

Empirical Analysis of the Economics of Deepwater Development in the Gulf of Mexico

*Dr. Omowumi O. Iledare, SPE
Professor & Director Energy Information*



Baton Rouge, LA 70803

Outline of Presentation

- **Overview**
- **GOM Deepwater within Global Context**
- **US Deepwater Lease Development**
- **Development Economics**
- **Closing Remarks**

Purpose of the Study

- The purpose of this study is to characterize deepwater petroleum operations in the U.S. Gulf of Mexico (GOM) economic performance indicators.

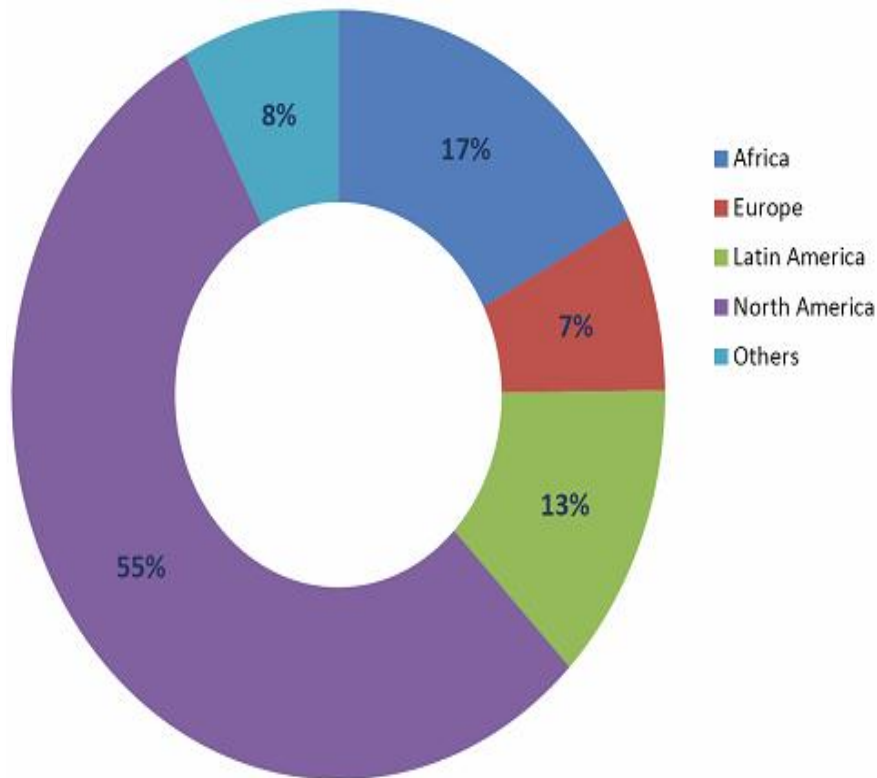
Data & Method of Analysis

- The study is based on 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.
- 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.

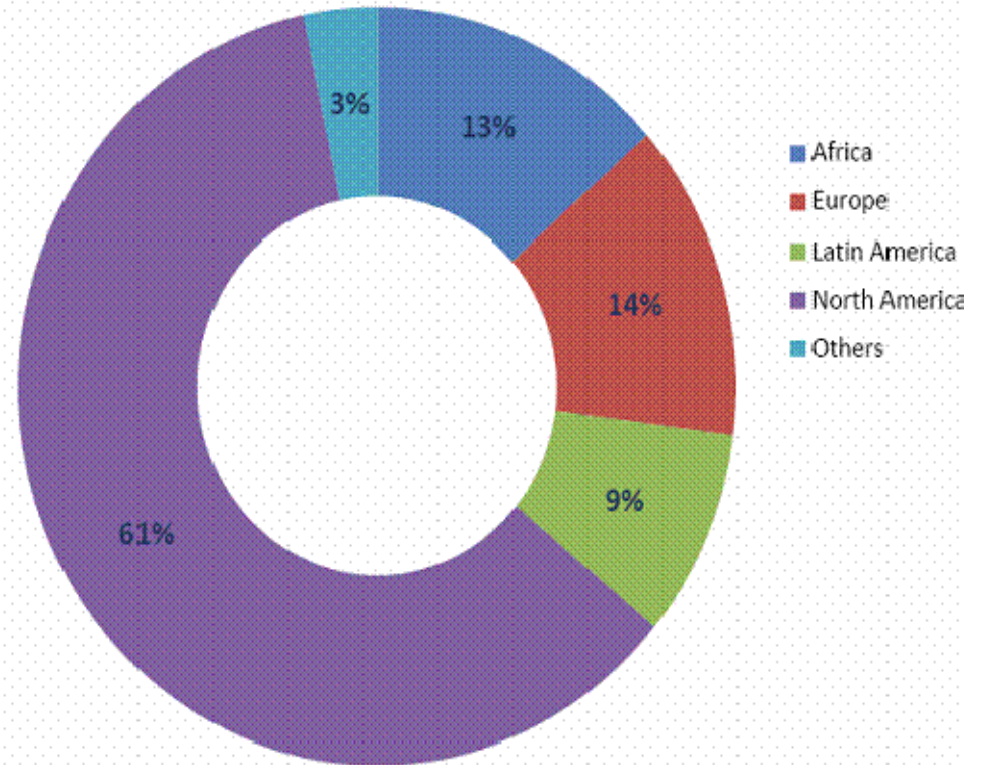
Distribution of Discovered Worldwide Deepwater Fields, 1983-2007

