

MERGERS IN THE U.S. PETROLEUM INDUSTRY

1971-1984:

AN UPDATED COMPARATIVE ANALYSIS

by

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SECTION 1:

Introduction and Executive Summary

In September 1982, the FTC published a report on merger activity in the United States petroleum industry. That report was written at the request of several Congressional committees that were concerned with the nature and extent of acquisitions by the leading petroleum companies.¹ The 1982 Report dealt with a number of issues involving mergers and acquisitions in the petroleum industry, including competitive effects, possible efficiencies, and the financial costs of these transactions. The 1982 Report presented data for 1971-1981 on merger activity and on concentration in the petroleum industry.

The purpose of the present study is to add three more years of data, for 1982-1984, to the historical series on merger activity and concentration in the 1982 Report. The present study is divided into three principal sections: (1) an analysis of acquisition activity by leading petroleum firms, (2) a

¹ Federal Trade Commission, "Mergers in the Petroleum Industry: Report of the Federal Trade Commission," Washington, D.C., September 1982. [Cited hereinafter as 1982 Report.]

discussion of concentration in crude oil reserves and production, and (3) a review of concentration in domestic petroleum refining.

The 1982-1984 period recorded several large transactions involving leading petroleum companies.² While these transactions were newsworthy because of their large size, they do not necessarily represent increases in the relative size of the leading petroleum companies. In some cases, the leading petroleum companies were acquired by firms that previously did not have substantial domestic petroleum interests. Compared with other large firms in the economy, the leading petroleum companies, over 1979-1984, were not the most active acquirers, measured either by the number of transactions or by the value of the acquisitions relative to the assets and sales of the acquiring firms (see Section 2). For 1979-1984, the 18 leading petroleum companies made 85 acquisitions, each valued at \$15 million or more, and the transactions value of these acquisitions each year averaged 3.21 percent of the

² In 1982, U.S. Steel (now USX) acquired Marathon, DuPont acquired Conoco, and Occidental Petroleum acquired Cities Service. In 1984, Socal (then Standard Oil of California now known as Chevron) purchased Gulf, Texaco purchased Getty, and Mobil purchased Superior Oil.

acquirers' market value. In comparison, 16 Fortune 100 firms with limited petroleum interests made 103 acquisitions, which each year averaged 6.69 percent of the acquirers' market value, and a sample of 18 other Fortune 100 firms with no petroleum interests made 59 acquisitions, which each year averaged 3.53 percent of the acquirers' market value. Recently, from 1982-1984, the leading petroleum companies made \$2.5 billion in net divestitures of non-energy related assets; this development suggests the conglomeration movement among petroleum companies that was of public concern in the 1970's has diminished.

A second major portion of this report concerns changes in concentration in the petroleum industry, which is affected by mergers and acquisitions as well as other factors. The appropriate areas in which to measure concentration in the petroleum industry depend on the vertical stage of production and on the policy issues under consideration. We consider crude oil reserves and production separately from crude oil refining.

For crude oil reserves and production, the appropriate area for measuring concentration is the world as a whole. Since

1973, movements in the world price level of crude oil have primarily governed the basic price paid by domestic consumers. This should continue so long as the United States does not directly limit the import of foreign oil products, such as happened when the pre-1973 oil import quotas were in effect. The level of world prices is primarily determined by the production decisions of the large state-owned oil companies of foreign governments that control production within their own national borders. Changes in ownership among U.S.-based oil companies will have relatively little effect on world concentration, because these firms own or directly control only a small fraction of the world production and reserves.³

Concentration of world crude oil reserves lies in the lower end of the "moderately concentrated" range and remained virtually unchanged from year-end 1981 to year-end 1984. Measured by the Herfindahl-Hirshman Index (HHI), concentration of world crude oil reserves, as reported in Section 3, was 1047 in 1981 and 1062 in 1984, and the four-firm concentration ratio was 53.0 percent in 1981 and 53.8 percent in 1984.

³ For example, Exxon, the largest U.S.-based oil company, controls only 1.5 percent of world crude oil reserves.

World crude oil production is unconcentrated. Moreover, concentration fell from 1981 to 1984; the HHI for world crude oil production for 1981 was 816 and for 1984, 653. Similarly, the four-firm concentration ratio fell over the same period from 57.3 to 52.6 percent.

Concentration of domestic oil reserves and production could be of antitrust concern if imports into the U.S. were limited for a prolonged period either by international developments or by U.S. government-imposed restrictions on oil imports. Here, the concerns are limited, however, because ownership of domestic crude oil production and reserves is unconcentrated.⁴ In crude oil, concentration is affected by success in exploration and development independently of acquisitions. Correspondingly, the acquisition activity of the leading oil companies had relatively little effect on the concentration levels of domestic crude oil production and reserves.

For U.S. crude oil production, four-firm concentration (reported in Section 3) increased from 24.8 percent in 1981 to

⁴ If there were regional submarkets in crude oil, such as the West Coast, and if reserve ownership were concentrated in these regions, then intraregional mergers could be of antitrust concern.

26.1 percent in 1984 and the HHI increased from 251 to 282 over the same period. Based on U.S. reserves, four-firm concentration fell slightly from 30.5 percent at year-end 1981 to 29.2 percent in 1984, and the HHI remained virtually unchanged at 322 in 1981 and 333 in 1984.

The markets for refined petroleum products may be more regional in nature, as discussed in Section 3.2. For a variety of economic and technological reasons, international and inter-regional trade occurs more in crude oil than in refined products. Thus, while the base price may be determined by the world market price of crude oil, the refining margins and the corresponding prices of refined products to end users could differ among regions. Concentration (and acquisition activity) of domestic oil companies is consequently of greater concern in crude oil refining and is more appropriately considered on a regional basis.

