



THE JAMES A. BAKER III INSTITUTE FOR PUBLIC POLICY  
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# THE INTERNATIONAL OIL COMPANIES

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## **International Oil Companies**

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## ABOUT THE POLICY REPORT

### *THE CHANGING ROLE OF NATIONAL OIL COMPANIES IN INTERNATIONAL ENERGY MARKETS*

Of world proven oil reserves of 1,148 billion barrels, approximately 77% of these resources are under the control of national oil companies (NOCs) with no equity participation by foreign, international oil companies (IOCs). The Western IOCs now control less than 10% of the world's oil and gas resource base. In terms of current world oil production, NOCs also dominate. Of the top 20 oil producing companies in the world, 14 are NOCs or newly privatized NOCs. However, many of the Western major oil companies continue to achieve a dramatically higher return on capital than NOCs of similar size and operations.

Many NOCs are in the process of reevaluating and adjusting business strategies, with substantial consequences for international oil and gas markets. Several NOCs have increasingly been jockeying for strategic resources in the Middle East, Eurasia, and Africa, in some cases knocking the Western majors out of important resource development plays. Often these emerging NOCs have close and interlocking relationships with their national governments, with geopolitical and strategic aims factored into foreign investments rather than purely commercial considerations. At home, these emerging NOCs fulfill important social and economic functions that compete for capital budgets that might otherwise be spent on more commercial reserve replacement and production activities.

The Baker Institute Policy Report on NOCs focuses on the changing strategies and behavior of NOCs and the impact NOC activities will have on the future supply, security, and pricing of oil. The goals, strategies, and behaviors of NOCs have changed over time. Understanding this transformation is important to understanding the future organization and operation of the international energy industry.

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# THE INTERNATIONAL OIL COMPANIES

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## INTRODUCTION

The 1990s witnessed highly volatile oil prices and with them, a wave of consolidations in the international energy world that has brought about a structural shift in the industry still being played out today. In 2005, *Petroleum Intelligence Weekly (PIW)* “Top 50” oil companies’ annual ranking no longer included five companies—Mobil, Texaco, ARCO, Amoco, and Unocal—that had ranked in the top 40 back in 1995. Of the so-called “Seven Sisters” that dominated the world oil scene in the aftermath of World War II, only four remain, now commonly referred to as the IOCs (international oil companies) and including in their ranks one additional megafirm created by the merger of two large independents, Conoco Inc. and Phillips Petroleum Co. Similar consolidations have occurred in Canada, Europe, and Japan.

These consolidations come against the backdrop of the rising power and market position of national oil companies (NOCs). Ranked on the basis of oil and gas reserve holdings, 14 of the top 20 upstream oil and gas companies in the world today are national oil companies or newly privatized national oil companies, according to the annual survey of *PIW*. State monopolies represent the top 10 reserve holders internationally. By comparison, Exxon Mobil Corporation, BP p.l.c., Chevron Corporation, and the Royal Dutch Shell p.l.c. are ranked 14th, 17th, 19th, and 25th respectively.

The disadvantaged position of the majors relative to the NOCs in terms of reserve holdings has led to speculation about their future. The IOCs' futures—and the rationale for their mergers with each other—depend on their ability to develop giant oil and gas fields around the world. In recent years, leaders from major oil producing countries, such as Russia, Venezuela, and Saudi Arabia, have been disinclined to share their oil and gas exploration and development business with the majors, who have seen their access to existing prolific reserves greatly restricted. In some cases, notably in Venezuela and Russia, the majors are suffering from renationalizations reminiscent of the 1970s. At the same time, NOCs appear to be on the rise, not only grabbing back control and rents for their in-country resources but also collaborating and exploring in foreign oil plays, in some cases beating out the majors to these resources and in others, taking over in places where the majors are banned from exploring by international sanctions levied by the United States or the United Nations. This has led commentators and the majors themselves to ponder about the future of the big IOCs; a recent *Wall Street Journal* article began by stating “Big Oil has a big problem.”<sup>1</sup>

The IOCs still rank among the largest oil and gas producers worldwide, and these Western majors also have also achieved a dramatically higher return on capital than national oil companies of similar size and operations.<sup>2</sup> The IOCs still control massive capital inflows that could be invested in future production. The so-called Big Five (BP, Chevron, ConocoPhillips Company, ExxonMobil, and Royal Dutch Shell) had \$120.8 billion in profits in 2006 against 9.7 million barrels a day (b/d) of oil production. By contrast, the next 20 largest American oil firms had \$31.2 billion in profits against 2.1 million b/d in oil production. In terms of operating cash flow, the Big Five registered \$155 billion in 2006, compared to only \$50 billion for the next 20 largest American oil firms.

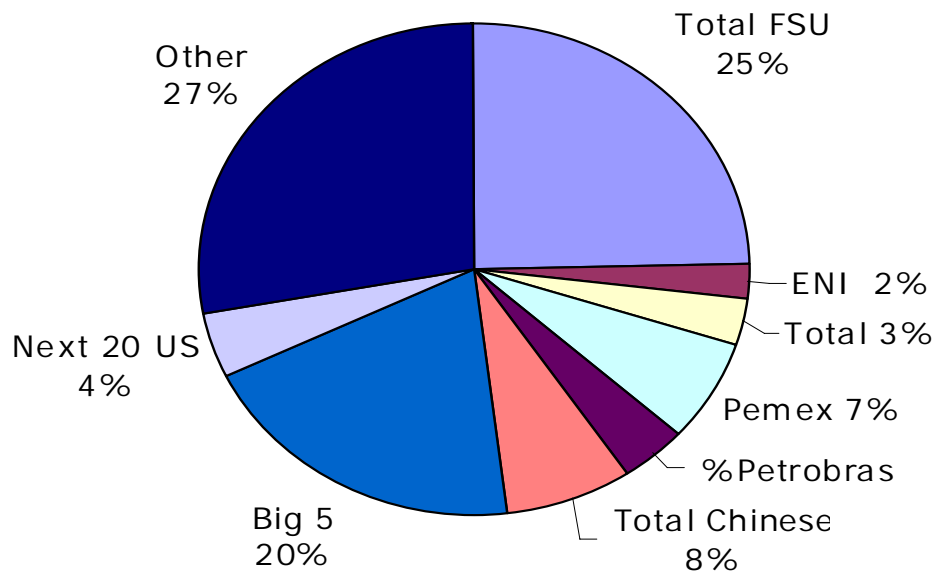
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<sup>1</sup> “Big Oil’s Latest Roadblock: Governments Reduce Access to Aid National Champions amid Scramble for Supply,” *The Wall Street Journal*, September 24, 2007, p. C10; Dermot Gately, “What Oil Export Levels Should We Expect from OPEC?” *Energy Journal* 28 (2007): 151-173; Petter Osmundsen, Klaus Mohn, Bard Misund, and Frank Asche, “Is Oil Supply Choked by Financial Market Pressures?” *Energy Policy* 35 (2007): 467-474; Dermot Gately, “OPEC’s Incentives for Faster Output Growth,” *Energy Journal* 25 (2004): 75-96; Dermot Gately, “How Plausible is the Consensus Projection of Oil Below \$25 and Persian Gulf Oil Capacity and Output Doubling by 2020?” *Energy Journal* 22 (2001): 1-27.

<sup>2</sup> Peter Hartley, Kenneth B. Medlock, III, and Stacy L. Eller, “Empirical Evidence on the Operational Efficiency of National Oil Companies,” in *The Changing Role of National Oil Companies in International Energy Markets*, March 2007, available at <http://www.rice.edu/energy/publications/nocs.html>

As Figure 1 shows, the Big Five represent more than 20% of total current non-Organization of Petroleum Exporting Countries (OPEC) production. This compares to global market powerhouse Saudi Arabia, which controls 10% of total world oil production and about a third of total production of OPEC.

**Figure 1. Non-OPEC Production (2006)**



Saudi Arabia serves as a swing producer for the global oil market and has, over the years, demonstrated a willingness to increase or lower its oil production to calibrate oil prices to levels targeted by OPEC or in some instances levels that meet simply its national policy goals. By contrast, the majors produce every barrel of developed resource to ensure that they return maximum profits to shareholders.

However, while the international majors produce their fields at maximum production, it is still worthwhile to ask whether these firms are sufficiently reinvesting their rising cash flow to find new reserves and increase production. It is appropriate to ask this question because the oil majors are not fully replacing reserves and therefore are seemingly slowly liquidating their long-term asset base, implying that they may see a declining rate of production over time. Ironically, despite high profits and rising oil

prices, the largest IOCs have not been able to replace their reserve assets in recent years in contrast to smaller, independent U.S. oil companies and some NOCs. In fact, the IOCs have not responded to the strong market incentives by devoting a larger share of their soaring profits and cash flow to exploration of new fields, as might have been expected. This is in contrast to the 1970s and 1980s when strong IOC exploration spending spurred a large increase in non-OPEC production, promoting diversity of supply and enhancing U.S. energy security for two decades. Now, these legacy assets are moving toward natural, geologic decline, raising the question about what new resources will be available to replace them.

In recent years, OPEC has been slow to reinvest its rising cash flow in new oil production capacity in an effort to raise prices and thereby their short-term revenues. In fact, OPEC’s total sustainable production capacity has not risen between 1998 and 2005, despite a rising call of demand for OPEC crude oil supply. Capacity gains made through added investments in Iran, Saudi Arabia, Kuwait, Algeria, Qatar, and Libya have barely managed to offset the losses in Iraq, Venezuela, and Indonesia. See Table 1 below.

**Table 1. OPEC Sustainable Production Capacity (in million barrels a day)**

| <b>Member Country</b> | <b>1998</b>  | <b>2001</b>  | <b>2003</b>  | <b>2005</b>  |
|-----------------------|--------------|--------------|--------------|--------------|
| Saudi Arabia          | 9.8          | 9.9          | 10.15        | 10.3         |
| Iran                  | 3.7          | 3.8          | 3.8          | 4            |
| Iraq                  | 2.8          | 3.05         | 2.2          | 1.8          |
| Kuwait                | 2.4          | 2.4          | 2.5          | 2.6          |
| UAE                   | 2.4          | 2.45         | 2.5          | 2.4          |
| Qatar                 | 0.72         | 0.75         | 0.75         | 0.82         |
| Venezuela             | 3.3          | 3.1          | 2.5          | 2.5          |
| Nigeria               | 2.05         | 2.3          | 2.3          | 2.3          |
| Indonesia             | 1.35         | 1.3          | 1.15         | 0.9          |
| Libya                 | 1.45         | 1.45         | 1.45         | 1.6          |
| Algeria               | 0.88         | 0.88         | 1.15         | 1.35         |
| <b>Total</b>          | <b>30.85</b> | <b>31.38</b> | <b>30.45</b> | <b>30.57</b> |
| <b>Call on OPEC</b>   | 25.85        | 28.23        | 29.2         | 29.87        |
| <b>Spare Capacity</b> | <b>5</b>     | <b>3.15</b>  | <b>1.25</b>  | <b>0.7</b>   |

In some cases, notably in Nigeria and Iran, capacity gains have been delayed or derailed by civil unrest, bureaucratic infighting, corruption, and sector mismanagement.<sup>3</sup> In other cases, such as Qatar and Algeria, geologic constraints limit the potential for expansion. But in the important states of Saudi Arabia, the United Arab Emirates and Kuwait, decision makers have been conservative about committing resources to capacity expansion. Saudi Arabia has invested \$10 billion to \$15 billion in recent years designed to bring on new fields to maintain its 1 million to 1.5 million barrels a day cushion of spare capacity in the face of declining output capacity at some of its mature fields, but the kingdom has resisted calls from the United States and elsewhere that it expand its output quickly to 15 million b/d to meet the expected rise in oil demand in the coming years. Production in the United Arab Emirates has been relatively static, while Kuwait has been expanding output only slowly.

