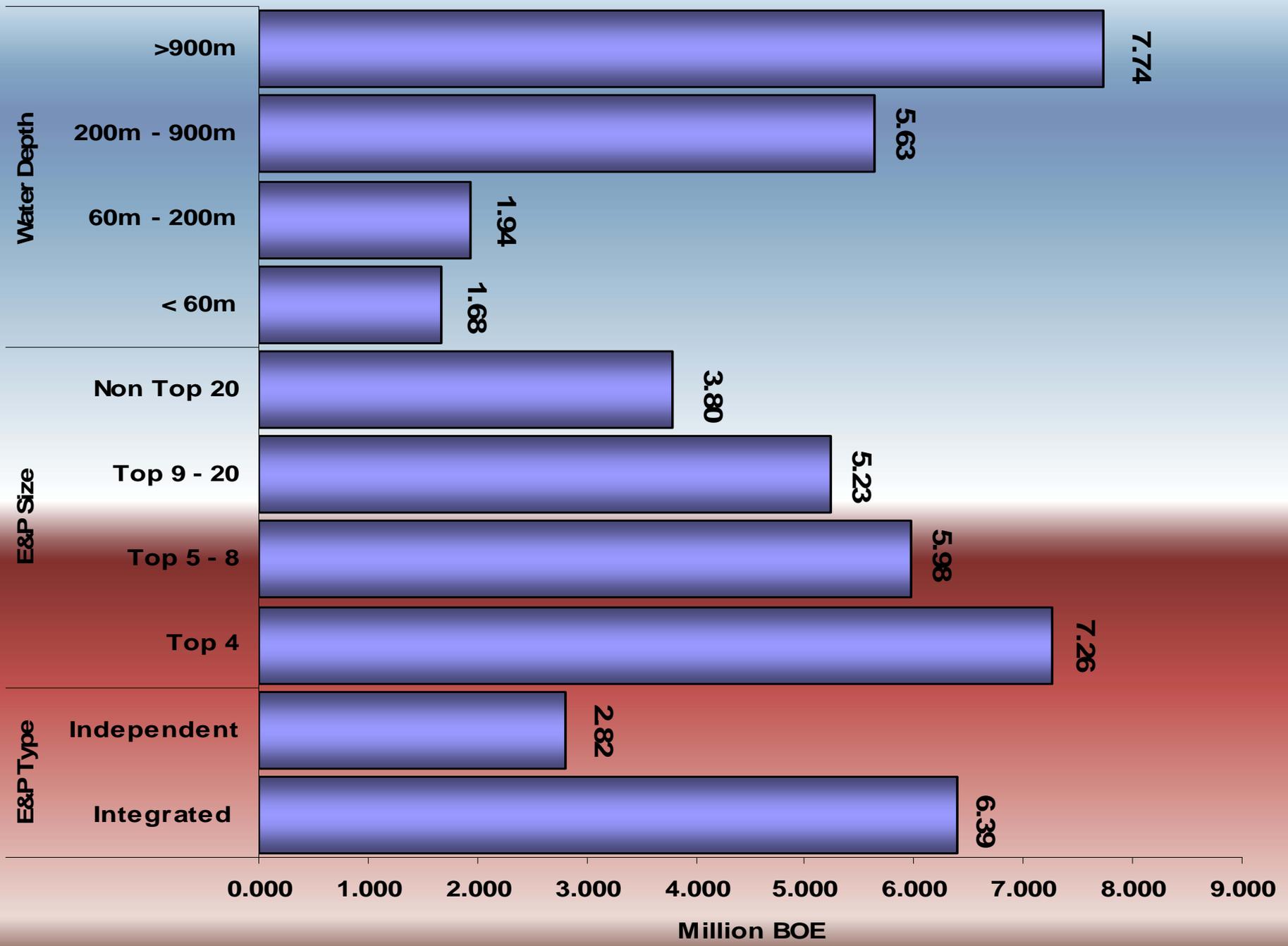


# Lag from Lease Sales to Production

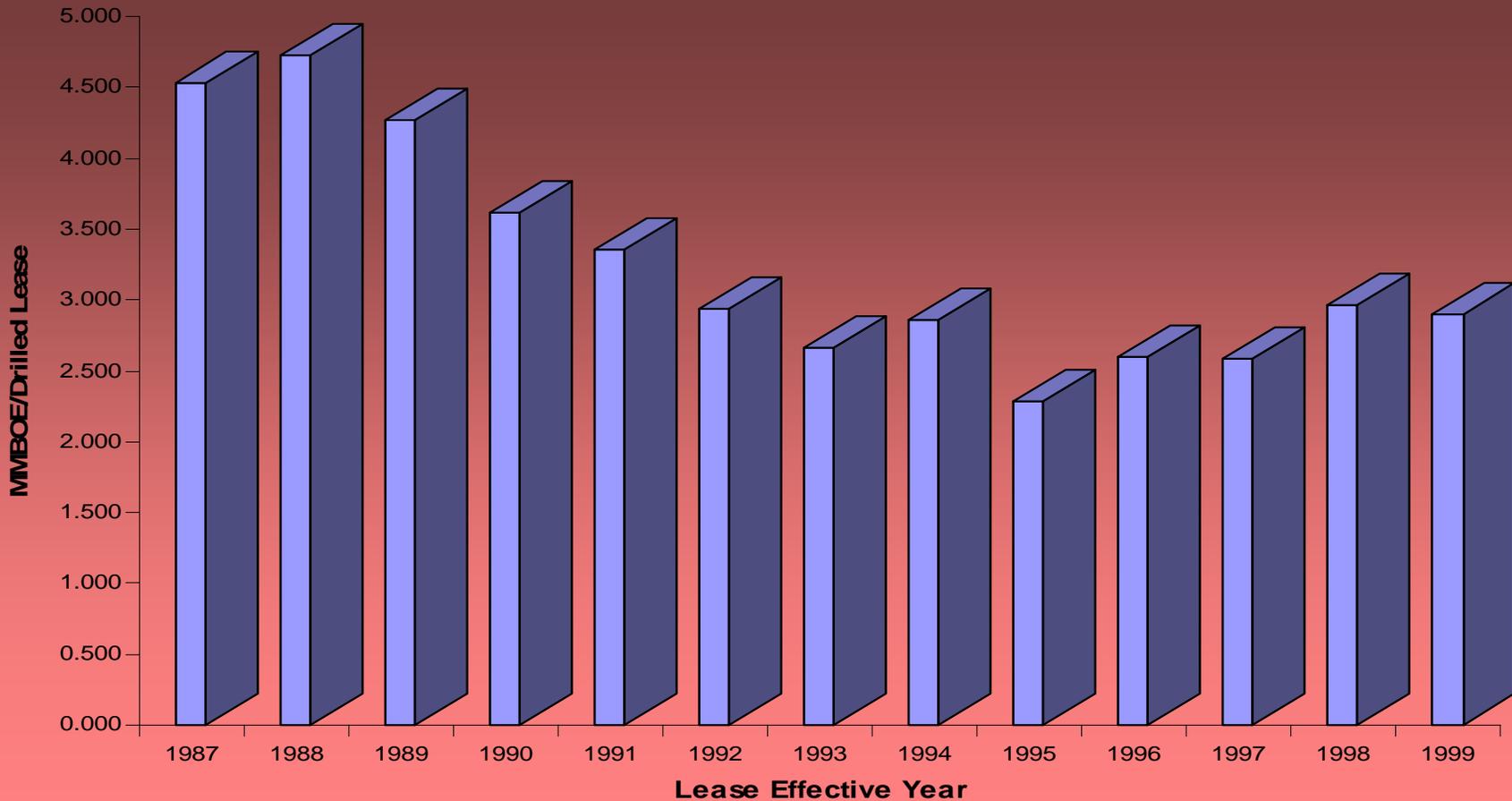


# Lease Development Productivity in the U.S. GOM, 1983–2004

- Ultimate hydrocarbons producible per lease drilled declines with time in the aggregate for leases issued in the U.S. GOM from 1983–1999 and developed as of 2004.
- Productivity trends vary by firm size, water depth, and by other category.
  - Why?