Distribution of Worldwide Deepwater Fields, 1983-2007

Discovered



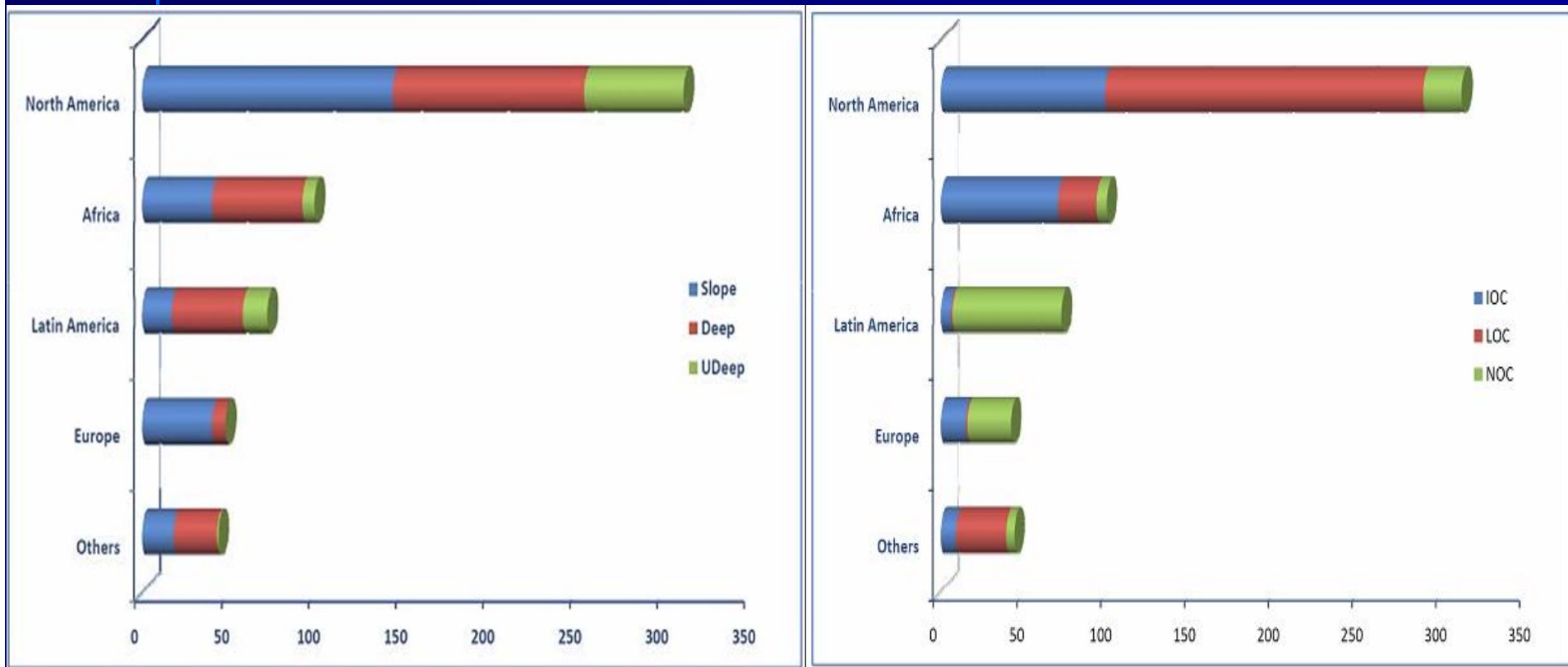
On-Stream



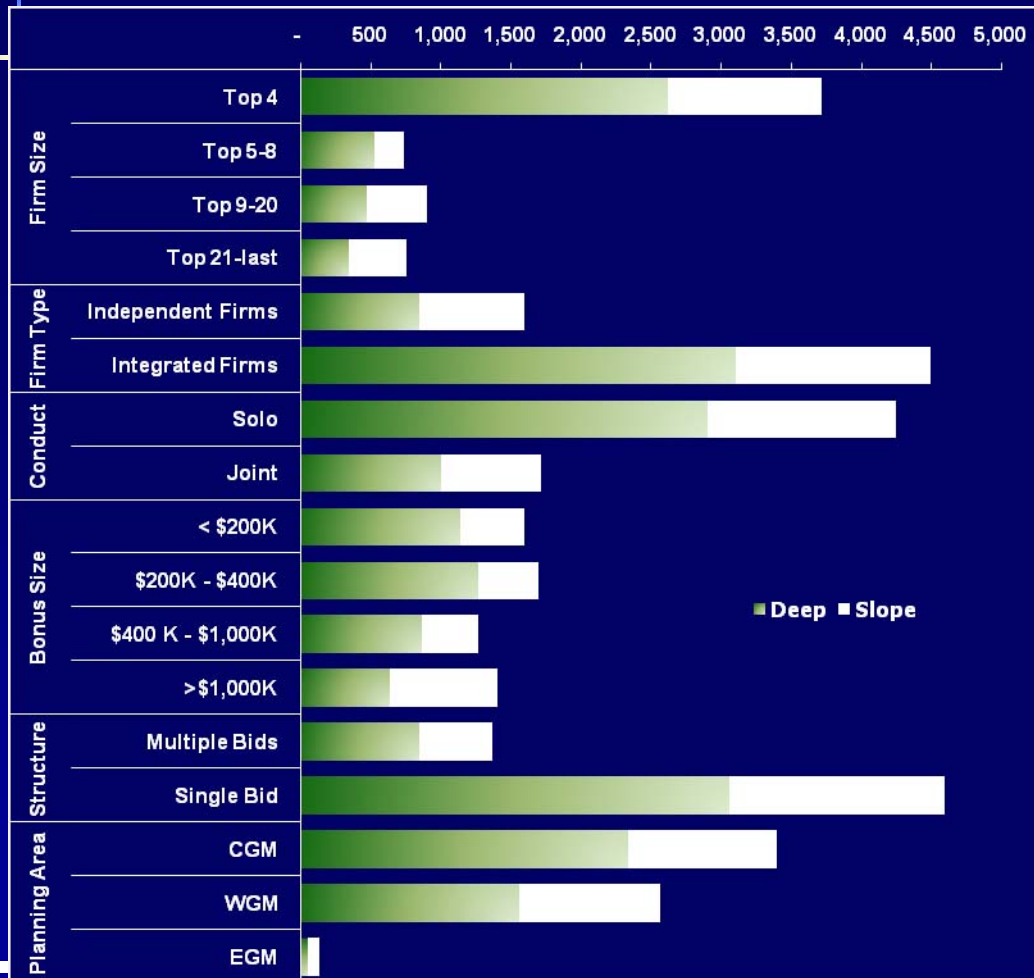
GOM Deepwater Discoveries within Global Context, 1983-2007

Water Depth Category

Firm Type Category



Classification of All Deepwater Leases in the GOM, 1983-1999



- Top four firms accounted for more than half of leases in the slope (200m-900m) and two-thirds of leases in the deep (>900m).
- In comparison, firms not in the top twenty dominated lease inventories in the OCS shelf
- Solo ventures dominated deepwater lease inventories probably because of MMS joint bidding restriction policy
- Bidding structure was characterized by single-bid winners.
- One out of four leases awarded was to independents