It has been suggested that it is indeed not in OPEC's interest to serve as a residual supplier to make up the difference between world demand and non-OPEC supply. Instead, OPEC can optimize its gain by producing less than the market call for its crude oil.<sup>4</sup> In addition, OPEC exports will be reduced further by very rapid increases in demand within OPEC itself, calling into question whether the level of OPEC crude exports that will be available in the future will match the rosy projections of Western forecasting organizations like the International Energy Agency (IEA) or U.S. Department of Energy.

In the 1970s and 1980s, the large IOCs responded to a reduction in OPEC supply and investment by increasing their own investment in non-OPEC resources, raising their own market share at OPEC's expense, but also contributing to lower prices as OPEC proved unwilling over time to cut its own production to continue to defend prices. In this paper, we investigate whether private oil companies, either the big IOCs or the next 20 largest U.S. firms, have responded to OPEC's restraint on investment in new oil production capacity by increasing their own spending on oil exploration. In particular, the paper investigates the investment behavior of the largest IOCs and examines what these firms have done with the rapidly increasing profits. We also look at the investment

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<sup>3</sup> *The Changing Role of National Oil Companies in International Energy Markets*, Policy Report 35, James A. Baker III Institute for Public Policy, April 2007.

<sup>4</sup> Gately, "What Oil Export Levels Should We Expect from OPEC?" (2007): 151-173; Gately, "OPEC's Incentives for Faster Output Growth," (2004): 75-96.

patterns of the next 20 largest U.S. oil firms as well to determine how competitive a market is likely to evolve over the next decade or so. In doing so, we analyze whether the largest publicly traded private oil firms are “free riding” off of OPEC market restraints, or, on the other hand, whether these firms, or some grouping of these firms, represent a competitive threat to OPEC’s monopoly power.

The investment patterns of these large publicly traded firms will have important implications for future global oil supply and pricing. In studying the investment patterns of these firms, we hope to highlight any structural pressures on the maintenance of market competition in global oil markets, and the implications of those structural pressures for future oil production trends and U.S. energy security.

Finally, we will discuss, in light of the investment habits of the largest U.S. oil firms, whether the United States would benefit from having its own national oil company instead of relying on market forces to bring on line needed supplies.

All the analysis in this paper is based on Baker Institute research on investment expenditures by the IOCs, the next 20 U.S.-based oil firms, and NOCs. Data was culled from Securities and Exchange Commission (SEC) filings going back to 1995 and, in the case of NOCs, to news reports and other public data compiled directly for this research project. The authors wish to thank *Petroleum Intelligence Weekly* and Asia Pacific Consulting for their assistance in providing access to data on NOC exploration spending.

*Our study concludes:*

- 1) The exploration spending of the five largest IOCs has been flat to lower in the aftermath of OPEC’s reinvigorated effort to constrain market supply in 1998. Given the rise in costs of material, personnel, and equipment such as drilling rigs, the five largest IOCs have in effect cut spending levels in real terms over the past 10 years. This trend appears, however, to be easing, with exploration spending by the five largest IOCs rising by 50% in 2006, from 2005.
- 2) Instead of favoring exploration, the five largest IOCs have used (in 2006) 56% of their increased operating cash flow on share repurchases and dividends. They have also increased spending on developed resources, presumably to monetize these assets quickly while oil prices are high.

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- 3) The next 20 largest privately traded American oil firms have not followed a similar pattern. Instead, they have steadily been increasing exploration spending since 1998, and their exploration spending levels are now equal to that of the five largest IOCs. This differing pattern comes despite the fact that the five largest IOCs have access to operating cash flow that is three times the size of the next 20 largely traded American oil firms. This exploration spending trend would indicate that these 20 next largest privately traded American firms will control an increasing portion of non-OPEC oil production in the coming years.
- 4) The oil production of the five largest oil companies has declined since the mid-1990s. Oil production for the five largest oil companies fell from 10.25 million b/d in 1996 to 9.45 million b/d in 2005 before rebounding to 9.7 million b/d in 2006. By contrast, for the next 20 American independent oil firms, their oil production has risen since 1996, from 1.55 million b/d in 1996 to about 2.13 million b/d in 2005 and 2006.
- 5) Since 1994, the nine NOCs<sup>5</sup> which actively participate in international exploration invested more than \$66 billion abroad in upstream activities. Chinese firms alone announced foreign projects worth \$9 billion in 2006, most of which was in the form of access to oil fields in Russia, Nigeria and Kazakhstan—comparable to the total amount spent by the Big Five oil companies on exploration that year but still quite small compared to the \$59.4 billion spent by the same Big Five on exploration and development combined.
- 6) Wall Street investors are increasingly recognizing these new exploration investment trends, and the values of shares of NOCs have risen at a much faster rate than those of the largest IOCs.
- 7) Parallel restraints on exploration spending by the five largest IOCs and major OPEC producers could lead to less competitive global oil markets in the next decade.
- 8) The wave of consolidations in the 1990s of the largest publicly traded oil firms has not led to related success in completion of large complex oil projects and

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<sup>5</sup> Includes Lukoil, StatoilHydro, Petrobras, PETRONAS, China National Petroleum Corporation (CNPC), China National Offshore Oil Corp. (CNOOC), Sinochem Corporation, Rosneft, and India's Oil and Natural Gas Corporation Ltd. (ONGC).



reduction in costs for those projects.<sup>6</sup> Several of the world's largest oil companies merged in 1998, arguing for the need to cut costs, enhance efficiency and grow capital strength to tackle the massive spending requirements for multibillion dollar megaprojects in places like Russia, Venezuela, and Saudi Arabia. However, spending patterns of these companies since the mergers failed to show any appreciable increase in exploration spending from the previous levels of their premerger entities. One explanation for this trend is that companies may now be opportunity-constrained due to a change in political climate in major oil producing countries such as Russia and Venezuela. Given the superior record of the next 20 largest publicly traded American oil firms for reserve replacement and exploration activity, there appears to be a level of consolidation that suggests that firms can become too large to exploit effectively the kinds of reserves currently available for private capital.

### IOCs DEFINED

The distinction between IOCs and NOCs is not always clear-cut since, over time, some NOCs such as BP, Total and ENI S.p.A. have been privatized—or substantially privatized—so that they behave in ways that are similar to firms that have always been in the private sector. And there are firms such as StatoilHydro and Petrobras that, although partially privatized, still seem to operate in some ways that reflect interests of their national governments.

Our study focuses on 25 firms that, with the exception of BP and Shell, are U.S. companies. The selection of companies reflects constraints imposed by data availability. Most of the data in this study comes from filings with the SEC, and companies that are not listed on U.S. exchange markets are not required to file this data. Some foreign firms have begun to file with the SEC but it was not possible to get historical data for them.

Throughout the paper the term “Big Five” refers to the ExxonMobil, BP, Chevron, Royal Dutch Shell and ConocoPhillips. Together with Total and ENI, these companies are commonly referred to as the “supermajors.” From the U.S. perspective, a

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<sup>6</sup> See Appendix A. for a chart showing mergers and acquisitions that resulted in the Big Five.

## International Oil Companies

focus of the Big Five firms is appropriate since each has a significant American presence and is more amenable to U.S. energy policies. In 2005, these five firms accounted for 56% of profits and reserves, 64% of output, and 31% of expenditures on exploration of the 135 private (U.S. and foreign) companies for which the *Oil and Gas Journal* collects data. Finally, the Big Five also dominate the U.S. gasoline market, with roughly 62% of the retail market and 50% of refinery capacity.

For comparison purposes, Table 2 shows profits and reserves of all supermajors. In 2005, they accounted for 72.9% and 73.8% of profits and reserves respectively.

**Table 2. Profits and Reserves (2005)**

| <b>Company</b>        | <b>Profits<br/>(\$Million)</b> | <b>Crude Oil Proven Reserves<br/>Million barrels (MMbbl)</b> |
|-----------------------|--------------------------------|--|
| ExxonMobil            | 36,130                         | 10,491   |
| BP                    | 22,341                         | 9,565  |
| Shell                 | 25,311                         | 5,748  |
| Chevron               | 14,099                         | 5,626  |
| Total                 | 13,733                         | 5,582  |
| ENI                   | 19,280                         | 3,773  |
| ConocoPhillips        | 13,529                         | 3,336  |
| Largest Seven         | 144,423                        | 44,121   |
| All Companies         | 198,183                        | 59,757   |
| Largest 7 as % of All | 72.9%                          | 73.8%  |

*Source: Oil and Gas Journal Data Book 2006*

In addition to the Big Five, we look at the next 10 and next 20 U.S. firms, ranked by size of reserves in 2006, in order to compare their experience with that of the largest firms.<sup>7</sup>

Throughout the paper, data are presented for each company on a consolidated basis for all years. For example, the data presented for BP includes data for Amoco and Arco, (companies that were absorbed into BP for the entire time period) even prior to the mergers. The purpose for doing so is to isolate reserve additions that were the result of

<sup>7</sup> The firms comprising the next 20 are listed in Appendix B.

extensions, exploration and development activity from those acquired through mergers or outright acquisition of another firm. Expenditures for the acquisition of reserves shown in the figures below represent reserves purchased from other firms but not those that were the result of mergers or outright purchase of other firms.

Our list of next 20 firms includes firms that did not exist for the entire period and some firms that would have been in the category of next 10 or 20 category a few years ago that have been absorbed by other firms and are now included in the consolidated data of the acquiring firm. The chart in the Appendix A shows these mergers.

As data show, the industry is extremely concentrated. The largest 25 of the private firms account for 92% and 94% of profits and reserves respectively of the 135 firms tracked by the *Oil and Gas Journal (O&G)*.

### **IOC PROFITS, CASH FLOW, AND INVESTMENTS SINCE 1998**

Since hitting their nadir of roughly \$10/barrel in 1998, oil prices for U.S. benchmark West Texas Intermediate (WTI) rose to a peak in 2006 in the high \$70s. Profits of the 135 firms in the *O&G* database have risen in line with prices—and increased by 2006 over seven times the average levels prevailing during the period 1996-99. Profits of the Big Five have increased by a factor of four over the same time period.

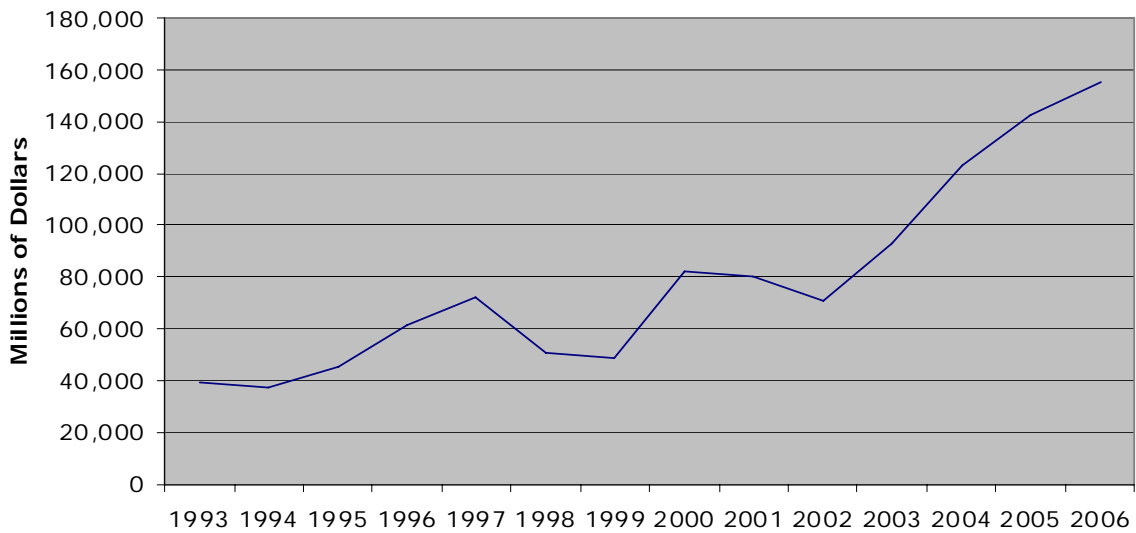
Cash flow is a better measure of the discretionary resources available to firms than profits. For the Big Five IOCs, operating cash flow, shown in Figure 2, was slightly more than two and a half times higher in 2006 than the average levels prevailing in the 1996-99 period, rising from roughly \$60 billion in the late 1990s to \$154.9 billion in 2005.