In domestic refining, concentration remained relatively constant or rose slightly from year-end 1981 to year-end 1984, depending on the region reviewed. On the West Coast (PADD

V)⁵, the four-firm concentration ratio for 1981 was 55.9 percent and for 1984 58.0 percent (adjusting for a temporarily closed refinery). In the Upper Midwest (part of PADD II), concentration remained unchanged with a four-firm concentration ratio for 1981 of 54.1 percent and 54.2 percent for 1984 (allowing for a temporarily closed refinery). In the East (PADD's I, II, and III), four-firm concentration increased from 29.5 percent in 1981 to 33.0 percent in 1984. Concentration may have increased partly because some smaller refineries closed following the loss of entitlements to low-cost crude after price controls ended, but also because of horizontal acquisitions among large petroleum companies. Yet, this latter effect was limited by the application of the antitrust laws. If Marathon's private antitrust suit had not blocked its acquisition by Mobil and if the FTC had not required divestiture of certain refinery assets in the Socal/Gulf⁶ and Texaco/Getty transactions, four-firm concentration at year-end 1984 in the Upper Midwest would have been 64.2

⁵ Much regional petroleum data is reported by Petroleum Administration for Defense Districts (PADD). The PADD's are delineated in Figure 1 in Section 3.2.

⁶ In the case of Socal/Gulf, the divestiture was of assets related to kerosine for jet fuel.

percent (instead of 54.2) and in the East 37.5 percent (instead of 33.0).

These results, and many others, are reviewed in more detail in the sections that follow.

SECTION 2:

Merger Activity by the Leading Petroleum Companies, 1971-1984

1. Introduction

A principal section of the 1982 Report developed and analyzed data on merger activity by the leading petroleum companies from 1971-1981. The purpose of the present study is to add three more years of data, for 1982-1984, to the historical series on merger activity in the 1982 Report. This update also provides an opportunity to correct certain errors in the data reported in the 1982 Report. Data sources and methodology used for this update are, with indicated exceptions, the same as those used in the 1982 Report.

The 1982 Report observed that apparently heightened acquisition activity by the largest petroleum companies ("LPC's") could be attributed to these firms' absolute large size rather than to any greater propensity by them to acquire other firms than that shown by other large corporations. The data for 1982-1984 confirm this observation. Acquisitions by petroleum companies included in the sample are no larger proportionally to their size than acquisitions by other large firms,

and apart from two exceptional years, there are no discernible trends in acquisitions relative to the LPC's size. Secondly, the 1982 Report noted that LPC's were concentrating their acquisitions on energy-related assets. This trend extended in 1982-1984, with the LPC's making substantial net divestitures of non-energy-related assets; the conglomeration movement among petroleum companies, prominent in the early- to mid-1970's, has not continued in the 1980's.

The present study, as was the original study, is organized around two sets of data. The first reports the merger and acquisition activity of the 16 LPC's, as ranked by total sales for calendar 1970 as reported in the 1971 Fortune 100.⁷ The 1982 Report sought to identify and quantify all mergers, acquisitions, and divestitures, each exceeding a \$10 million threshold, by the LPC's for the period from 1971-1981. The present Report extends the period examined through 1984. However, in most of the tables presented below figures are given for

⁷ The Fortune 500 Directory of leading industrial firms for a particular year bases its rankings on sales of the previous year and assets as of January 1 of the year of publication.

The selection of LPC's is further discussed in Section 2 below.

the entire period covered by both studies. The second set of data compares the merger and acquisition activity of the 18 largest petroleum companies (as of 1978) with that of (1) a group of 16 petroleum-related firms (those with some but proportionately smaller oil interests than the 18 largest) and (2) a random sample of 18 large non-petroleum companies. The 1982 Report presented figures for each of these groups over the period 1979-1981. The present Report extends this comparison through 1984.⁸ Again, most of the tables present figures for the entire period covered by both studies.

A large variety of measures can be used to describe merger activity, and our choices are governed largely by those measures employed in the 1982 Report. In both the description of mergers by LPC's over time and the comparison of petroleum company acquisitions with those of other large firms, we begin with some basic data on sales and assets of the firms in the

⁸ As discussed below in Section 3 and in the 1982 Report, pp. 52-56, the study differentiates between petroleum companies that devote their principal efforts to petroleum activities and petroleum-related companies that have some petroleum interests but devote a proportionally smaller amount of their efforts to petroleum activities.

sample.⁹ We then proceed to look at the acquisitions classified in several ways. Data tables are presented for each of these classifications.

The primary taxonomic split is between acquisitions that involve entire companies, "whole company acquisitions," and those that involve some of a firm's assets as well as whole company acquisitions, "total acquisitions." Within each of these two primary classifications, acquisition activity can be measured by simple counts of transactions, by the amount of the sales price, by the book value of the assets acquired, and by dollar sales of the acquired firm (in the case of whole company acquisitions).

The basic data are then adjusted to correct for the effects of three possible sources of bias. The first set of adjustments corrects for the effects of general inflation over the 1971-84 period. The second set of adjustments confines the analysis to transactions exceeding \$100 million in constant dollars; this attempts to eliminate a potential bias caused by possible

⁹ We did not reproduce the 1971 and 1979 historical data on the petroleum activities of the firms that were used to determine the original sample composition, since that data had not changed.

underreporting of smaller acquisitions in the pre-1978 period, when there were no official reporting requirements. The third group of adjustments expresses measures of merger activity relative to several measures of the acquiring firm's financial size; these adjustments allow for the effect of the increase in measures of the absolute size of petroleum firms following the post-1973 oil price increases.

We believe that by reviewing a multiplicity of measures, which allow for potential sources of bias in the data, we have strengthened our basic conclusions: (1) that there has been no trend, apart from two very active years (1979 and 1984), in LPC acquisitions relative to the size of the firms and (2) that the acquisition activities of the larger petroleum companies are not proportionately greater than those of other large companies.

In the present Report, the discussion concentrates on developments in the 1982-1984 period. When appropriate, the reader is referred to the 1982 Report for more extensive discussion of earlier developments.