Aggregate Deepwater Lease-Specific Economic Data by Lease Category, 1983-1999

Group	Category	# of Leases		Average Bonus \$000 per Lease		Est. Ultimate Value \$000 per Lease	
		<i>Deep</i>	<i>Slope</i>	<i>Deep</i>	<i>Slope</i>	<i>Deep</i>	<i>Slope</i>
Firm Size	<i>Top 4</i>	2,619	1,095	555.8	1,648.3	29,510	36,149
	<i>Top 5-8</i>	526	206	1,034.2	1,161.3	5,032	9,020
	<i>Top 9-20</i>	468	428	1,055.6	1,130.6	26,897	59,744
	<i>Top 21-last</i>	336	413	1,530.2	1,656.1	39,425	30,713
Firm Type	<i>Independent Firms</i>	846	751	1,217.0	1,288.5	23,788	32,929
	<i>Integrated Firms</i>	3,103	1,391	637.6	1,613.5	27,600	39,515
Conduct	<i>Solo</i>	2,901	1,351	622.4	1,062.7	23,488	31,401
	<i>Joint</i>	999	710	1,179.0	2,410.1	37,012	52,497
Bonus Size	<i>< \$200K</i>	1,138	456	162.7	162.4	17,439	8,783
	<i>\$200K - \$400K</i>	1,263	434	278.2	272.8	18,828	16,475
	<i>\$400 K - \$1,000K</i>	865	402	624.5	680.8	23,047	35,220
	<i>>\$1,000K</i>	634	769	3,007.4	3,486.1	99,405	70,718
Structure	<i>Multiple Bids</i>	844	518	1,701.3	3,417.7	38,602	81,484
	<i>Single Bid</i>	3,056	1,543	506.4	892.1	23,735	24,295
Planning Area	<i>CGM</i>	2,340	1,056	736.9	1,937.2	33,889	50,626
	<i>EGM</i>	50	82	505.1	833.8	13,080	*
	<i>WGM</i>	1,560	1,005	807.1	1,095.8	16,547	26,104
* Limited Data							

Lease Development Economics

- Two of the more popular measures of lease development economics:
 - IRR as a measure of the optimal use of capital funds.
 - PI as a measure of the amount of discounted future operating cash income per dollar invested.
- Leases evaluated have been limited to those issued from 1983 to 1999 and developed not later than 2004.

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 $D = D^*$: $PV = 0$.
- $\pi (f, F)$ = 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 l and the fiscal regime denoted by F , the present value and internal rate of return of the cash flow vector $NCF(l)$ is computed as

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

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

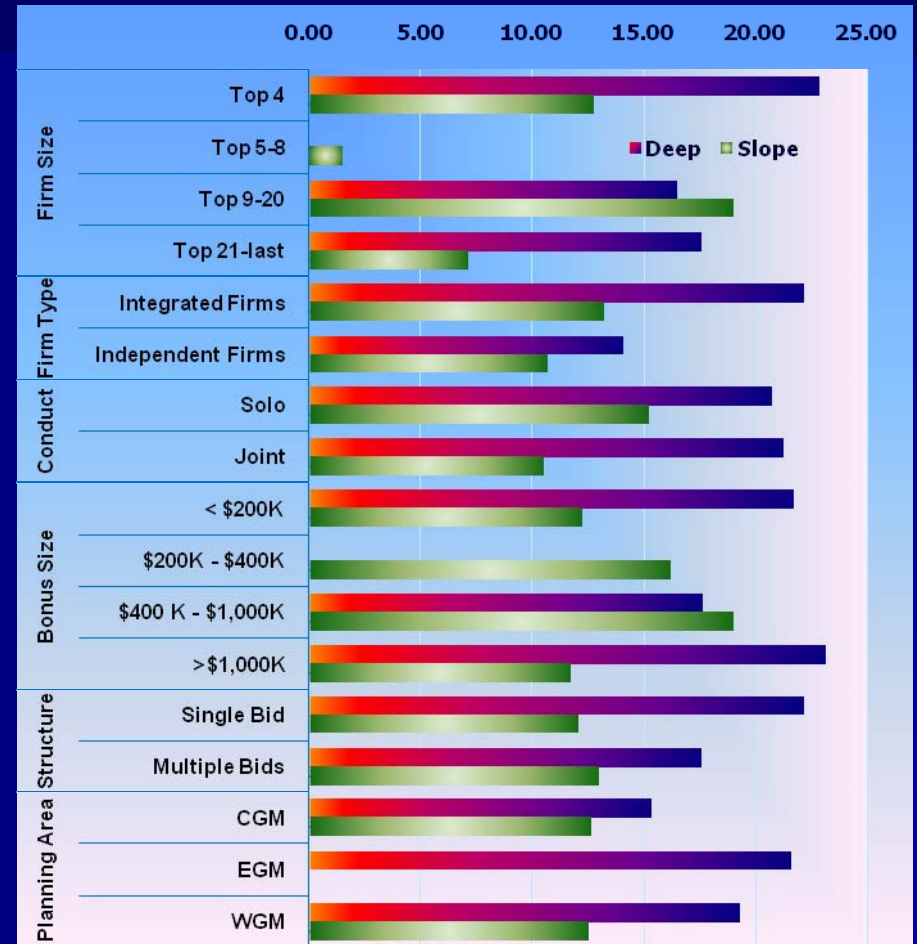
Aggregate Economic Outcomes for 1983-1999 Leases as of Yearend 2004