But while prices, profits, and cash flow have risen dramatically, investment in exploration has not—especially by the largest IOCs. Figure 3 shows outlays of the Big Five firms among the following categories: share buybacks, reserve acquisitions from other firms, exploration expenditures, development outlays, and dividend payments. What stands out in the graph is the surge in stock buybacks (equity purchases) that has occurred in the last few years. Purchases of reserves from other firms have declined in recent years while, except for 2006, expenditures on exploration (in nominal prices) have

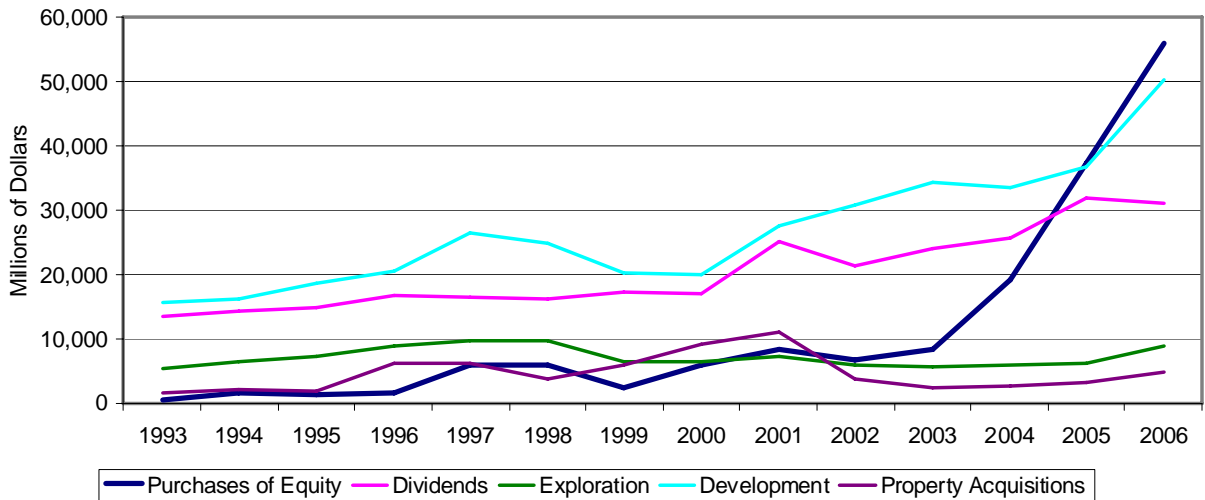
remained flat. Development outlays have been on an upward trend since the mid-1990s, with the exception of the period corresponding to the collapse in oil prices 1998-2000, possibly reflecting a desire to monetize legacy assets while prices are near historic highs.

Development expenditures reflect investments in fields that have already been discovered and are the easiest (most cost-effective) way to boost output in the short run. Nonetheless, it is investment in the exploration of new fields that will assure the long-term viability of these firms.

**Figure 2. Operating Cash Flow (Big Five)**



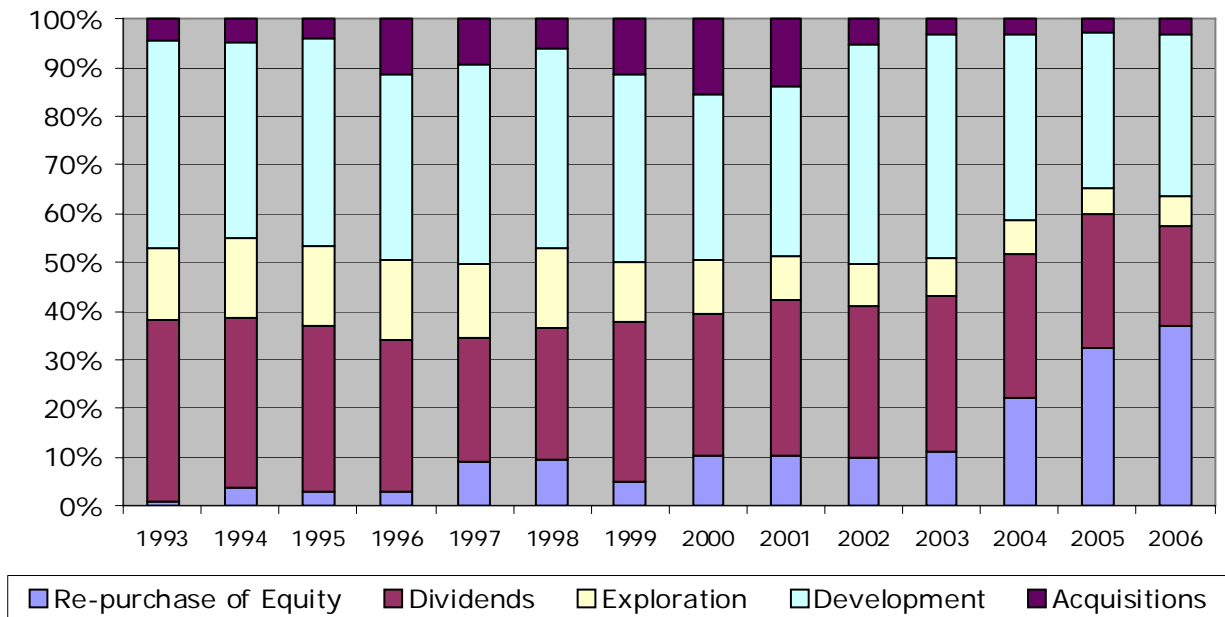
**Figure 3. Selected Outlays (Big Five)**



## International Oil Companies

Figure 4 shows each of the same expenditure categories as a share of the total. Share buybacks (equity repurchases) have absorbed a growing share of these outlays, rising from only 1% in 1993 to 37.1% in 2006, while expenditures on exploration account for a decreasing proportion, declining from 13.8% in 1993 to only 5.8% in 2006. It is interesting to note that, despite an almost 50% increase in exploration expenditures from 2005 to 2006, these expenditures as a share of the total increased from 5.3% to only 5.8%.

**Figure 4. Selected Outlays (Big Five)**

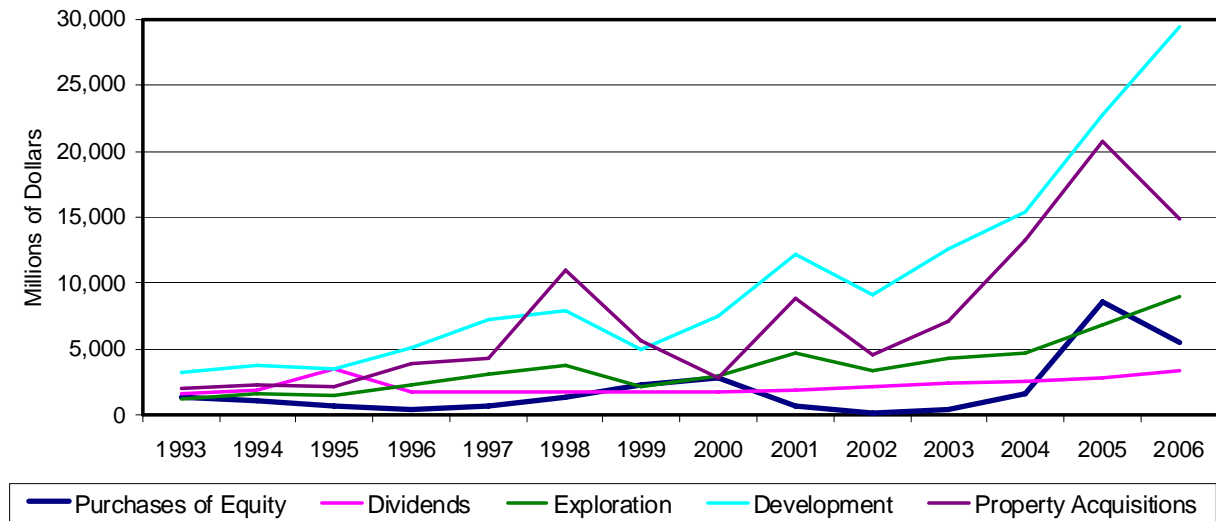


Figures 5 and 6 show similar data for the next 20 largest U.S. firms. Of these the 10 largest are Occidental Petroleum Corporation, Anadarko Petroleum Corporation, Apache Corporation, Amerada Hess Corporation, Devon Energy Corporation, Marathon Oil Corporation, Pioneer Natural Resources Company, Plains Exploration & Production Company, Noble Energy, Inc., and Dominion. Burlington Resources and Kerr-McGee Corporation were acquired by ConocoPhillips and Anadarko, respectively, in 2005. Some of these firms, such as Anadarko, Marathon, and Occidental have become quite large in terms of their reserve holdings, as is shown in Table 3.

Table 3. Reserves of Next 10 U.S. Companies

| US Companies  | Reserves<br>(Millions of Barrels) |
|---|-----------------------------------|
| <a href="#">Occidental Petroleum Corporation</a>    | 2,234                             |
| <a href="#">Anadarko Petroleum Corporation</a>      | 1,264                             |
| <a href="#">Apache Corporation</a>                  | 1,061                             |
| <a href="#">Hess Corporation</a>                    | 932                               |
| <a href="#">Devon Energy Corporation</a>            | 708                               |
| <a href="#">Marathon Oil Company</a>                | 677                               |
| <a href="#">Pioneer Natural Resources</a>           | 417                               |
| <a href="#">Plains Exploration &amp; Production</a> | 333                               |
| <a href="#">Noble Energy</a>                        | 296                               |
| <a href="#">Dominion</a>                            | 232                               |

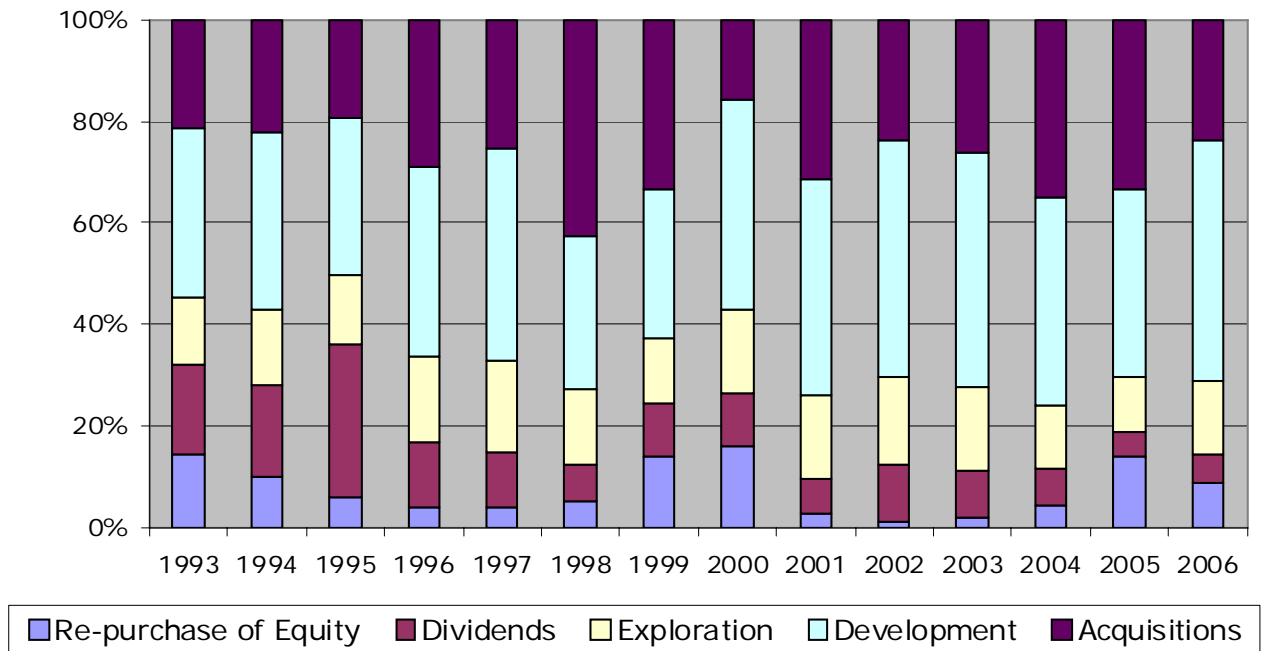
Figure 5. Selected Outlays (Next 20 U.S. Firms)



## International Oil Companies

The data for the “next 20” firms reveals a pattern of expenditures that is quite different from that of the Big Five. Outlays for exploration have increased significantly in absolute terms, although not as a share of total outlays. Dividends account for a much smaller proportion of outlays while acquiring reserves from other firms is larger. Development expenditures have increased more than three-fold since 1999. However, as a percentage of these outlays, development expenditure has increased from 33.5 % to 47.3%.