2. Acquisition Activity of LPC's, 1971-1984.

a. Background Information on LPC's

Table 1 (parts A and B) lists the 16 corporations identified in the 1982 Report as LPC's based on their sales and assets in 1970 and 1971.¹⁰ A LPC is a firm that appeared in the top 100 firms of the Fortune 500 Directory of Industrial Companies in 1971 and devoted a substantial proportion of its activity to domestic crude oil production and refining. The preparers of the 1982 Report determined the domestic crude oil and natural gas liquids production for 1970 and the domestic petroleum refining capacity as of January 1, 1971 for all the firms in the Fortune 100 for which information was available. These firms were then ranked based on indices of their crude oil production and refining capacity relative to their total sales and assets. The 16 companies chosen for the LPC group all had high

¹⁰ Several of the LPC's have changed names since 1970, with several adopting as their formal corporate title their previously used retail trade name. The following changes have occurred: Standard Oil of California (Socal) is now known as Chevron; Standard Oil of Indiana as Amoco; Standard Oil of New Jersey as Exxon; Standard Oil of Ohio as simply Standard Oil; Sun Oil as Sun Companies; Union Oil of California as Unocal.

To keep the discussion consistent with the 1982 Report, the historical names are used throughout this Report.

TABLE 1A

**16 Large Petroleum Companies, 1970:
1970 and 1983 Comparative Assets,
Sales, and Fortune Rankings
(values in current dollars)**

Company	Rank	1970		Rank	1983	
		Assets (\$ million)	Sales		Assets (\$ million)	Sales
Ashland Oil	79	1000	1407	45	4108	7852
Atlantic Richfield	30	4392	2738	12	23282	25147
Cities Service	62	2193	1714	N.A.	N.A.	N.A.
Continental Oil	31	3023	2712	N.A.	N.A.	N.A.
Getty Oil	95	1946	1221	24	10385	11600
Gulf Oil	11	8672	5396	11	20964	26581
Mobil Oil	6	7921	7261	3	35072	54607
Phillips Petroleum	39	3057	2273	16	13094	15249
Shell Oil (US)	19	4610	3590	13	22169	19678
Standard Oil of CA	14	6594	4188	9	24010	27342
Standard Oil of IN	16	5397	3733	8	25805	27635
Standard Oil of NJ	2	19242	16554	1	62963	88561
Standard Oil of OH	83	1747	1374	25	16362	11599
Sun Oil	48	2767	1942	17	12466	14730
Texaco	9	9924	6350	6	27199	40068
Union Oil of CA	57	2515	1811	31	9228	10066

Sources: Fortune 500 Directory, 1971 and 1984. Sales are for years shown. Assets are end-of-year values. Company names are those used in 1970.

Note: N.A., Company merged, and separate data are no longer available.

TABLE 1B

**16 Large Petroleum Companies, 1970:
1970 and 1983 Comparative Assets,
Sales and Fortune Rankings
(values in constant dollars: 1970=100)**

Company	Rank	1970		Rank	1983	
		Assets (\$ million)	Sales		Assets (\$ million)	Sales
Ashland Oil	79	1000	1407	45	1662	3177
Atlantic Richfield	30	4392	2738	12	9420	10175
Cities Service	62	2193	1714	N.A.	N.A.	N.A.
Continental Oil	31	3023	2712	N.A.	N.A.	N.A.
Getty Oil	95	1946	1221	24	4202	4694
Gulf Oil	11	8672	5396	11	8483	10755
Mobil Oil	6	7921	7261	3	14191	22095
Phillips Petroleum	39	3057	2273	16	5298	6170
Shell Oil (US)	19	4610	3590	13	8970	7962
Standard Oil of CA	14	6594	4188	9	9715	11063
Standard Oil of IN	16	5397	3733	8	10441	11182
Standard Oil of NJ	2	19242	16554	1	25476	35834
Standard Oil of OH	83	1747	1374	25	6620	4693
Sun Oil	48	2767	1942	17	5044	5960
Texaco	9	9924	6350	6	11005	16212
Union Oil of CA	57	2515	1811	31	3734	4073

Sourced: Fortune 500 Directory, 1971 and 1984. Sales are for years shown. Assets are end-of-year values. Company names are those used in 1970.

Note: N.A., Company merged, and separate data are no longer available.

measure of relative petroleum activity on at least one of the indices and most ranked high on both. For 1970, the LPC's had a per-firm average of 394.4 thousand barrels per day of domestic crude oil and natural gas liquids production, and as of January 1, 1971, they had a per-firm average of 636.5 thousand barrels per day of domestic refining capacity.¹¹

As of 1983-1984, the LPC's were still substantial enterprises that as a group had increased in size in real terms since 1970, although not necessarily by acquisition of other firms. Two of the original 16 were acquired by firms outside the LPC group and separate data are no longer available for them.¹² The 14

¹¹ For a more complete discussion of the definition and selection of the LPC's, see the 1982 Report, pp. 18-21 and Appendix A of that report. For a presentation of the salient statistics of petroleum activities of the LPC's, see the 1982 Report, Table III-1, pp. 22-23.

¹² DuPont acquired Conoco in 1981 and Occidental Petroleum bought Cities Service in 1982. The acquisition or divestiture activity by Conoco and Cities Service up to the time they were acquired is included in the figures reported below. However, when an LPC was acquired by a non-LPC, subsequent acquisition activity by the buyer is excluded from the LPC sample.

The decision to exclude subsequent acquisitions by a non-LPC that bought an entire LPC was motivated by two considerations: a. Complete data on the petroleum activities for the merged firm were not always available due to limitations in financial reporting requirements; and b. Acquisition activities
(continued...)

firms that remain as identifiable entities had combined assets of \$307.1 billion as of January 1, 1984 and 1983 sales of \$380.7 billion measured in current dollars; in constant (or deflated) 1970 dollars their beginning 1984 assets were \$124.3 billion and their sales for 1983 were \$154.0 billion. They accounted for 34 percent of the assets and 33 percent of the sales of the 1984 Fortune 100. In 1971 they accounted for 29 percent of the assets and 21 percent of the sales of the 1971 Fortune 100.¹³

¹²(...continued)

and policies of the surviving, non-LPC buyer might have been significantly different than those of the acquired LPC so that the comparability of the data on the acquisition behavior of a specific group of LPC's defined at a particular point in time would be limited.