		Average Bonus \$000 per Lease		Undiscounted NCF \$000 per Lease		Aggregate Pretax Rate of Return Percent	
Group	Category	<i>Deep</i>	<i>Slope</i>	<i>Deep</i>	<i>Slope</i>	<i>Deep</i>	<i>Slope</i>
Aggregate	<i>All</i>	762	1,500	13,574	15,882	20.86	12.49
Firm Size	<i>Top 4</i>	556	1,648	16,222	16,002	22.89	12.78
	<i>Top 5-8</i>	1,034	1,161	*	429	*	*
	<i>Top 9-20</i>	1,056	1,131	10,493	28,884	16.49	19.02
	<i>Others</i>	1,530	1,656	18,738	9,844	17.57	7.14
Firm Type	<i>Integrated Firms</i>	638	1,613	14,773	17,597	22.20	13.21
	<i>Independent Firms</i>	1,217	1,289	9,191	12,730	14.09	10.69
Conduct	<i>Solo Bidders</i>	622	1,063	11,862	13,787	20.72	15.25
	<i>Joint Bidders</i>	1,179	2,410	18,876	21,827	21.25	10.52
Bonus Size	<i>< \$200K</i>	163	162	8,521	2,935	21.71	12.24
	<i>\$200K - \$400K</i>	278	272	*	7,002	*	16.19
	<i>\$400 K - \$1,000K</i>	624	681	10,112	17,597	17.66	19.01
	<i>>\$1,000K</i>	3,007	3,486	55,912	29,483	23.14	11.72
Structure	<i>Single Bid</i>	506	892	12,553	10,008	22.15	12.09
	<i>Multiple Bids</i>	1,701	3,418	17,662	39,063	17.57	13.00
Planning Area	<i>CGM</i>	736.9	1,937	17,828	22,107	21.62	12.66
	<i>EGM</i>	505.1	834	6,928	*	15.36	*
	<i>WGM</i>	807.1	1,096	7,406	10,725	18.29	12.51