# Trend in Lease Development Productivity in the U.S. GOM



# Economic Performance Indicators

- PV provides an absolute measure for evaluating net worth of a project.
- Rate of return measures the optimal use of capital funds.
- Profitability index measures the amount of discounted future operating cash per dollar invested.

# Present Value Estimation

- DCF Model Specification:

$$\pi (f, F) = \sum_{t=0}^k \frac{R (t) - C (t)}{(1 + D)^t}$$

- R (t) is estimated gross annual revenue
- C (t) is estimated annual total costs,
- D is the rate of discount
- Internal rate of return is defined as  $D = D^*$ , which makes  $PV = 0$ .
- $\pi$  present value of profit

# Profitability Index

Profitability index, or investment efficiency ratio, normalizes the value of the project relative to the total investment such that:

$$PI(f, F) = \frac{PV(f, F)}{PV(TC)}$$

# Present Value & IRR

For lease  $f$  and the fiscal regime denoted by  $F$ , the present value and internal rate of return of the cash flow vector  $NCF(f)$  is computed as

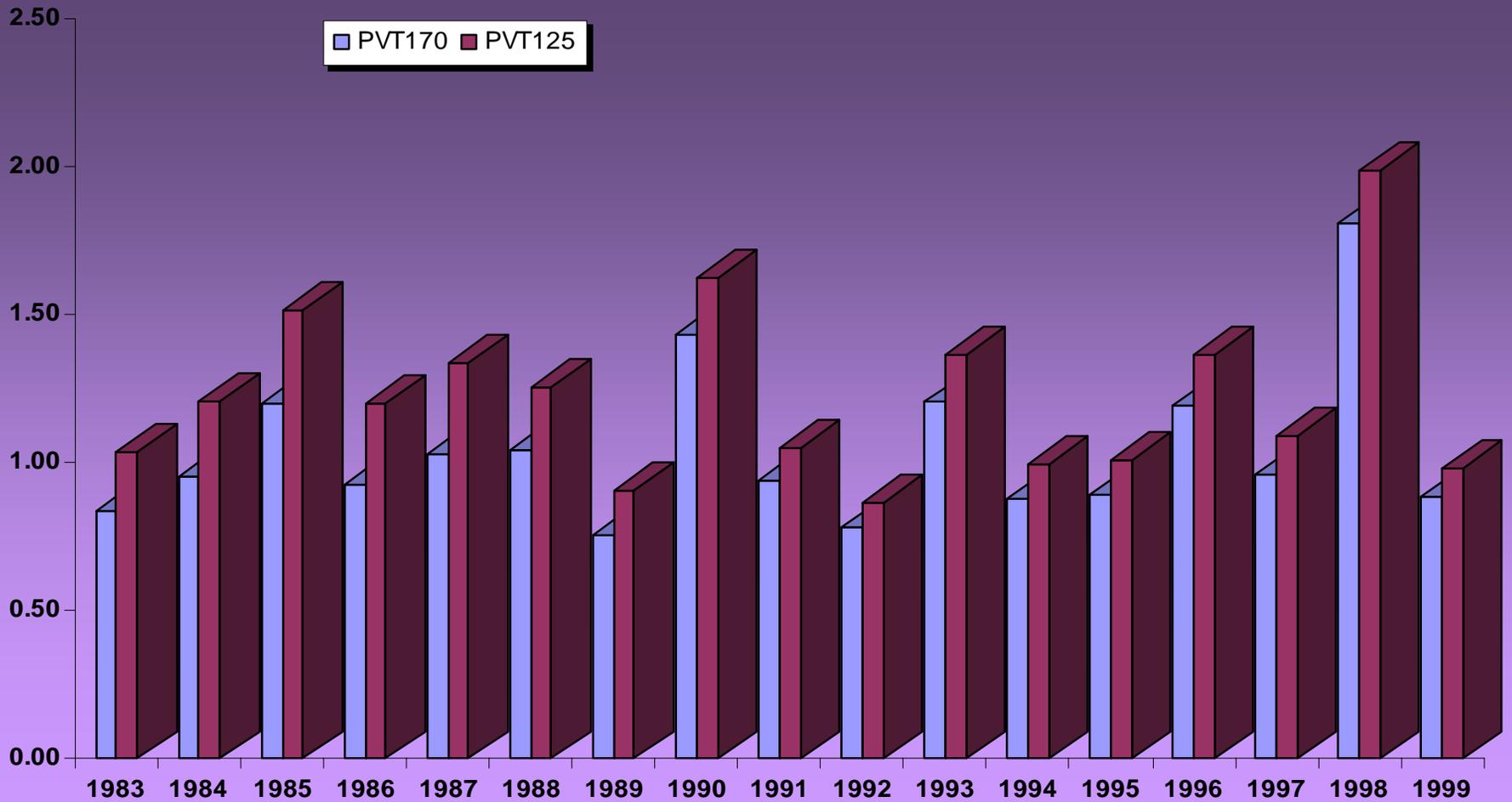
$$PV(f, F) = \sum_{t=1}^k \frac{NCF_t}{(1 + D)^{t-1}}$$