**Figure 6. Selected Outlays (Next 20 U.S. Firms)**



The data show that the smaller firms are more aggressive in spending for reserves additions than the Big Five—through growing exploration outlays and through acquisitions from other firms.

Figure 7 clearly shows the difference in the time trend of exploration outlays. The gap between the exploration expenditures of the Big Five and the smaller companies has closed, with the next top 20 firms now spending in absolute amounts roughly the same as the Big Five. This is especially telling when one considers the huge differences in operating cash flow between the two groups, where the Big Five registered \$155 billion in 2006 against only \$50 billion in operating cash flow for these next 20 oil independents.

One caveat may be appropriate here. Some of the firms in the “next 20” did not exist in earlier time periods. Their inclusion in the latter years may have the result of increasing rate of growth in exploration expenditures. The data for the next 10 companies might be more appropriate although one could argue that the creation of new firms is also a demonstration of the vibrancy of smaller firms in the exploration game.

Figure 7. Exploration Expenditures

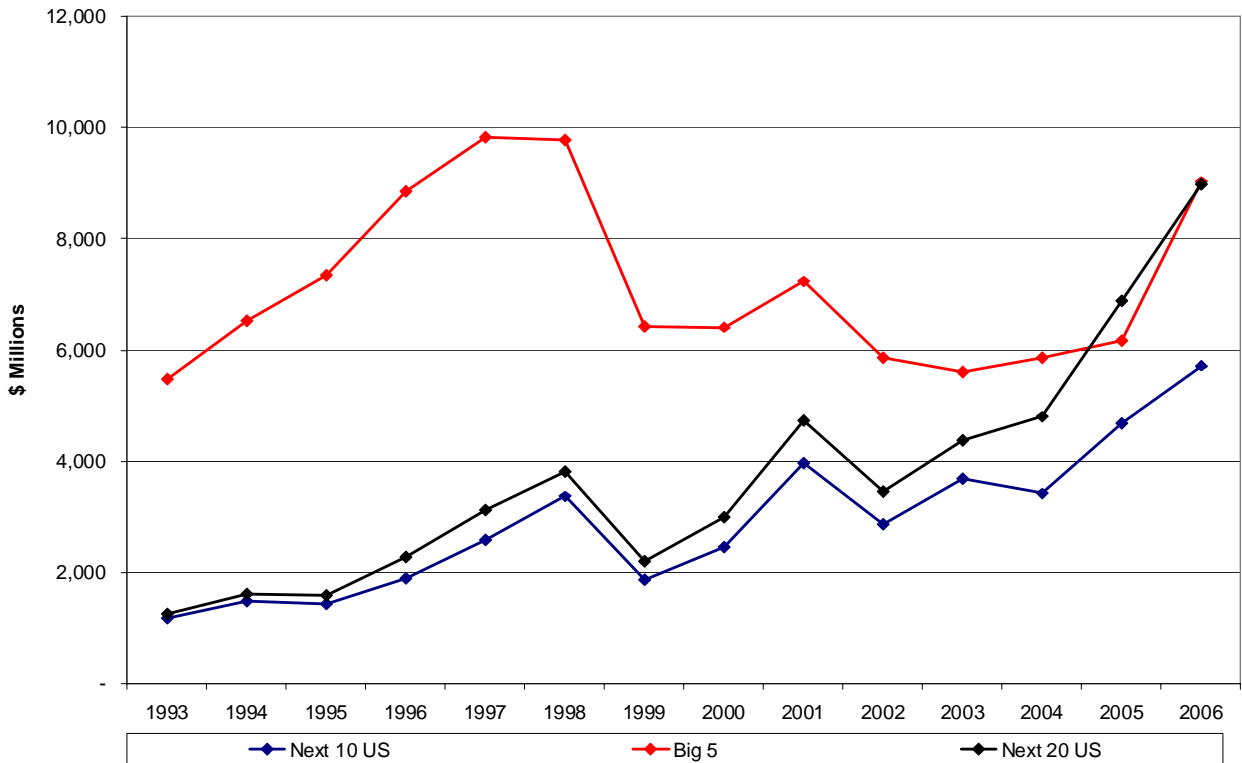


Figure 8 shows reserve replacement ratios for the two groups of companies. The pattern is similar. The Big Five are gradually depleting their reserves with an average replacement ratio of only 82% in the period since 1999, as compared with 147% for the next 20.<sup>8</sup>

<sup>8</sup> To some extent the decline for the Big Five is attributable to the downward restatement of reserves, especially by Royal Dutch Shell.



Figure 8. Reserve Replacement Ratio



These trends in investment in exploration activity have important effects on future reserves and production. There are substantial lags between the initial outlay for exploration, the booking of reserves found, and finally their development and production. Unless large companies are much more efficient than smaller ones in terms of exploration expenditure per barrel, the existing levels in exploration outlays for the past decade suggest that the largest firms will have increasing difficulty in replacing reserves and maintaining output relative to smaller firms. The IOCs may be planning to replace reserves through increasing acquisitions from other firms, in effect subcontracting the exploration function to others.

Similar affects apply to the impact of these investment patterns on production trends for the Big Five versus the next 20 independent U.S. firms. The oil production of the five largest oil companies has declined since the mid-1990s. Oil production for the five largest oil companies fell from 10.25 million b/d in 1996 to 9.45 million b/d in 2005 before rebounding to 9.7 million b/d in 2006. By contrast, for the next 20 U.S. independent oil firms, their oil production has risen since 1996, from 1.55 million b/d in 1996 to about 2.13 million b/d in 2005 and 2006.

**Table 4. Oil Production (Millions b/d)**

| <b>Year</b> | <b>Next 20</b> | <b>Big Five</b> |
|-------------|----------------|-----------------|
| 1995        | 1508           | 9,605           |
| 1996        | 1553           | 10,258          |
| 1997        | 1584           | 10,329          |
| 1998        | 1840           | 9,833           |
| 1999        | 1837           | 10,019          |
| 2000        | 1903           | 9,479           |
| 2001        | 2064           | 9,485           |
| 2002        | 2203           | 9,058           |
| 2003        | 2179           | 9,258           |
| 2004        | 2138           | 9,482           |
| 2005        | 2129           | 9,452           |
| 2006        | 2130           | 9,704           |

**IS THE OIL MARKET COMPETITIVE?**

The international oil market bears some similarity to the economist’s definition of a competitive market. There are a large number of buyers and suppliers of a product that, while not homogeneous, is differentiated in ways that are easily measured and adjusted for. While the market is characterized by NOCs—some of which have significant market shares, and most of the largest NOCs belong to the OPEC oil cartel that collectively accounts for roughly a third of the market—the fact is that except in times where demand is growing rapidly and production capacity fails to keep up, the oil market is reasonably competitive.

When the market is tight—that is, when demand is rising faster than production capacity—firms with large shares of the market have some control over future prices by controlling the rate at which they expand capacity. They can also influence prices by cutting production. It is during these times that OPEC strength returns. Because of inelastic demand and non-OPEC supply in the short-run, small production cuts can have significant effects on price. And in an environment of growing demand, a policy of constraining the expansion of oil production capacity expansion can continue to put

upward pressure on prices. The spoiler in this scenario is the large number of companies that lie outside of OPEC who can exploit OPEC's go-slow policy to expand their own output and market share. To the extent that they are small firms (relative to OPEC), they will individually have little impact on prices. But the point is that there will usually be a large number of firms investing in exploration. And some of the firms outside of OPEC, such as the IOCs, are quite large and therefore as a group can have significant impact if they substantially raise investment spending. This was the scenario that played out in the 1970s and early 1980s when large increases in non-OPEC capacity and output, especially from the North Sea and Prudhoe Bay, put downward pressure on prices. OPEC—essentially, Saudi Arabia—frantically cut back its own production to support oil price targets but to little avail.

A similar non-OPEC response phenomenon has not yet occurred with the recent surge in oil prices. Once again, OPEC is not rushing to expand capacity. And there are a number of political events/factors that have reduced output by some major players such as Russia, Venezuela, and Nigeria. But so far, there appears to be no equivalent to the North Sea and Alaska that will result in a giant surge in non-OPEC production in the near term.

Normally, given that there are a large number of private firms, competition among them would result in a competitive rush to find new deposits—especially in an environment of prolonged high oil prices. As Figures 4 and 6 show, some increases in spending have come from the 20 largest firms outside the Big Five. But these firms account for a small proportion of total expenditures and reserves. Their response to higher oil prices, although very robust, has only a minimal effect on the overall levels of exploration and reserve acquisition by private firms because of the small size of the capital expenditure involved compared to the aggregate market size. A vigorous non-OPEC response to the higher oil prices requires a vigorous response on the part of the major IOCs who control far more capital. The question is why these firms have not responded.

While the increase in development expenditures indicates a response by the Big Five to rising oil prices by exploiting existing finds, the decline in exploration expenditures in real terms and as a share of net revenue raises the question of the long-

term viability of these firms. And from a public policy perspective, the lack of response in the area of exploration activity raises the issue of whether the Big Five are acting in the best interests of the nation—as opposed to the interests of their shareholders.

### POSSIBLE EXPLANATIONS FOR SLOW RESPONSE

In the following sections, we examine several hypotheses that might explain the slow response of the Big Five in increasing exploration outlays. These are:

- i) The growing concentration of the IOCs has reduced competition among them. This reduced competitive environment has permitted them to move slowly in ratcheting up their exploration activity.
- ii) The shortage of skilled labor and equipment has made it difficult to expand exploration activity quickly.
- iii) Pressures from the financial markets and incentives facing management have resulted in a focus on short-term share price to the detriment of longer-term capacity expansion.
- iv) The expanding reach of NOCs and the fact that most of the remaining reserves lie in countries that exclude or limit investment by IOCs means that there is a scarcity of good prospects for further exploration. There are few very large fields—the type where IOCs have a comparative advantage—to be discovered in areas where the IOCs have access.
- v) Uncertainty about future oil prices and price volatility induces caution in terms of outlays for exploration. Larger firms may believe that they can eliminate the risks associated with wildcat exploration by waiting for oil prices to recede and then acquiring small firms that are currently engaging in active exploration programs.

1) Explanation One: Increasing industry concentration has muted competitive response.