To account for a possible downward bias in the data caused by the exclusion of the post-acquisition activity of the LPC's purchasers, certain of the tables present alternative estimates (based on a simple proportional extrapolation) of how much acquisition activity would have happened if these firms had not been deleted from the sample.

¹³ Two more LPC's were acquired by other LPC's in 1984. The 1984 transactions were Standard Oil of California's purchase of Gulf and Texaco's acquisition of Getty. These transactions did not require any alternative estimates for subsequent years because they occurred in the last year of the sample period.

b. Basic Acquisition Data

Tables 2 and 3 provide summary information regarding the number and size of acquisitions by LPC's in each year from 1971 through 1984.¹⁴ The data in Table 2 refer to "whole company acquisitions," which the 1982 Report defines as the acquisition of essentially an entire firm as opposed to just some of its assets.¹⁵ Column 1 of Table 2 lists by year the number of whole company acquisitions that were each valued at \$10 million or more in current dollars. Column 2 provides by year the total value of these acquisitions measured by the amount

¹⁴ A variety of sources were consulted to construct the series on acquisitions including FTC records of premerger notification filings under the Hart-Scott-Rodino Act, Moody's Industrial Manual, Moody's "Industrial News Reports", The Wall Street Journal, and Mergers and Acquisitions. The 1982 Report used these sources and several others that are described in Appendix A of the 1982 Report.

¹⁵ While acquisitions of firms can take on a variety of forms, due to a number of financial, tax, and legal considerations, acquisitions were considered to be "whole company acquisitions" when control, defined by 50 percent or more stock ownership, of a previously independent corporation was acquired by another corporation. Corporate reorganizations and sales of subsidiaries were thereby excluded from the whole company category. Whole company acquisitions are more completely defined in the 1982 Report, pp. 24-26.

TABLE 2

**Whole-Company Acquisitions by
16 Large Petroleum Companies: 1971-1984
(values in current dollars)**

Year	Number of Acquisi- tions (1)	Value of Acquisi- tions (\$million) (2)	Number of Acquisi- tions ² (3)	Assets of Acquired Companies (\$million) (4)	Sales of Acquired Companies (\$million) (5)
1971	1	26	3	92	72
1972	1	47	1	28	9
1973	1	10	1	13	13
1974	5	956	5	1,824	2,295
1975	2	36	2	48	90
1976	3	1,164	4	2,301	2,630
1977	7	1,351	7	2,035	1,485
1978	3	48	2	42	85
1979	9	5,989	10	2,025	1,828
1980	12	1,451	12	2,303	2,889
1981	8	3,145	8	5,195	5,490
1982	2	106	2	318	980
1983	3	1,253	3	687	417
1984	6	29,442	5	36,838	42,602

¹ Based on acquisition price of \$10 million or more in current dollars. Column (2) is sum of acquisition prices of transactons in column (1).

² Based on assets of \$10 million or more in current dollars. Columns (4) and (5) are the values of assets and sales for transactions shown in column (3).

TABLE 3

**Total Acquisitions and Divestitures by
16 Large Petroleum Companies¹: 1971-1984**
(values in current dollars)

Year	Number of Acquisi- tions (1)	Value of Acquisi- tions (\$million) (2)	Number of Divesti- tures (3)	Value of Acquisitions Net of Divestitures (\$million) ² (4)
1971	2	113	0	113
1972	4	132	6	-289
1973	3	55	5	-184
1974	13	1,358	1	1,333
1975	7	678	0	678
1976	7	1,256	5	859
1977	13	1,598	2	1,542
1978	7	399	4	288
1979	14	7,140	11	4,907
1980	23	5,528	4	5,052
1981	19	4,553	9	-4,251
1982	6	931	11	-3,797
1983	8	1,641	14	792
1984	23	32,286	12	6,861

¹ Acquisitions and divestitures valued at \$10 million or more in current dollars.

² Column (4) represents difference of the value of acquisitions in column (2) less the gross value of divestitures.

paid for them by the acquiring firm.¹⁶ Column 3 similarly shows the number of whole company acquisitions each with a book asset value of \$10 million or more. Columns 4 and 5 present the book assets and sales, respectively, of the acquired companies for the transactions tallied in column 3.

Table 3 presents figures on "total acquisitions," which the 1982 Report defines as both (1) "whole-company acquisitions" and (2) partial acquisitions involving only some of the assets of the selling firm, whereby the selling firm remains as an

¹⁶ For the earlier years, column 1 of Table 2 may contain a minor over-counting of whole company transactions. A few instances of two-stage acquisitions were observed in which partial stock ownership was acquired in one year and full control achieved in a subsequent year. For the initial year, the assets and sales of the acquired firm were added to the total assets and sales for whole company acquisitions in proportion to the fraction of stock ownership acquired in that year. The remaining assets and sales of the acquired firm were added to the corresponding measures for whole company acquisitions in the year in which full control was achieved. Thus, these figures do not contain double counting for two-stage acquisitions. However, the count of transactions includes a tally for the transaction both in the year of the initial partial acquisition and then again in the year the final step was taken. This results in a minor overstatement of the number of acquisitions reported in Table 2 column 1. There were no new instances of two-stage transactions in 1982-1984.