$$IRR(f, F) = \{D \mid PV(f, F) = 0\}$$

			Aggregate Gross		Undiscounted		
		Average	Value of Production		Aggregate Net Cash		
	Leases	Bonus (\$M) per	(\$M) Per Lease <sup>a</sup>		Flow (\$M) Per Lease <sup>a</sup>		IRR
Lease Category	Issued	Lease	Historical	Ultimate	Historical	Ultimate	(%)
<i>Top4</i>	5675	\$1,261	\$15,146	\$24,334	\$4,078	\$10,071	10.22%
<i>Top5-8</i>	1937	\$832	\$7,968	\$11,177	(\$1,562)	\$386	1.20%
<i>Top9-20</i>	2510	\$1,092	\$14,891	\$24,694	\$737	\$6,753	8.32%
<i>Top21-last</i>	3515	\$1,405	\$12,724	\$22,289	(\$3,978)	\$1,535	1.62%
<i>Depth &lt; = 60m</i>	5365	\$1,262	\$10,560	\$14,703	(\$2,850)	(\$583)	-
<i>60m &lt; Depth &lt; = 200m</i>	2183	\$1,593	\$12,264	\$16,375	(\$4,281)	(\$1,985)	-
<i>200m &lt; Depth &lt; = 900m</i>	2143	\$1,500	\$23,787	\$37,189	\$7,463	\$15,882	12.49%
<i>Depth &gt; 900m</i>	3950	\$762	\$12,430	\$26,777	\$4,196	\$13,574	20.86%
<i>Bonus &lt; = \$200,000</i>	3528	\$152	\$4,316	\$9,753	(\$546)	\$2,840	9.36%
<i>Bonus &lt; = \$400,000</i>	3249	\$278	\$3,751	\$7,299	(\$1,525)	\$619	2.39%
<i>Bonus &lt; = \$1,000,000</i>	2749	\$657	\$12,178	\$21,499	\$136	\$5,919	8.81%
<i>Bonus &gt; \$1,000,000</i>	3768	\$3,387	\$32,469	\$48,350	\$3,994	\$13,866	6.87%
<i>Independent Firms</i>	6508	\$1,132	\$12,008	\$20,114	(\$2,652)	\$2,099	2.76%
<i>Integrated Firms</i>	7128	\$1,274	\$14,778	\$23,734	\$3,542	\$9,341	9.92%