Beginning in the late 1990s, there has been a significant consolidation of the large IOCs. In 1993, the largest five firms at the time (BP, Chevron, Exxon, Mobil, and Shell) controlled 69% of the reserves of all the firms that, through consolidation, now make up

the top 25. This share has increased to 82% in 2005. Thus, despite the rapid growth of the smaller firms, the Big Five now make up a larger share of reserves held by the top 25 firms. In terms of production, the largest five firms in 1993 produced about 45% of total output of major oil companies, whereas in 2005 the current Big Five produced 88%.

The significance of the growing concentration in the private sector is not that a small number of large firms can exert market power in oil markets. The Big Five control a very small proportion of the world's production and reserves. Rather, the significance lies in the competitive pressures that each firm feels in terms of pursuing an aggressive exploration program so as to maintain or increase future market share and relative position. When there are a large number of large firms it is likely that one or more will be tempted to take advantage of reduced exploration and development activity of others in order to gain market share relative to them. This potential rivalry serves to make all behave in a more aggressive competitive manner. When the number of large firms is reduced—say through mergers and acquisitions—it is easier for them to tacitly coordinate and act in parallel to delay expansion even if there is no direct or overt collusion. There are of course a large number of private firms in addition to the Big Five, but they account for a relatively small share of production and reserves; hence their behavior, no matter how aggressive they are, is unlikely to threaten the majors.

This is not to say that recent consolidation of the industry was motivated by such intentions. Those mergers took place before the surge in oil prices and there were other reasons for their consolidation. Rather, we suggest that in an environment of fewer firms, the competitive pressures to maintain an active and expanding exploration program in the face of rising oil prices is reduced. This is but one possible explanation for the weak response in exploration expenditures.

2) Explanation Two: The shortage of skilled labor and equipment has made it difficult to expand exploration activity quickly.

Since the 1960s, the oil industry has been characterized by a boom-bust cycle. During periods of high prices, industry responds to higher price signals by investing in capacity expansion until an excess of capacity relative to demand growth results in falling prices. Lower prices, in turn, are then followed by reduced investment in capacity and

increasing tightness in the market as low prices stimulate demand growth. As demand grows and eventually outstrips demand, prices rise and the investment cycle begins again. During the periods of low investment, oil firms tend to reduce employment levels and demand for oil field services and equipment. This in turn results in a contraction in the capacity of these suppliers and a reduction in the number of students studying geology and petroleum engineering. Meanwhile, those with the required skills who are laid off gravitate toward other occupations.

As a result of the contraction in the capacity of supplier firms and the reduction in the supply of skilled labor, it is impossible for oil companies collectively to ramp up investments after a period of low investment. Firms may demand more drilling platforms or seismic crews but the short-run effect will be higher rental rates for rigs and platforms and a shortage of skilled personnel. These shortages will take time to be overcome and desired investments will have to be delayed until additional resources become available.

The recent period follows this scenario. When oil prices weakened to roughly \$10 per barrel in 1998, oil companies pulled back and reduced their exploration budgets. One result of industry consolidation in 1998 was the thinning of the numbers of personnel involved in exploration and production (E&P) activities. This was part of the “efficiencies” that usually accompany mergers. The effect of these layoffs was to discourage university students and laid-off workers from pursuing or continuing careers in petroleum geology and engineering. Many professionals who were laid off pursued other careers. When oil prices began to rise, the absence of a large pool of trained and experience skilled labor was one constraint on increasing E&P activity rapidly. Similarly, in the exploration slowdown that accompanied the low prices in the 1990s, many firms that supplied E&P activities with inputs such as offshore platforms, drilling rigs and other equipment, and oil field services also reduced capacity and laid-off skilled workers such as welders. As exploration activity has picked up over the past few years, these suppliers of intermediate inputs were capacity constrained as well.

Table 5 shows changes to the global offshore mobile rig fleet. Total available rigs fell in 2004 and 2005 then recovered slightly in 2006 but overall the total available has remained fairly constant. Utilization rates have increased throughout the period but

demonstrate that rigs were not as large a constraint to increased investment until more recently.

**Table 5: Changes to the Global Offshore Mobile Fleet**

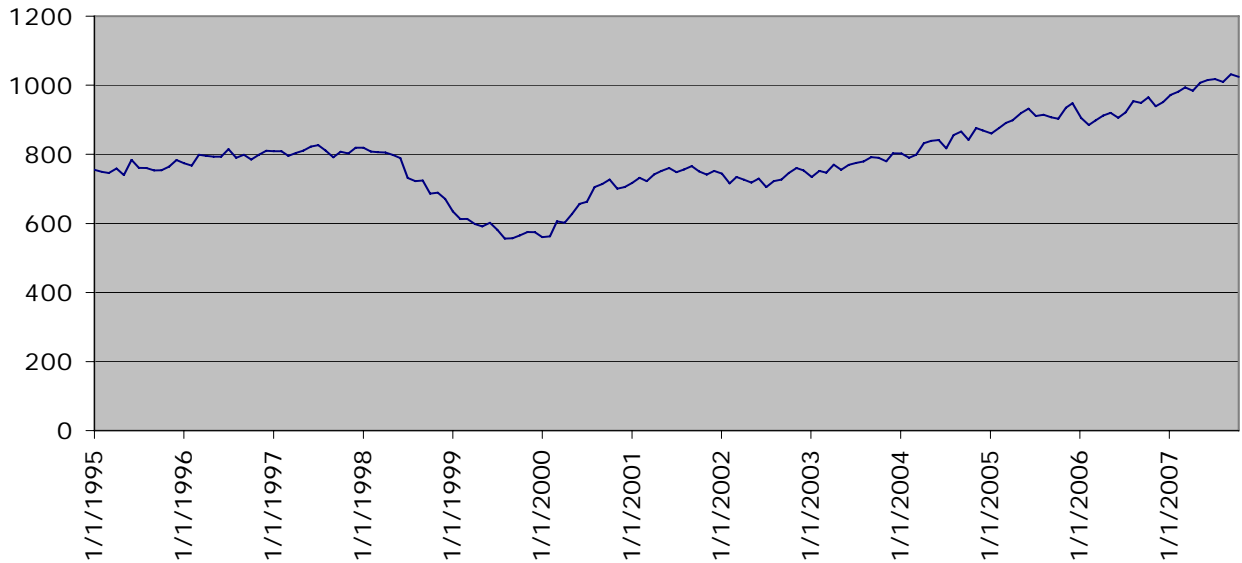
|                              | 2007 | 2006 | 2005 | 2004 | 2003 | 2002 |
|------------------------------|------|------|------|------|------|------|
| <b>Previous Year's Fleet</b> | 654  | 641  | 673  | 678  | 677  | 670  |
| <b>Reductions to Fleet</b>   |      |      |      |      |      |      |
| Retired                      | -26  | -10  | -42  | -15  | -2   | -2   |
| Destroyed                    | 0    | -6   | -3   | -1   | -3   | 0    |
| <b>Subtotal, deletions</b>   | -26  | -16  | -45  | -16  | -5   | -2   |
| <b>Additions to Fleet</b>    |      |      |      |      |      |      |
| Brought Back into Service    | 11   | 20   | 8    | 1    | 1    | 1    |
| Newly Manufactured           | 11   | 9    | 4    | 9    | 5    | 8    |
| Assembled from Parts         | 0    | 0    | 1    | 1    | 0    | 0    |
| <b>Subtotal, additions</b>   | 22   | 29   | 13   | 11   | 6    | 9    |
| <b>Net Change</b>            | -4   | 13   | -32  | -5   | 1    | 7    |
| <b>Total Available Rigs</b>  | 650  | 654  | 641  | 673  | 678  | 677  |
| <b>Total Active Rigs</b>     | 574  | 557  | 545  | 486  | 479  | 460  |
| <b>Utilization</b>           | 88%  | 85%  | 85%  | 72%  | 71%  | 68%  |

*Source: Steve Berkman, Tory Stokes , ReedHycalog. SPECIAL FOCUS: 54TH REEDHYCALOG RIG CENSUS. "Rig building continues while fleet utilization declines." Vol. 228. No. 10. October 2007. WorldOil.com*

There has been a significant percentage increase in newly manufactured rigs, but their number remains small in absolute terms and as a percent of the stock of existing rigs. Rig construction, especially those used in deep water operations, require up to three years to plan, design, and manufacture.

Figure 9 shows total monthly international rig stocks since 1995. These data show a steady increase since 2003, reflecting the period of increasing oil prices. Land rigs, which accounted for 71% of all rigs in 2006, are simpler and can be constructed with a shorter lead time and hence are more responsive to oil prices.

**Figure 9. Total International Rig Count: Offshore and Land**

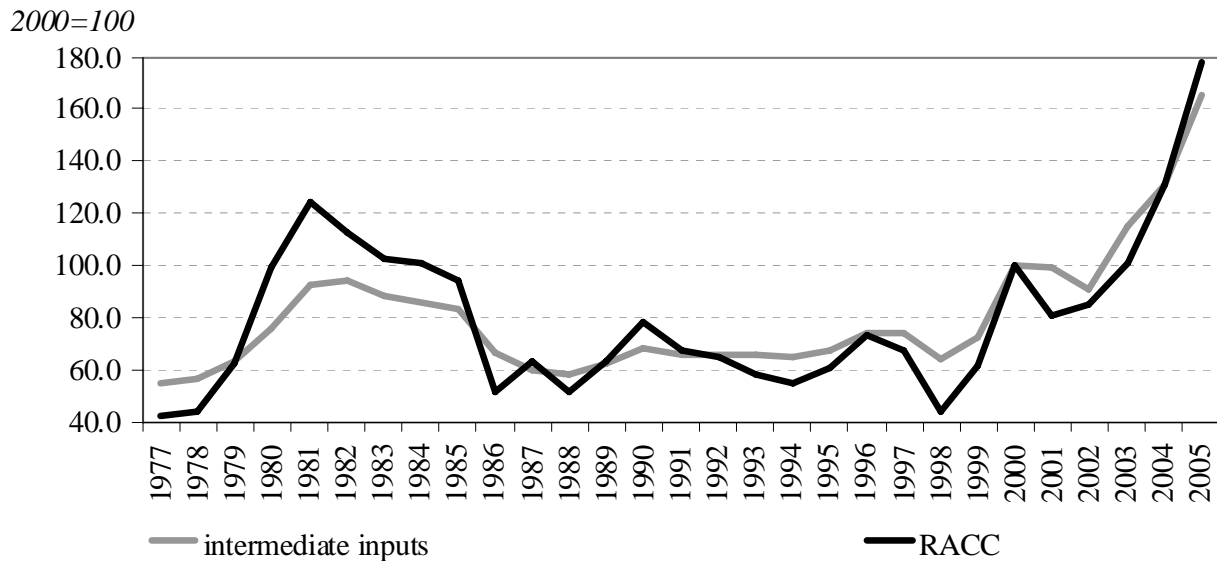


The effect of capacity constraints by suppliers of these inputs into E&P activity can be seen in Figure 10, which shows an index of prices for these intermediate inputs. The price series reflects the costs of intermediate inputs into the extraction activity but are suggestive of what prices are for similar inputs used in exploration activity.

While input prices were fairly stable during the late 1980s and 1990s, they rose sharply in 2000 and after a three-year pause rose dramatically in the 2004-05 period. The argument that exploration activity has been curtailed because of the scarcity of labor and equipment has merit for the last two or three years, but it does not explain the declining real levels before that. Furthermore, the skyrocketing prices of E&P activities suggests that the pattern of relatively flat outlays for exploration by the Big Five in recent years is, in fact, a substantial decline in real exploratory activity and that the 54% increase in exploration outlays in 2004-06 still represents a decline in real terms.



Figure 10. Oil and Gas Extraction Price Indices (1977-2005)



3) Explanation Three: Uncertainty about future oil prices and price volatility induces caution in exploration investments by companies.