See the 1982 Report, pp. 25-26, for a fuller discussion of two-stage transactions.

independent entity post-transaction.¹⁷ Column 1 lists the number of total acquisitions each having a transaction value of \$10 million or more, while column 2 lists the total transaction value of these acquisitions.¹⁸

Columns 3 and 4 reflect the fact that many of the LPC's both sold and purchased assets during the period studied. Thus, column 3 of Table 3 gives the number of divestitures by these companies which were valued at \$10 million or more, while column 4 gives the total market value of acquisitions net of divestitures; this is equal to the value of total acquisitions less the gross value of divestitures.¹⁹

¹⁷ A variety of transactions are counted in the total acquisition category. Such acquisitions include partial acquisitions of the stock of other firms operating in the U.S. and acquisitions of subsidiaries or other assets located in the U.S. The 1982 Report excluded certain miscellaneous transactions, including purchase of undeveloped real estate and mineral leases, corporate reorganizations, transfers of physical assets to or from joint ventures, and financial investments in petroleum and coal production payments. Total acquisitions are more fully defined in the 1982 Report, pp. 24-26.

¹⁸ The book asset value and sales related to the acquired assets in partial acquisitions could not be measured as part of total acquisitions activity, because the necessary information is rarely available for acquisitions of less than an entire firm.

¹⁹ The sale of an entire company in the LPC group is treated as a divestiture, just as is the sale of part of its assets.
(continued...)

The data presented in Tables 2 and 3 indicate that LPC acquisition activity, measured in current dollars, has increased since 1971, particularly during 1979-1984, when compared with earlier years. This is so whether acquisition activity is measured by the value of whole company acquisitions, total acquisitions, or total acquisitions net of divestitures. For example, total acquisitions net of divestitures averaged \$1.594

¹⁹(...continued)

In the case of the sale of a LPC to a firm outside the LPC group, the procedure leads to a possibly large negative figure for net acquisitions, such as arose in 1982 from the Occidental/Cities Service transaction. Occidental was not one of the original LPC's. Intragroup transactions (transactions between two LPC's) are reflected in the number and value of both acquisitions and divestitures, but cancel each other in the net acquisitions sum, because an acquisition by one LPC group member is matched by an equal divestiture by another LPC group member.

Treating the acquisition of an entire LPC by another firm as a divestiture of LPC assets is a change in methodology from the 1982 Report. During 1971-1981, there was only one whole company divestiture among the LPC's, that of Conoco's sale by its stockholders to DuPont. The 1982 Report did not count this transaction among the divestitures. In Table 3 and other tables that contain information on divestitures, we have revised the data for 1981 from the 1982 Report to include the DuPont/Conoco transaction as a divestiture by a LPC.

If the DuPont/Conoco transaction had not been treated as a divestiture, the acquisitions net of divestitures figure in Table 3 for 1981 would have been \$3.549 billion. Similarly, excluding the Occidental/Cities Service transaction from data on divestitures would yield an acquisitions net of divestitures amount of \$187.0 million for 1982.

billion per year over the period 1979-1984 compared with an average of \$542 million per year over the period 1971-1978. Comparable averages for the value of whole company acquisitions are \$6.898 billion (1979-1984) and \$455 million (1971-1978).

Similarly, the average transaction size increased in the 1979-1984 period when compared with earlier years. The average whole company acquisition in 1971-1978 was \$158 million and in 1979-1984, \$1.035 billion. The average total acquisition was \$100 million from 1971-1978 and \$560 million from 1979-1984.

The 1982 Report noted that net acquisitions of energy-related properties increased from 29.3 percent of net total acquisitions for the years 1971-1978 to 63.1 percent for 1979-1981.²⁰ This apparent move toward greater specialization continued in the 1982-1984 period. Net acquisitions for 1982-1984 totaled \$3.856 billion and net acquisitions of

²⁰ 1982 Report, pp. 30-31. The 1982 Report defined transactions as energy-related when at least some part of the assets acquired involved either energy (e.g., oil, natural gas, or coal) reserves or production facilities (e.g., wells or mines); the definition excluded transactions that involved only transportation, refining, or distribution facilities. A transaction was classified as energy-related if it had any energy-related component, and the figures reported are for the entire transactions and not just for the values of the energy-related assets.

energy-related assets totaled \$6.334 billion, or 164.3 percent of net acquisitions. The LPC's in effect made net divestitures of \$2.478 billion of non-energy-related assets. For the entire 1979-1984 period, total net acquisitions of the 16 LPC's were \$17.15 billion of which \$15.122 billion or 88.1 percent were of energy-related properties.

The data for 1984 and the magnitude of all acquisitions for the entire 1979-1984 period are significantly influenced by three unusually large transactions in 1984: (1) the purchase of Gulf by Standard Oil of California for \$13.3 billion, with an asset value of \$21.0 billion and 1983 sales of \$28.9 billion; (2) the purchase of Getty by Texaco for \$10.2 billion, with an asset value of \$10.4 billion and 1983 sales of \$11.8 billion; and (3) the purchase of Superior Oil by Mobil for \$5.7 billion, with an asset value of \$5.3 billion and 1983 sales of \$1.8 billion.²¹ These three transactions alone accounted for 70.6 percent of the market value of all whole company acquisitions by the LPC's from 1979-1984, and they accounted for 56.1 percent of all total acquisitions from 1979 to 1984.

²¹ We refer to these subsequently as the three large transactions of 1984.

The coincidence (not repeated since) of the three particularly large transactions in 1984 may have arisen from circumstances unique to that year. If such were the case, then distortions may be introduced that might lead to faulty inferences about trends in acquisition activity. To illustrate the effect of these large transactions, we recomputed several of the key averages using the 1979-1983 period only. For 1979-1983, the market value of whole company acquisitions averaged \$2.389 billion per year, compared with \$6.898 billion per year when averaged for 1979-1984. Similarly, the size of the average transaction for whole company acquisitions was \$351 million over 1979-1983; the average rose to \$1.035 billion over 1979-1984. For total acquisitions, the annual average was \$3.959 billion for 1979-1983 and \$8.680 billion for 1979-1984. The average transaction (for total acquisitions) was \$283 million for 1979-1983 and \$560 million for 1979-1984. It is clear that the three transactions were large in relation to those occurring in the immediately preceding years. The figures suggest that but for these exceptionally large events the apparent trend toward heightened acquisition activity by the LPC's would have been much less pronounced.