			Aggregate Gross		Undiscounted		
	Productive	Average	Value of Production		Aggregate Net Cash		
	Leases	Bonus (\$M) per Lease	(\$M) Per Leasea		Flow (\$M) Per Leasea		IRR
Lease Category		Lease	Historical	Ultimate	Historical	Ultimate	(%)
<i>Top4</i>	281	\$5,401	\$305,881	\$491,453	\$128,323	\$249,352	17.99%
<i>Top5-8</i>	203	\$1,320	\$76,025	\$106,654	\$3,807	\$22,399	10.61%
<i>Top9-20</i>	335	\$1,826	\$111,571	\$185,017	\$22,642	\$67,711	14.32%
<i>Top21-last</i>	747	\$1,999	\$59,874	\$104,882	(\$7,001)	\$18,941	5.41%
<i>Depth&lt;=60m</i>	1030	\$2,397	\$55,002	\$76,584	(\$4,819)	\$6,990	3.10%
<i>60m&lt;Depth&lt;=200m</i>	314	\$2,310	\$85,265	\$113,842	(\$12,483)	\$3,482	1.16%
<i>200m&lt;Depth&lt;=900m</i>	141	\$3,555	\$361,526	\$565,215	\$154,081	\$282,031	23.25%
<i>Depth&gt;900m</i>	82	\$2,580	\$598,785	\$1,289,847	\$320,841	\$772,590	34.87%
<i>Bonus &lt;= \$200,000</i>	194	\$146	\$78,496	\$177,358	\$9,204	\$70,768	16.81%
<i>Bonus &lt;= \$400,000</i>	224	\$286	\$54,408	\$105,863	(\$2,268)	\$28,825	10.52%
<i>Bonus &lt;=\$1,000,000</i>	326	\$676	\$102,693	\$181,295	\$19,139	\$67,905	15.85%
<i>Bonus &gt;\$1,000,000</i>	821	\$4,373	\$149,018	\$221,905	\$38,351	\$83,661	12.39%
<i>Independent Firms</i>	1179	\$1,763	\$66,282	\$111,028	(\$2,695)	\$23,532	7.07%
<i>Integrated Firms</i>	386	\$4,693	\$272,902	\$438,276	\$109,753	\$216,847	17.96%