Adding to the problem of the boom-bust cycle for personnel and equipment is the increasing volatility of oil prices, which makes forecasting of price trends more difficult. Firms typically set a “planning price” to help them decide when to develop a resource. Resources are not developed unless the firm can earn a targeted rate of return at the planning price. In recent years, this planning price has tended to be very conservative and has seriously lagged behind actual market prices. The justification for using a conservative price in making investment decisions reflects the fact that it takes several years between the time that a decision is made to develop a resource and the time that output is available for sale. Given past volatility of oil prices, firms want to guard against the event that market prices fall below the planning price by the time that production has begun.

However, given today’s markets in which the forward price available in derivatives markets is at historic highs, firms have had the opportunity to hedge new increased investments by selling all or some portion of the expected future oil production stream on futures or long-term financial derivatives markets. Forward sales protect the oil-exploring firms from price uncertainty, at least for any discovered barrels, by allowing

the firms to guarantee the margin of profit on future production by locking in sales prices in forward financial markets, such as the 5- and 10-year derivative market. Such hedging strategies do mean that the firm will be “giving up” the possibility of any supplemental profits if, in fact, oil prices are to rise above the current forward financial derivative prices. And sometimes it can be hard to sell large volumes of oil forward in over-the-counter markets. Thus, many commercial players have been disinclined to use hedging as a means to reduce the risk associated with long-term investments. However, the forward market remains a vehicle for companies who want to reduce the element of price uncertainty from upstream expenditure, and hedging stands as a counterargument to the explanation that price uncertainty by necessity discourages investment.

Some economists have suggested that higher price volatility and increasing uncertainty is a deliberate (and optimal) strategy for OPEC, since predictably high prices will induce capacity and output increases from non-OPEC suppliers and a subsequent reduction in price. In order to maximize revenue without inducing entry by competitors, OPEC maintains the threat of low future prices—a credible threat given the past price behavior of oil and the low costs of OPEC producers relative to the costs of potential entrants.

4) Explanation Four: Short-term pressures from shareholders and investor markets prevent oil company management from favoring long-term, asset-building strategies over policies that will boost short-term immediate quarterly gains in stock shares.

One explanation for the failure of major oil companies to increase spending on exploration is that investors are signaling to management that short-term profits, including earnings gained from buying existing shares, is a better use of profits than outlays on oil exploration and other major capital investments. Investors benefit from share buybacks since earnings per share, and hence the price of shares, will be higher with fewer shares outstanding. Firms have also increased dividend payouts; again, the presumption is that this is what “the market” prefers.

It should also be pointed out that management also benefits from stock appreciation since compensation and value of stock options are tied to profits and stock price. For those who are concerned with corporate governance issues there is a conflict of

interest here between the long-term interest of shareholders and a combination of stock traders (short-term investors) and management.

An alternative view by Osmundsen, Mohn, Misund, and Asche (Osmundsen et al.) argues that share prices have not been sensitive to the rate of return to capital employed (RoACE)—the indicator that markets have used to value oil companies and that “companies have not been rewarded for their short-term efforts.” It is their judgment that companies will revert to focusing on traditional indicators such as production and reserve growth.

It can be argued that these large increases in dividends and buybacks suggest that these firms are, in effect, beginning the process of partial liquidation, accepting a smaller role in the future energy world in return for larger cash payouts now.

Still, firms with strong balance sheets believe that they will have the option later on to tap strong cash flow from their remaining legacy assets to purchase new reserves via mergers or acquisitions to replace depletion of their existing assets.<sup>9</sup> Some firms believe that prices will eventually sink, creating bargain opportunities to pick up the reserves of small firms who will be harder hit by lower prices. However, this “I will fix it later through acquisitions” strategy could prove tenuous, especially if markets do not weaken significantly in the coming years. In the case of any one individual firm acting alone, this strategy would make sense. A single firm can potentially reverse its failure to replace reserves by acquiring the reserves of another firm. But if many firms all follow this same “wait and see” approach and few other firms make significant exploration investments, then the amount of newly discovered reserves will be quite limited and the price for a firm to “buy” existing reserves will rise accordingly, limiting the option to gain reserves via purchases.

This phenomenon would lead to even greater consolidation and concentration in the industry, as more firms merge to attain control of the shrinking pool of existing reserves, with fewer and fewer new oil fields coming on line to increase world production capacity. From the point of view of public interest, this scenario of increased consolidation against depleting asset bases and sinking available future production would threaten future energy security for major consuming countries such as the United States.

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<sup>9</sup> This view is based on the authors’ interviews with senior executives from major oil companies.

Thus, there could be a disconnect between the interests of any individual private U.S. firm and the national interest when it comes to exploration and acquisitions strategies.

5) Explanation Five: Scarcity of good prospects that are available to IOCs has restrained increases in spending on exploration.

There are fewer and fewer highly prolific domains where foreign oil company investors are still welcome, and the Big Five majors are therefore opportunity-constrained. Indeed, a large part of the remaining world reserves is restricted to development by the NOCs. Today, NOCs hold nearly 80% of global reserves of oil; they also dominate the world's oil production. Many of the countries with the largest fields, including Saudi Arabia, Iraq, Iran, Kuwait, and Mexico are currently closed to exploration and investment by the Big Five companies, while access to other previously available oil-rich areas such as Russia and Venezuela is becoming increasingly restricted. Certain resources at home in the United States are also off limits due to environmental restrictions. Outside these key regions, there are fewer opportunities to identify giant oil fields of the scale of the North Sea or Prudhoe Bay, limiting the options for IOCs to earn high rates of return from exploration activity. IOCs have an advantage over smaller firms in developing large acreage because of their capital and stock of managerial skills honed in managing large-scale projects. For smaller fields still to be found in Africa, Latin America, the U.S. Rockies and Southwest, and elsewhere, the smaller independents may be able to operate with lower costs and are therefore better suited to developing them.

### **ARE IOCs OBSOLETE?**

Like so much of the modern economy, the oil industry functions on the basis of a nexus of contracts with many subcontractors. Each firm is highly specialized in what it does. Increasingly, the IOCs have become more like general contractors, coordinating the operation of a number of suppliers who themselves are the ones who undertake seismic work, analyze data, provide drilling rigs and crews and a host of oil field services. The larger IOCs also serve the function of bankers, providing the vast amount of financial resources required to mount greenfield projects in increasingly unfavorable and

difficult environments. They also provide the management, organizational skills, and oversight that these large projects require.

The question is whether NOCs will find this role increasingly useful or whether they believe that such operational planning functions can either be performed by themselves or be farmed out to a service company under a fee-for-service structure. The fact that IOCs have had a poor record in recent years avoiding giant cost overruns on mega projects in Kazakhstan, the Sakhalin Islands, and the Middle East means that NOCs might be skeptical of the benefits being offered by IOCs. Moreover, investors are also questioning whether there is a continued role for the largest firms in a world where the average size of new finds is declining. Smaller E&P firms have lower costs than the large bureaucratic IOCs. They might have an advantage in finding and developing the remaining reserves that are available to private firms. Stock markets reflect these perceptions, with the shares of NOCs and American independents generally performing better than IOC shares.

Figure 11 shows an unweighted index of share prices for the Big Five as opposed to 12 NOCs that have partially privatized and whose shares are publically traded. Since the latter part of 2002, prices of NOC shares have risen by 531% while those of the IOCs have increased by only 113%, reflecting the financial market's valuation of the reserve assets and future profit potential of the two groups of companies.

In addition to the rising exploration expenditure of the smaller U.S. independent firms, the IOCs are also facing increased competition from NOCs that are going beyond their own shores to search and develop resources abroad. The Chinese firms PetroChina and CNOOC are in the forefront of this trend, but Petrobras, StatoilHydro, PETRONAS, and others are also pursuing this go-abroad exploration strategy.

Figure 12 shows announcements by Chinese firms of foreign investments and acquisitions. Some of the planned acquisitions are for pipelines and other infrastructure, but there are significant investments in exploration and development as well. Although some of these firms are very large in terms of domestic reserves, their foreign reserves and current production remain small compared to the IOCs. PetroChina, a subsidiary of CNPC and the most aggressive of the Chinese firms in overseas investment, still has 95% of its reserves in China.

Figure 11. Share Price Performance (Indexed October 2002 equals 100)

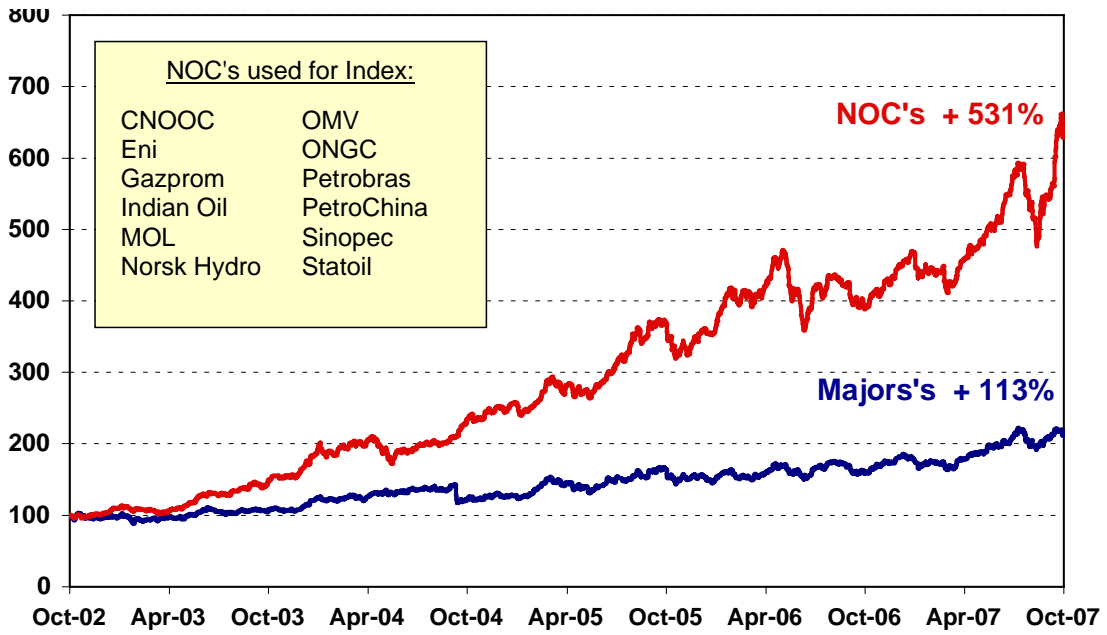
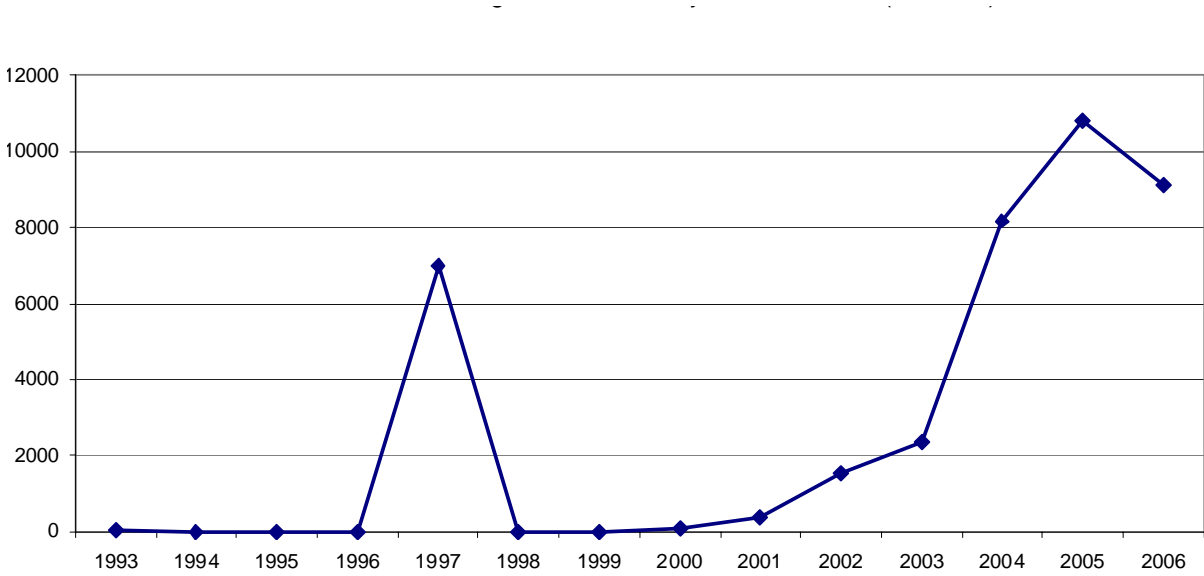


Figure 12. Announcements of Foreign Investments by Chinese Firms (million \$)



### DO THE UNITED STATES NEED AN NOC?

The U.S.-based IOCs have, in many ways, acted as America's NOCs, despite the fact that they are privately owned. Generally speaking, many countries see the role of an NOC to help promote energy security and support the national foreign and strategic policies of the government. In the case of many countries, such as China, Saudi Arabia, Russia, and India, this responsibility comes at the expense of solely focusing on maximizing profits. However, for the U.S., it might be argued, that tradeoffs have generally not been required. Throughout modern U.S. history, the American IOCs have been able to support U.S. foreign policy in many instances without the sacrifice of profits. On the contrary, in a variety of examples such as U.S.-Middle East policy following World War II, corporate profits of the American IOCs have been enhanced by being instruments of U.S. foreign policy.