c. Adjustments for Inflation

The data presented in Tables 2 and 3 are to some extent biased toward finding an increase in acquisitions. The most important source of bias is the general inflation between 1971 and 1984, which affects both the total number of transactions exceeding a particular threshold and the total value of such transactions. To correct for this, the figures in Tables 2 and 3 have been adjusted by a two-step procedure based on the GNP deflator.²²

Inflation influences the number of acquisitions reported by year in Tables 2 and 3, because these Tables do not report acquisitions valued at less than \$10 million. Since the same physical assets will have a higher market value over time, an acquisition worth \$5 million in 1971 would very likely exceed the \$10 million threshold in 1984, when it might be valued at \$12 to \$12.5 million. The potential bias in the number of transactions created by the use of an unchanged \$10 million in

²² See the Appendix for a discussion of the deflator used and the specific values for each year 1971-1984. The deflator has a base value of 42 applied to 1971 and a final value of 103.8 applied to 1984. This represents an increase of 61.8 points, which corresponds to inflation of 147.1 percent of the base of 42.

current dollars reporting threshold may be partly addressed by using the GNP deflator to adjust the threshold from year to year. Thus, a time series of the number of transactions adjusted by the GNP deflator counts the number of transactions of \$10 million or more in 1971, of \$10.4 million or more in 1972, of \$11 million or more in 1973, and so on up to acquisitions of \$24.7 million or more in 1984. The adjusted results for the number of whole company acquisitions, total acquisitions, and divestitures are presented in Tables 4 and 5.²³

The adjustment of the reporting threshold to \$10 million in constant (or inflation-adjusted) dollars noticeably affects the number of transactions only for the later years of the study period. From 1979-1984 there were 30 whole company acquisitions each with a transaction price of \$10 million or more measured in constant dollars (see Table 4, column 1) and 40 such acquisitions in current dollars (Table 2, column 1). Over this same time period, there were 78 total acquisitions in constant dollars (Table 5, column 1) compared with 93 in current dollars (Table 3, column 1); and there were 54 total divestitures in

²³ As explained in Appendix A, all figures are deflated to 1970 dollars, because the original basis for the data used 1970 information.

TABLE 4

Deflated¹ Whole-Company Acquisitions by
16 Large Petroleum Companies: 1971-1984

Year	Number of Acquisi- tions ² (1)	Value of Acquisi- tions (\$million) (2)	Number of Acquisi- tions ³ (3)	Assets of Acquired Companies (\$million) (4)	Sales of Acquired Companies (\$million) (5)
1971	1	26	3	92	72
1972	1	44	1	26	8
1973	0	0	1	12	12
1974	5	810	5	1,546	1,945
1975	2	28	2	37	70
1976	3	826	3	1,624	1,830
1977	7	901	7	1,356	990
1978	1	13	1	19	28
1979	8	3,476	8	1,161	994
1980	5	724	10	1,216	1,505
1981	8	1,542	8	2,547	2,686
1982	1	38	2	142	438
		(41) ⁴		(151) ⁴	(467) ⁴
1983	2	521	3	289	175
		(595) ⁴		(330) ⁴	(200) ⁴
1984	6	11,920	5	14,911	17,248
		(13,623) ⁴		(17,041) ⁴	(19,712) ⁴

¹ Deflated by GNP deflator, 1970 = 100.

² Based on acquisition price of \$10 million or more in constant dollars. Column (2) is sum of real acquisition prices of transactions in column (1).

³ Based on asset values of \$10 million or more in constant dollars. Columns (4) and (5) are sums of real sales and assets of transactions in column (3).

⁴ Represents adjustments for changes in group size.

TABLE 5

Deflated¹ Total Acquisitions and Divestitures
by 16 Large Petroleum Companies: 1971-1984

Year	Number of Acquisitions ² (1)	Value of Acquisitions (\$million) (2)	Number of Divestitures ³ (3)	Value of Acquisitions Net of Divestitures ⁴ (\$million) (4)
1971	2	113	0	113
1972	4	125	6	-273
1973	2	41	5	-175
1974	12	1,142	1	1,121
1975	6	516	0	516
1976	7	891	1	618
1977	9	1,033	2	995
1978	4	224	3	162
1979	13	4,145	11	2,847
1980	16	2,904	3	2,655
1981	17	2,217	9	-2,066
1982	5	406 (433) ⁵	11	-1,704 (-1,818) ⁵
1983	5	669 (765) ⁵	10	342 (391) ⁵
1984	22	13,065 (14,931) ⁵	10	2,788 (3,186) ⁵

¹ Deflated by GNP deflator (1970 = 100).

² Acquisitions with transaction prices of at least \$10 million in constant dollars.

³ Divestitures with transaction prices of at least \$10 million in constant dollars.

⁴ Column (4) is the difference of the value of acquisitions in column (2) less the gross value of divestitures.

⁵ Represents adjustments for changes in group size.

constant dollars (Table 5, column 3) compared with 61 in current dollars (Table 3, column 3).

For transactions exceeding the revised threshold levels, a second adjustment must be applied to the measures of the value of transactions, sales, and assets. These figures must be deflated to state them in a constant 1970 dollar value by dividing them by an appropriate deflator. The results of these deflation steps are also presented in Tables 4 and 5.