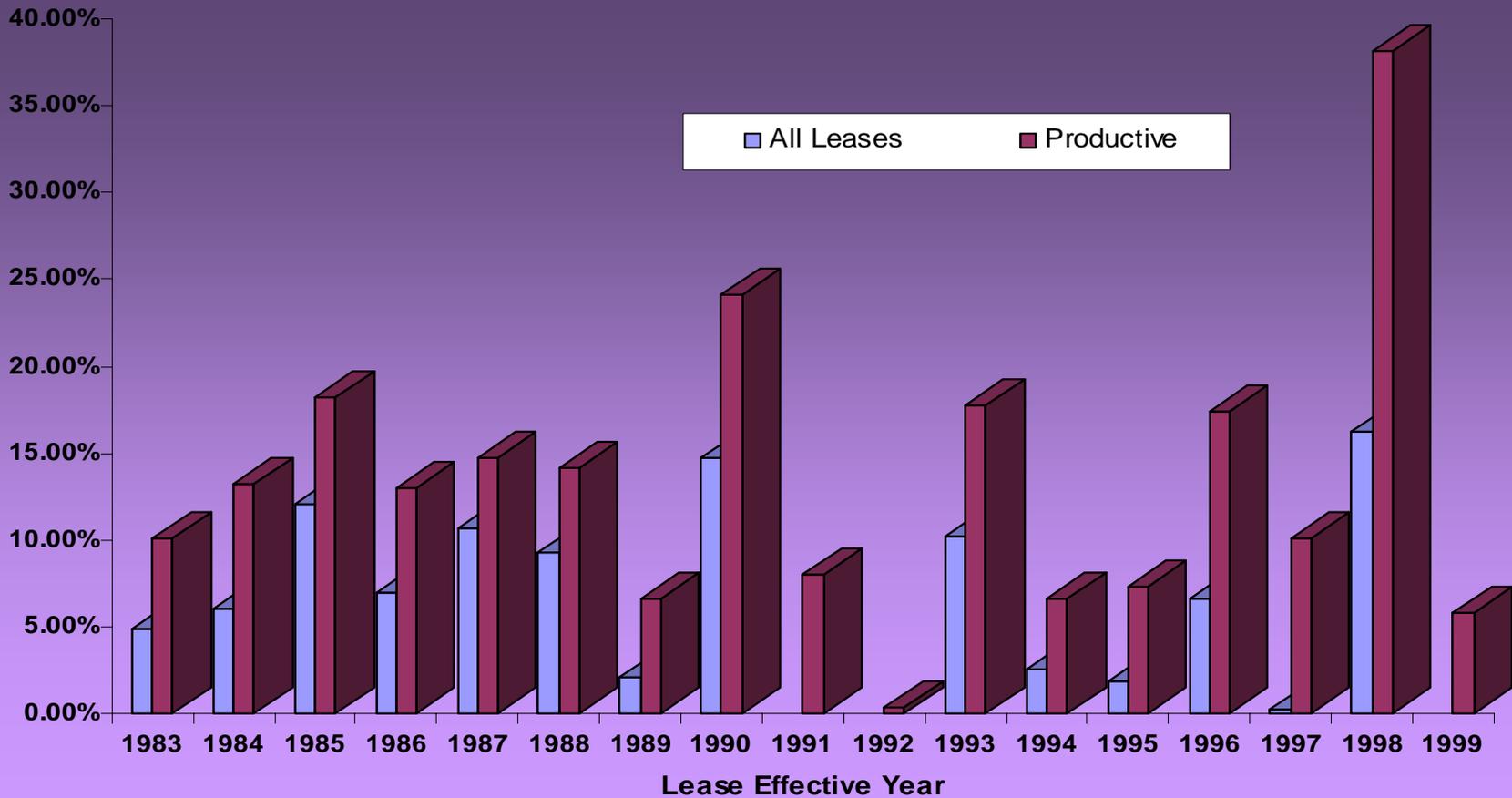
# Lease Profitability Index

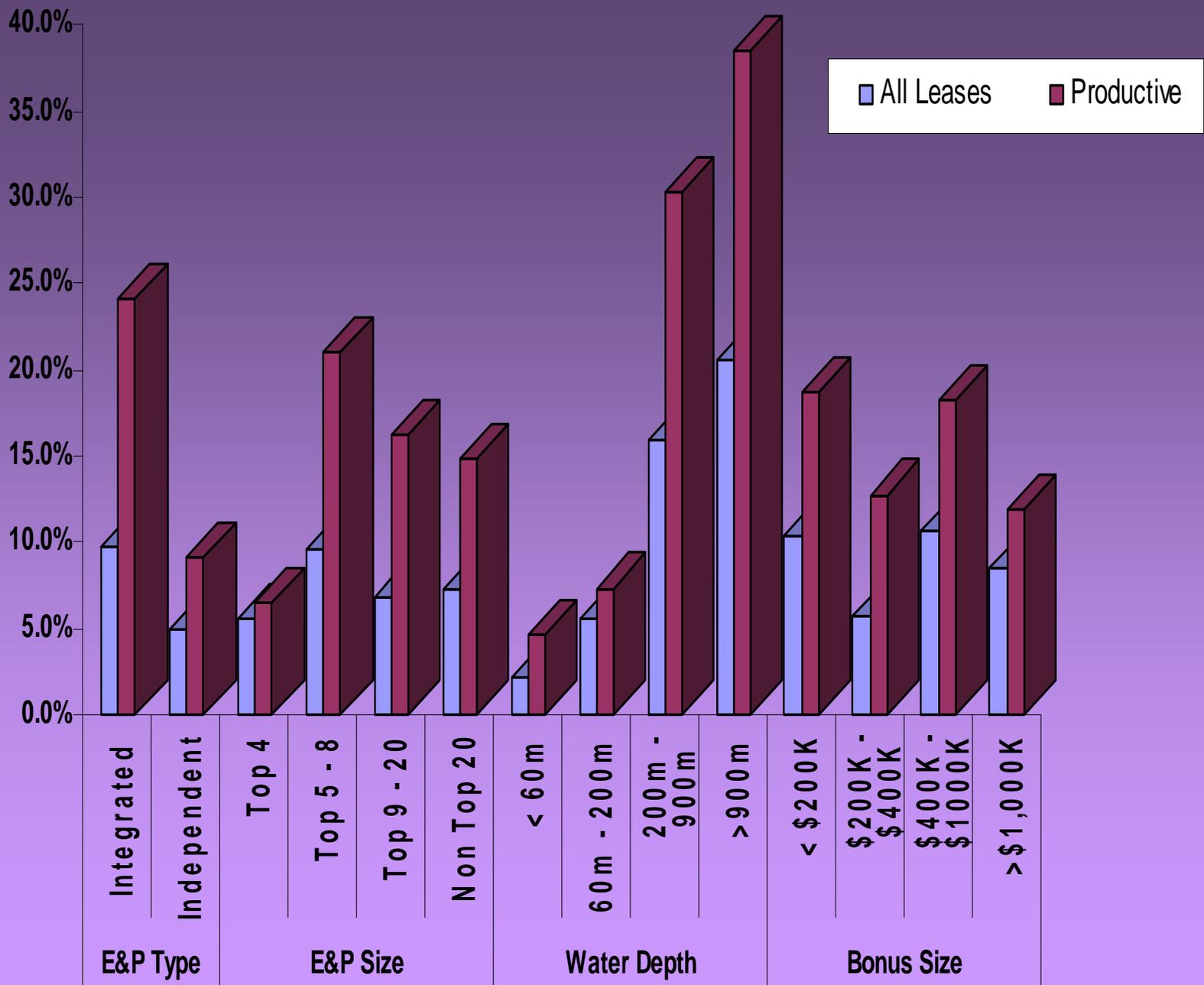


# Bonus Payment & Profitability

		<i>Profitability Index (Total Investment Minus Bonus)</i>		<i>Profitability Index (Total Investment)</i>	
<b>Group</b>	<b>Lease Category</b>	<b>17.00%</b>	<b>12.50%</b>	<b>17.00%</b>	<b>12.50%</b>
E&P Type	Integrated	<b>1.33</b>	<b>2.13</b>	0.69	0.96
	Independent	<b>1.04</b>	<b>1.41</b>	0.57	0.72
E&P Size	Top 4	<b>1.32</b>	<b>2.14</b>	0.70	0.97
	Top 5 - 8	<b>1.19</b>	<b>1.61</b>	0.63	0.77
	Top 9 - 20	<b>1.50</b>	<b>2.10</b>	0.76	0.95
	Non Top 20	0.89	<b>1.22</b>	0.50	0.64
Water Depth	< 60m	0.91	<b>1.19</b>	0.52	0.63
	60m - 200m	0.72	0.99	0.43	0.55
	200m - 900m	<b>1.71</b>	<b>2.86</b>	0.83	<b>1.16</b>
	>900m	<b>4.81</b>	<b>7.41</b>	<b>1.38</b>	<b>1.70</b>
Bonus Size	< \$200K	<b>2.23</b>	<b>3.01</b>	0.82	<b>1.01</b>
	\$200K - \$400K	<b>1.54</b>	<b>1.98</b>	0.64	0.77
	\$400K - \$1000K	<b>1.79</b>	<b>2.47</b>	0.79	0.99
	>\$1,000K	<b>1.06</b>	<b>1.56</b>	0.60	0.80

# Trends in E&P Economic Indicators (IRR)





# Conclusions

- The changing pattern of lease ownership in the Gulf of Mexico shows a significant influx of new players in the bidding process for OCS leases over time.
  - There is, however, significant evidence to suggest that the attractiveness of the Gulf of Mexico OCS to the big four E&P firms remains strong.
- Approximately one out of nine leases produces hydrocarbons in the Gulf of Mexico OCS, but variations in lease prospectivity within different groups are evident.
- The study shows declining trends over time in the average lag from lease sales to production.

# Conclusions (continued)

- The overall aggregate productivity per drilled lease is declining with lease effective year.
- The impact of bonus payments on the economic performance of lease development on the OCS is found to be significantly regressive.
- In general, the estimated rates of returns for all categories of leases are relatively low when compared to reported return value in the U.S. manufacturing sector during the period.
- We observed, however, that in the aggregate, leases issued in the early 1990s have higher annual rate of return on average than leases issued in the late 1980s.