During World War II and the Cold War, U.S. policy was to ensure that the prolific oil deposits in the Middle East and North Africa (MENA) were kept out of enemy hands and that they would not be used to threaten U.S. (and Western) interests. It was in the U.S. national interest to have plentiful supply at reasonable prices. The IOCs were more than willing to provide ample supply and to keep international oil prices low—so much so that U.S. independents were able to convince the Eisenhower administration to impose import quotas so as to “protect” U.S. domestic production in the name of promoting energy security!

With the wave of oil nationalizations that swept many oil-producing countries in the 1970s, the IOCs lost their preeminent position, and the United States lost considerable leverage in determining future oil supplies. National oil companies took over vast resources, and their controlling governments began to set policies for production and pricing. The result was a successful attempt to limit supply to raise the rents earned from control of the resources, and the 1970s witnessed a huge transfer of wealth from the industrialized West to the oil-rich Middle East. For the first time, in 1973, oil producers used oil as a weapon of foreign policy, imposing an embargo to protest U.S. foreign policy towards the Arab-Israeli conflict.

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Still, even with the nationalizations of the 1970s, the United States forged alliances with sufficient oil producing nations so that oil did remain outside the influence of the Soviet Union. And, it is also worth noting, Saudi Arabia and the other Arab Gulf states undertook massive investment programs to increase their capacity and keep cheap oil flowing to the United States and the other industrialized nations throughout the 1980s and 1990s. IOC investment in new areas such as the North Sea, West Africa, and Australia also helped keep a diverse supply base for the United States.

With the fall of the Soviet Union in 1989, the United States pursued a vigorous policy of opening the countries of the former Soviet Union (FSU) to investments by the American IOCs in another example of where U.S. foreign policy and IOC profit making businesses were able to make a marriage of convenience. This was especially true in the countries of Central Asia where the construction of the Baku-Tbilisi-Ceyhan pipeline, supported by the U.S. government, has helped Central Asian countries become more independent of Russia's sphere of influence.

The economic crises in the 1980s also resulted in loosening the grip of NOCs in Latin America as countries were required to privatize state owned enterprises as a condition of receiving loans from the international lending agencies.

In each of these instances, U.S. policy was to maintain a competitive international oil market—to counteract policies by other countries that attempt to constrain the market and exert control over it. The IOCs have played an important role in maintaining this open, competitive market in Latin America.

The U.S. government may not favor these large firms per se, but the fact is that the IOCs have strong managerial competence, experience, and resources that enable them to undertake the development of new resources in foreign countries, helping meet the larger U.S. government goal of diversification of the international oil supply. In reality, large IOCs have had substantial bargaining leverage on their own and required little explicit intervention by the U.S. government.

But it is not at all obvious as a matter of public policy whether the United States should now worry a priori if foreign companies or NOCs have an increasingly important role in exploiting the world's energy reserves. There are no longer "enemy states" from which we wish to protect the world energy supply, and the United States continues to



dominate the world's sea-lanes, limiting the chances of a major cuoff of oil shipments by sea. Even in a world of a diminished role for the IOCs, the basic contours of the world oil and gas supply could remain relatively unchanged: there will be a large number of suppliers, and some will continue to control, either individually or in concert with others, a substantial share of the market which can be used to influence price in tight markets. But the “competitive fringe”—whether it consists of mainly large IOCs; a larger number of smaller aggressive firms; a combination of NOCs, partially privatized NOCs, and private international firms; or firms producing alternative energy—will continue to undermine any exercise of monopoly power.

As we have pointed out in this paper, recent behavior of the IOCs has raised questions about whether they should still be considered as part of the competitive fringe or, whether intended or not, they have supported OPEC policy to restrict supply and raise price. To the extent that they continue recent policies of underfunding exploration, depleting their reserves, and continuing the slow decline in output, they are not supporting U.S. energy security interests.

A primary rationale for the mergers of these IOCs was that they could better seek and develop major new fields. Since this has not been the ultimate outcome of the mergers, U.S. policy should address whether additional mergers are in the best interests of the country or whether tax policies should be adopted that shift incentives toward investing in exploration and away from share buybacks and buying reserves from others.

We have shown that smaller U.S. companies are growing, in part through a process of their own mergers, and are vigorously spending on exploration. In this respect, they are taking the place of the larger IOCs. However, as we noted, the capital in the control of these smaller firms is still small relative to the cash flow of the Big Five, arguing for the creation of policies that would better incentivize the Big Five to increase investments towards increasing future oil supply or other alternative energy.

Some U.S. government and policy analysts have discussed—in light of the less than favorable investment policies of the IOCs from the point of view of the public good aspect of aggregate future oil supply—whether the United States should consider creating its own NOC in order to compete with NOCs of exporting countries and thereby guarantee that the United States will be able to access needed future oil supply. This was

a path followed by many countries including Japan and Canada as a result of the oil crises of the 1970s. Yet, there is little evidence that these Japanese, Canadian, and other entities have had any real positive effect on the energy security of these countries, and in most cases these firms have subsequently been privatized.<sup>10</sup>

It has been the policy of the United States for many years to promote the diversification of oil supplies around the globe. This policy was successful in the 1980s and 1990s with new production areas opening in West Africa, Central Asia, and in unconventional oil and gas production in North America. But the rate of gain in non-OPEC oil production has been flagging recently despite very high oil prices, reflecting the geological limitations and political and bureaucratic barriers to investment in the many attractive areas such as Russia, the Caspian Basin, and Mexico.

Still, the privately-held American corporations that currently look for oil worldwide are more efficient and productive organizations than any new government-run entity that is likely to be created by a U.S. federal government initiative. The question of the future competitiveness of American companies and their continued access to resources is best answered by U.S. government actions in areas where Washington already has jurisdiction and experience:

- in promoting and enforcing bilateral and multilateral trade and investment treaties such as the World Trade Organization (WTO), North American Free Trade Agreement (NAFTA), the Energy Charter, and others;
- in utilizing foreign aid in places where social and economic development assistance is badly needed;
- in fostering transparency and governance in oil producing regions by supporting efforts of organizations like the World Bank and the Asian Development Bank;
- in fostering a comprehensive, domestic national energy policy that would enhance the health of our domestic industry, improve our energy security by promoting alternative energy, and increase U.S. credibility on the world scene.

The structure of the world oil market has changed since the 1970s from one characterized by contracts between buyers and sellers in specific countries to a well-developed commodity market where oil will flow based on its price. So long as the

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<sup>10</sup> Robert A. Manning, *The Asian Energy Factor* (New York: Palgrave, 2000), 143.

current regime of relatively open and competitive energy markets persists, the United States will be able to purchase the energy resources that consumers are willing to pay for.

It should certainly be in the U.S. interest to promote best practices for NOCs through existing and emerging bilateral and multilateral trade mechanisms such as the WTO, the Energy Charter, NAFTA, and other similar international trade architecture. These agreements already bar uncompetitive energy subsidies and barriers to open investment in energy projects. This would be an important element in ensuring that there is sufficient investment to meet global demand in the years and decades ahead.

More broadly, while the United States should certainly care whether its sources of oil supply are sufficiently diverse to prevent a single supplier or group of suppliers from exercising monopoly power, perhaps at the risk of geopolitical threats, it is not all that obvious whether the United States needs to care whether its oil companies have a dominant role in exploiting the world's energy reserves.

We have argued elsewhere that the current free-market structure is durable and unlikely to be seriously threatened in the foreseeable future.<sup>11</sup> While there is no question that a cartel of powerful countries armed with NOCs could try to disrupt oil supplies to the United States and its allies, it is hard to imagine the circumstances which would motivate such an alliance to make simultaneous withdrawals of supply from the market, leaving each exporter with no oil revenues. Moreover, it is unclear what having U.S. companies engaged in drilling around the world would achieve if their host countries suddenly announced for reasons of war that they were not allowed to produce and export production. The lesson of Aramco in 1973 is that American firms would have no choice but to comply with host government embargoes.

The flip side is equally true. It is unclear what benefit China is really getting from having its NOCs own or produce foreign equity oil, the shipments of which could easily be interdicted by the U.S. Navy during a time of war.

More fundamentally, the United States does need to protect itself from the geopolitical and strategic implications of collective action by a large exporter or group of exporters. One solution is a healthy American oil industry looking abroad to more diverse