Several features of the inflation-adjusted results deserve comment. The deflated data obviously show a much less dramatic increase in the annual value of acquisitions for 1979-1984 when compared with earlier years. Nevertheless, the deflated data still indicate a substantial increase in acquisition activity for 1979-1984; when deflated, whole company acquisitions averaged \$3.04 billion per year for 1979-1984 and only \$331 million per year from 1971-1978. Similarly, total acquisitions net of divestitures averaged \$810.3 million per year from 1979-1984 and \$384.6 million per year from 1971-1978. Excluding 1984, when the three large acquisitions occurred, whole company acquisitions averaged \$1.26 billion

and total acquisitions net of divestitures averaged \$414.8 million per year from 1979-1983.²⁴

The number of LPC's fell, as noted earlier, from 16 to 14 through the acquisition of two LPC's by non-LPC's--Conoco by Dupont in 1981 and Cities Service by Occidental Petroleum in 1982.²⁵ There are several possible ways of modifying the analysis to handle this change. One is to include subsequent acquisitions by the acquiring firm, treating it as the successor to the acquired firm. However, the acquiring firm might be much different in both past and future acquisition activity than the acquired firm. Under these circumstances, a retroactive adjustment in the data to substitute the acquiring firm's past acquisitions for the acquired firm's is required to gauge trends in acquisitions. Rather than attempting such a retrospective adjustment to the data, which would have greatly

²⁴ The average transaction size also increased. From 1979 to 1984, the average whole company acquisition, in deflated dollars, was \$3.04 billion (\$262 million for 1979-83), while from 1971 to 1978 the average whole company acquisition was \$132.4 million.

²⁵ Although Occidental Petroleum, as its name indicates, is heavily involved in the petroleum industry, prior to its acquisition of Cities Service, Occidental had very limited domestic crude oil production or refining capacity, which were the criteria for classification as a LPC.

reduced the comparability of the present data with that in the 1982 Report, we exclude subsequent acquisitions by DuPont and Occidental from the LPC sample. Acquisitions by Cities Service and Conoco up to the time of the purchase of each of these companies continue to be included in the data reported. Unlike the effect of inflation, removing subsequent acquisitions may have biased the data downward. To examine the possible effect of this change, we estimated, based on a proportional increase, the amount of merger activity that might have occurred if the number of firms in the sample had remained constant.²⁶ These estimates are presented (in parentheses) in Tables 4 and 5. The estimates suggest that the LPC's acquisition activity may have been 14 percent higher in 1983 and 1984 had Conoco and Cities Service remained independent and behaved similarly to the surviving LPC's.

²⁶ For example since DuPont acquired Conoco in 1981, the data for 1982 were multiplied by $16/15$'s to approximate the amount of acquisitions that would have taken place if the LPC group had continued to have 16 members rather than 15. Data for 1983 and 1984 are multiplied by $16/14$'s to adjust for the additional removal of Cities Service after 1982.

d. Large Transactions

The 1982 Report presented separate data on acquisitions exceeding \$100 million. The purpose was to address a problem that could have arisen from possibly overlooking some smaller transactions that exceeded the \$10 million threshold chosen for the 1982 Report but that were not widely (or even publicly) reported. If this underreporting became more pronounced over time, possibly because of inflation, then the data series based on the \$10 million threshold would be biased toward showing too small an increase in acquisitions activity. By considering a \$100 million (in constant dollars) threshold as a check, the preparers of the 1982 Report sought to identify acquisitions that were sufficiently large that it would be virtually certain that they would be widely reported.²⁷

²⁷ Before the implementation in the late 1970's of the premerger notification program by the Antitrust Division of the Department of Justice and the FTC, under the Hart-Scott-Rodino Antitrust Improvements Act, there were no official reporting procedures for mergers and acquisitions. Lacking official data, information for the 1982 Report was compiled from a variety of business press and financial reporting services. This procedure created the possibility that some transactions that exceeded the \$10 million threshold (but perhaps not by a large margin) would escape being recorded. This might be particularly true of transactions that involved only transfer of assets, which might not be judged material in
(continued...)

Table 6 presents the number of whole company acquisitions, total acquisitions, and divestitures that exceeded \$100 million (in constant dollars) for the years 1971-1984. Examining Table 6 suggests that transactions of this magnitude were relatively infrequent in the 1971 to 1978 period and became more frequent in the late 1970's and early 1980's. In 1982 and 1983, the number of large transactions dropped to a much lower level only to rise in 1984. Comparing Table 6 with the corresponding counts of transactions in Tables 4 and 5 shows the same general pattern of acquisition activity.

²⁷(...continued)

the context of financial reporting standards or newsworthy in the perspective of the business press. The preparers of the 1982 Report thought that the problem might grow worse over time, because as inflation eroded the real value of the dollar, transactions exceeding a \$10 million current dollar threshold would be thought of as progressively less important by those disseminating the information. This would bias downward any estimate of trends in acquisitions.

The implementation of the premerger notification program only partly alleviated the problem, because transactions between \$10 and \$15 million still were not required to be reported. One can even conjecture that the establishment of a \$15 million official reporting level may have reduced the amount of public disclosure of transactions less than \$15 million. In any event, there was a reasonable possibility that some smaller transactions were not included in the study despite the most diligent efforts to identify them. See the 1982 Report, pp. 43-45.

TABLE 6

**Number of Deflated¹ Large Acquisitions and
Divestitures by 16 Large Petroleum Companies: 1971-1984
(based on deflated transaction price of \$100 million or more)**

Year	Deflated Number of Whole Company Acquisitions	Deflated Number of Total Acquisitions	Deflated Number of Divestitures
1971	0	0	0
1972	0	0	2
1973	0	0	0
1974	1	1	0
1975	0	2	0
1976	2	2	1
1977	3	4	0
1978	0	1	0
1979	4	6	4
1980	2	6	1
1981	5	6	3
1982	0 ²	1	2
1983	1	1	0
1984	3	5	3

¹ Deflated by GNP deflator (1970 = 100).

² One transaction had a deflated asset value exceeding \$100 million, but the deflated purchase price was below \$100 million. For other years, the number of large whole company transactions with assets more than \$100 million in real dollars equaled the number based on the transaction price threshold. ©

With respect to bias caused by possibly more underreporting in the later years, the data do show a somewhat greater proportion of large acquisitions in the later years, which if statistically significant, would be consistent with the hypothesis of bias. The large transactions represent 30 percent of the whole company acquisitions for 1971-1978 and 50 percent for 1979-1984; large transactions represent 21.7 percent of total acquisitions for 1971-1978 and 32.1 percent for 1979-1984; and large transactions represent 16.7 percent of divestitures for 1971-1978 and 24.1 percent for 1979-1984. While these figures suggest that the proportion of large transactions may have increased in the later period, the differences are not large enough to be statistically significant,²⁸ and hence we cannot conclude that the difference was caused by reporting bias or any other systematic effect.