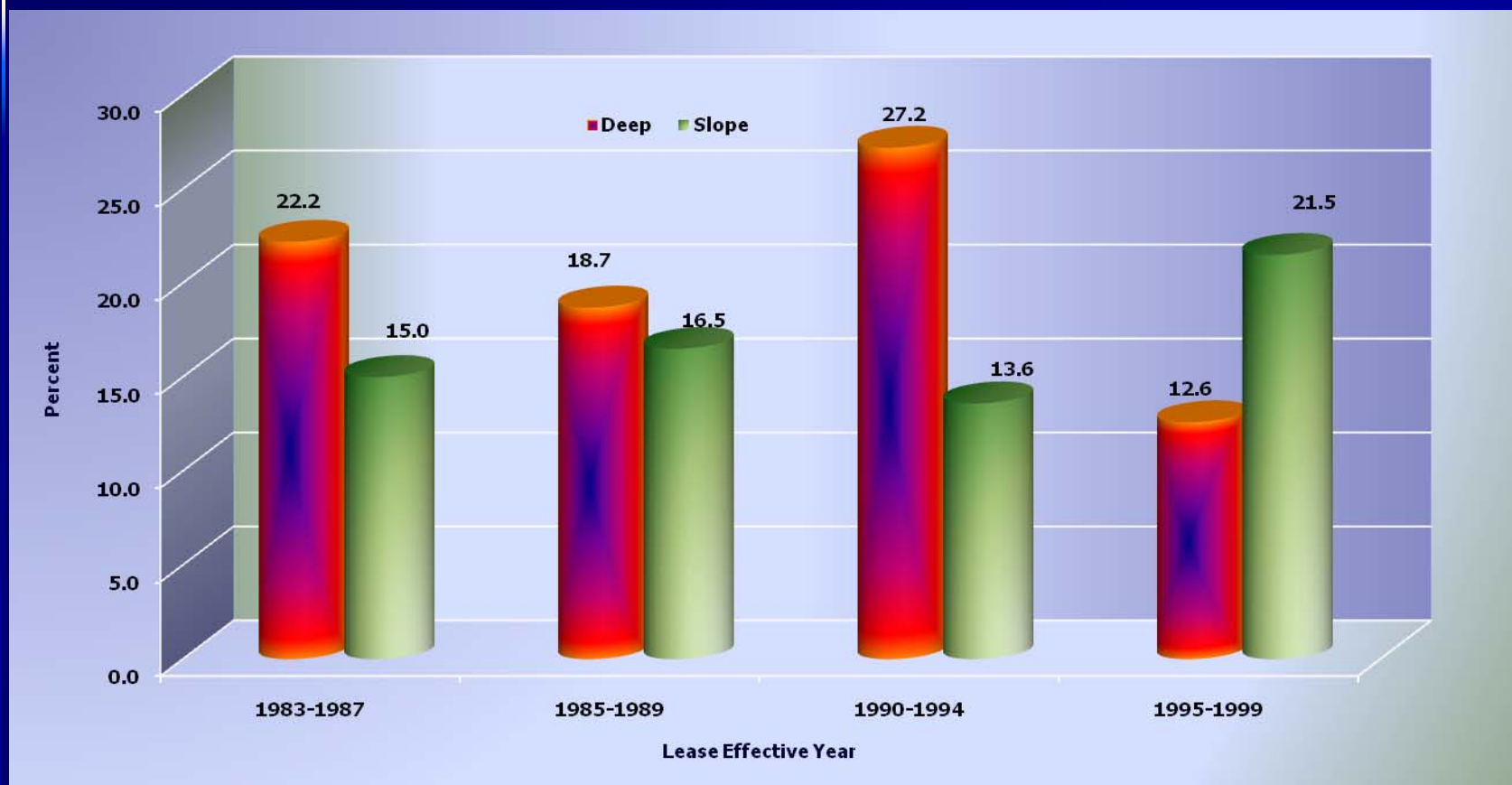
* Limited Data

Pretax Aggregate Rate of Return Estimates by Lease Category

- Leases with multiple bids had less return than single bid leases in the slope; the difference, however, was much more in the deep, on average.
- The difference in aggregate rate of return between integrated and independent firms was more significant in the deep than in the slope.
- The pretax rate of return in the Gulf slope was higher for integrated firms than independents.
- Solo bidders received higher aggregate rate of return on lease development investments in the slope than joint bidders, but there was no statistical difference in rate of return between these categories of bidders in the deep.



Periodic Trends in Pretax Rate of Return by Lease Effective Year



Conclusions

- The estimated aggregate pretax rate of return for deepwater leases that were issued from 1983 to 1999 in the U.S. Gulf slope was 12.5 percent
 - This relatively low when compared to reported pretax return value (17%) in the U.S. manufacturing sector during the period.
 - It is, however, at par with 12.5 percent representative rates return on manufacturing industry revenue.
 - The reason for this low return is most likely due to the number of leases that are reported as producible (6.6 percent of 2143 leases issued in the slope).
- The aggregate pretax rate of return on investments in the U.S. Gulf deep is about 20.86 percent despite low prospective index because of high productivity.