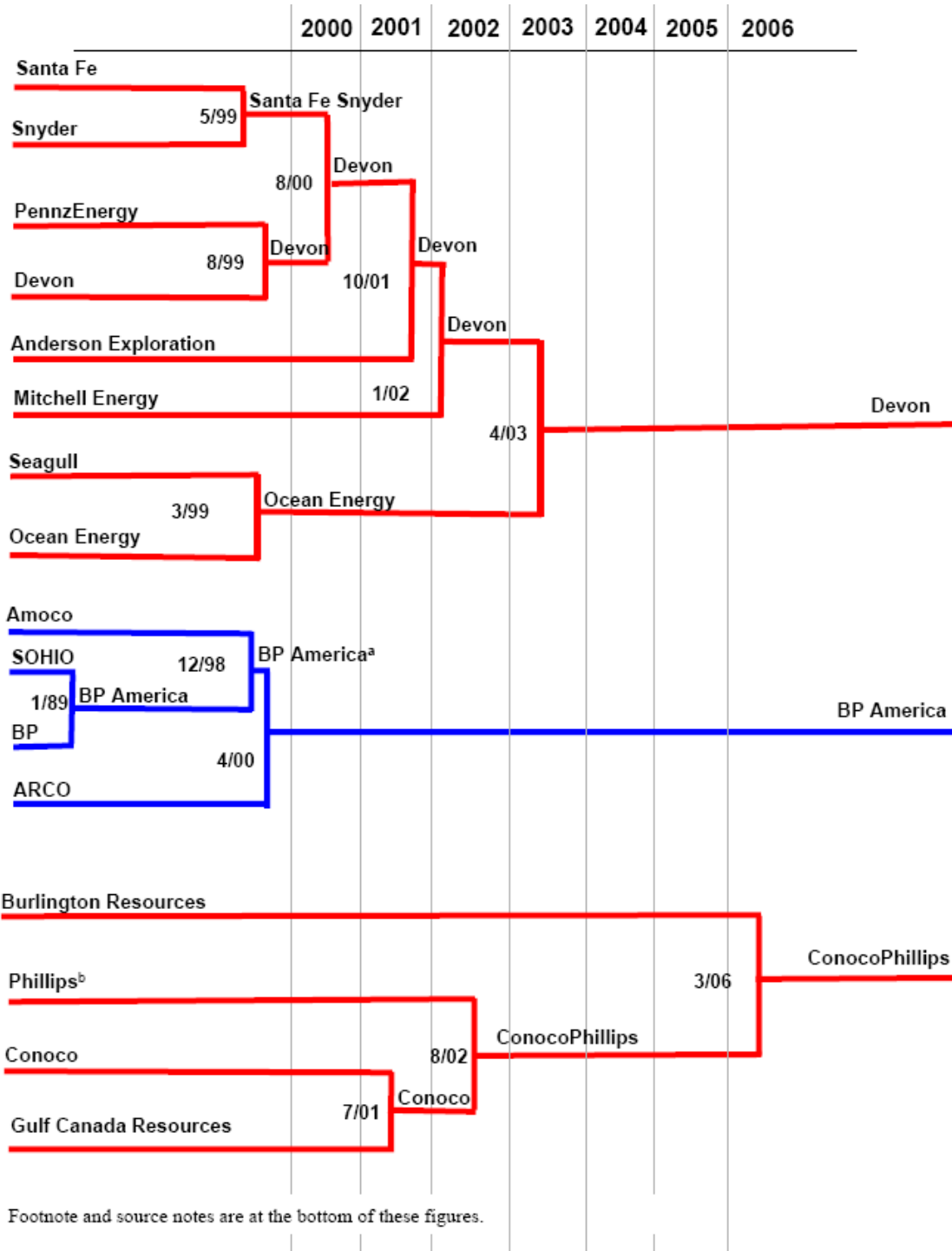
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<sup>11</sup> See chapter on "The Militarization of Energy—The Russian Connection," by Amy Myers Jaffe and Ronald Soligo, forthcoming in *Energy Security and Global Politics: The Militarization of Resource Management*, Routledge (eds. James Russell and Daniel Moran).

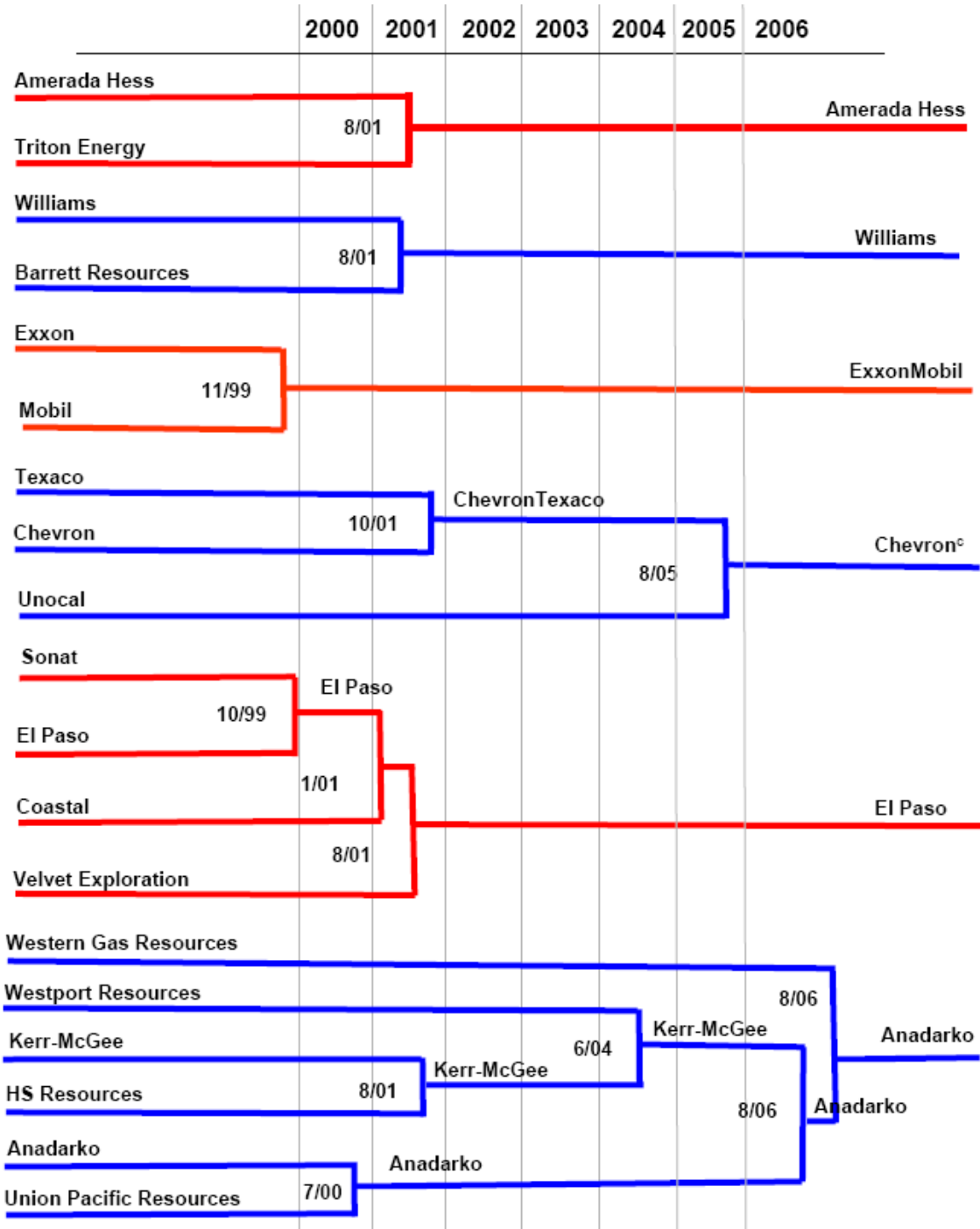
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sources of oil supply. But there are other means to break up the monopoly power of oil producers as well. The advent of nuclear power in the 1970s was an effective policy tool. So was the creation of strategic stockpiles of oil. In today's scene, an effective and broad-based American effort to reduce oil use by adopting more efficient transportation technologies or shifting to non-oil fuels would be extremely effective in limiting the monopoly power of any imaginable alliance of "enemy" NOCs.

Appendix A. Genealogy of Major U.S. Oil and Gas Producers (2000-2006)

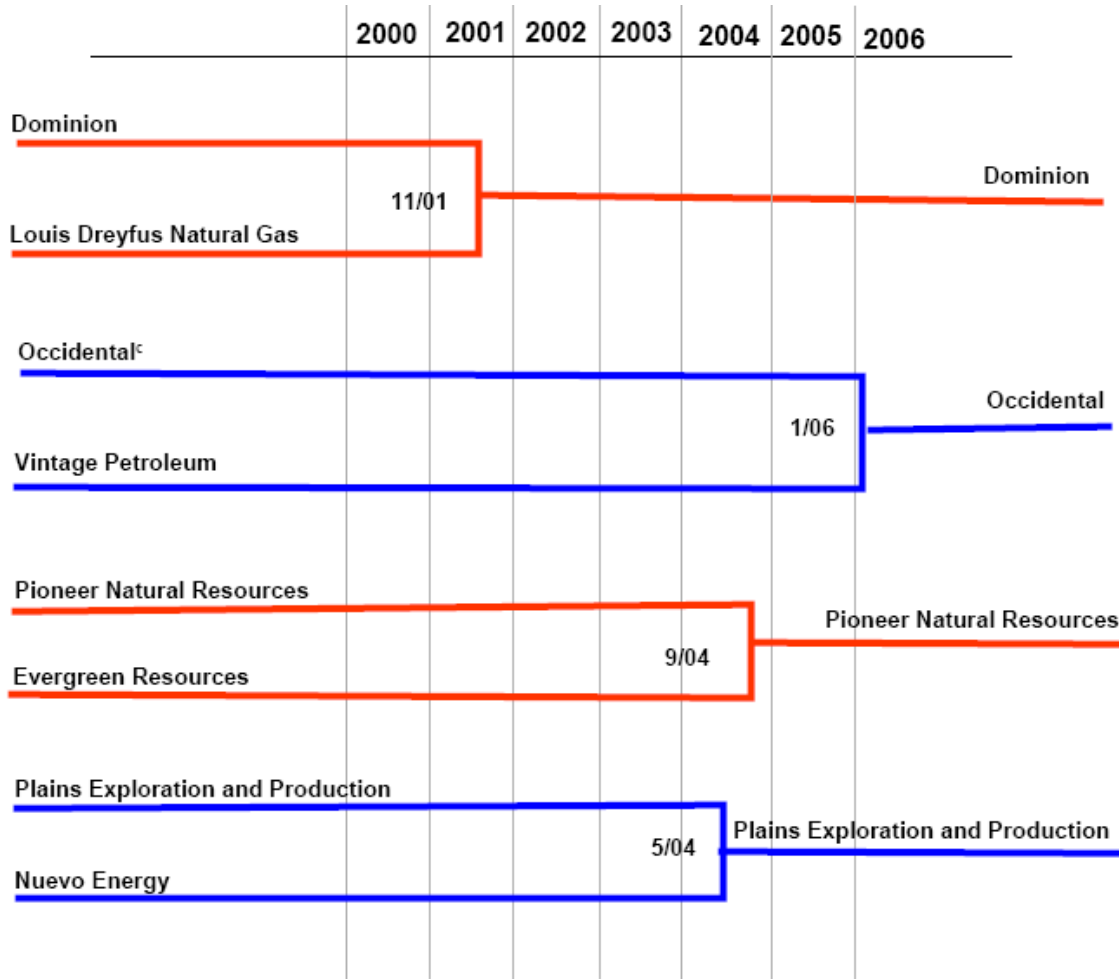


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Footnote and source notes are at the bottom of these figures.

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<sup>a</sup>The company resulting from BP's merger with Amoco was called BP Amoco initially (including at the time of the acquisition of ARCO), but subsequently reverted to BP America.

<sup>b</sup>Phillips acquired control of ARCO's Alaska assets from BP America in April 2000 as part of the consent agreement that was part of the U.S. Federal Trade Commission's approval of BP Amoco's acquisition of ARCO in April 2000.

<sup>c</sup>ChevronTexaco renamed itself Chevron on May 9, 2005.

<sup>d</sup>Occidental acquired control of Altura Energy, a limited partnership owned by BP Amoco and Royal Dutch/Shell (through Shell Oil) at approximately the same time as it acquired ARCO Long Beach. Altura Energy was the largest oil producer in the state of Texas at the time of the transaction. See Energy Information Administration, "Aspects of Occidental Petroleum's Purchase of Altura Energy and ARCO Long Beach" (April 18, 2000). This is available on the Internet at <http://www.eia.doe.gov/emeu/finance/mergers/oxyindex.html> (as of November 28, 2006).

Sources: Company news releases and other public disclosures.

"Genealogy of Major U.S. Oil and Gas Producers." 1/18/2007. Energy Information Administration. [www.eia.gov](http://www.eia.gov) [product#: upstream.pdf]  
<http://www.eia.doe.gov/emeu/finance/mergers/upstream.pdf>

**Appendix B. List of the Next 20 Firms in the U.S.**

Occidental Petroleum Corporation  
Anadarko Petroleum Corporation  
Apache Corporation  
Hess Corporation  
Devon Energy Corporation  
Marathon Oil Corporation  
Pioneer Natural Resources Company  
Plains Exploration & Production Company  
Noble Energy, Inc.  
Dominion  
XTO Energy Inc.  
Whiting Petroleum Corporation  
Murphy Oil Corporation  
Encore Acquisition Company  
Pogo Producing Company  
Denbury Resources Inc.  
Berry Petroleum Company  
Chesapeake Energy Corporation  
Newfield Exploration Company  
Forest Oil Corporation