The tabulations of acquisition activity reported above in Tables 4 and 5 have been repeated for those transactions

²⁸ For the proportion of whole company acquisitions that were large transactions, the chi-square with 1 degree of freedom for 1971-1978 vs. 1979-1984 was 1.97; for total acquisitions, chi-square was 1.86; for divestitures, chi-square was 0.29. None are significant at even the 90 percent confidence level.

exceeding \$100 million in constant dollars. The results for whole company acquisitions are shown in Table 7 and for total acquisitions in Table 8. While the number of such large transactions increased somewhat in the 1979-1984 period, the size of the individual transactions has increased markedly in this period, whatever measure of size is used. Total acquisitions averaged \$380 million per year (in constant dollars) from 1971-1978 and \$3.59 billion per year from 1979-1984. The average per year from 1979-1983 is \$1.80 billion. The average size per acquisition for 1971-1978 is \$303.9 million; for 1979-1984, \$862.6 million; and for 1979-1983, \$449.0 million.

e. Adjustments for Firm Size

Correcting the thresholds used in generating the acquisition data for general inflation may still leave a distortion in the measurement of LPC acquisition activity, since the price of oil and, in response, the values of oil company assets, sales, and market value have moved at significantly different rates (and in recent times possibly in different directions) than the general price index.²⁹ The data presented in this subsection examine

²⁹ 1982 Report, pp. 48-49.

TABLE 7

**Deflated¹ Large Whole-Company Acquisitions
by 16 Large Petroleum Companies: 1971-1984
(based on a deflated transaction price of
\$100 million or more)**

Year	Deflated Market Value of Acquired Companies (\$million)	Deflated Total Assets of Acquired Companies (\$million)	Deflated Sales of Acquired Companies (\$million)
1971	0	0	0
1972	0	0	0
1973	0	0	0
1974	705	1,443	1,931
1975	0	0	0
1976	779	1,613	1,801
1977	804	1,252	819
1978	0	0	0
1979	3,285	912	767
1980	636	1,064	1,150
1981	1,477	2,477	2,551
1982	0 ²	0	0
1983	479	242	147
	(547) ³	(277) ³	(168) ³
1984	11,822	14,824	17,202
	(13,511) ³	(16,942) ³	(19,659) ³

¹ Deflated by GNP deflator, 1970 = 100

² One transaction had a deflated asset value of \$130 million and deflated sales of \$371 million, but the deflated sales price fell below \$100 million threshold.

³ Represents adjustments for changes in group size.

TABLE 8

**Deflated¹ Large Total Acquisitions
by 16 Large Petroleum Companies: 1971-1984
(based on transactions with a deflated
price of \$100 million or more)**

Year	Deflated Market Value of Total Acquisitions (\$million)	Deflated Market Value of Total Acquisitions Net of Divestitures (\$million)
1971	0	0
1972	0	-247
1973	0	0
1974	705	705
1975	448	448
1976	799	635
1977	904	904
1978	183	183
1979	3,901	2,812
1980	2,601	2,440
1981	1,775	-2,269
1982	223	-1,714
	(238) ²	(-1,828) ²
1983	479	479
	(547) ²	(547) ²
1984	12,585	2,636
	(14,383) ²	(3,013) ²

¹ Deflated by GNP deflator, 1970 = 100.

² Represents adjustments for changes in group size.

the effect on the acquisition data of general changes in energy prices and in the prices of energy-related assets as reflected in certain LPC financial indices. In Table 9, the market value, assets, and sales of whole company acquisitions (from Table 2) are expressed as percentages of the LPC's market value, assets, and sales, respectively. Table 9 also reports the market value of whole company acquisitions expressed as a percentage of total flow of funds of the LPC's. Table 10 reports total acquisitions, and total acquisitions net of divestitures (from Table 3), expressed as percentages of the market value and of total funds from operations of the LPC's.

Viewed over the entire 14 year period, Tables 9 and 10 indicate little discernable pattern in acquisition activity. In Table 9, columns (1) and (2), two sharp peaks in acquisition activity (in 1979 and 1984) can be seen in the ratios based on the market values of whole company acquisitions. However, except for a single peak in 1984 that is five to six times greater than any of the previous observations, the measures of whole company acquisitions in columns (3) and (4) that are based on the sales and assets of acquired firms relative to those of the acquiring firms have no apparent patterns. There is even less

TABLE 9**Whole-Company Acquisitions: Percentage of Large Petroleum Company Financial Indicators**

Year	Market Value of Acquired Companies as Percentage of Market Value of LPCs (1)	Market Value of Acquired Companies as Percentage of Funds from Operations of LPCs (2)	Assets of Acquired Companies as Percentage of Assets of LPCs (3)	Sales of Acquired Companies as a Percentage of Sales of LPCs (4)
1971	0.04	--	0.11	0.11
1972	0.07	0.43	0.03	0.01
1973	0.00	0.00	0.01	0.01
1974	1.18	6.20	1.69	2.34
1975	0.06	0.17	0.04	0.05
1976	1.64	7.15	1.58	1.46
1977	1.45	6.80	1.24	0.73
1978	0.06	0.22	0.02	0.02
1979	6.54	23.31	1.01	0.73
1980	1.04	3.82	0.91	0.87
1981	1.52	6.35	1.86	2.24
1982	0.07	0.22	0.11	0.21
1983	1.05	2.82	0.23	0.10
1984	20.31	65.08	11.99	11.19

TABLE 10

Total Acquisitions: Percentage of Large Petroleum Company Financial Indicators

Year	Market Value of Acquisitions as Percentage of Market Value of LPCs (1)	Value of Acquisitions as Percentage Funds from Operations of LPCs (2)	Value of Acquisitions Net of Divestitures as Percentage of Market Value of LPCs (3)	Value of Acquisitions Net of Divestitures as Percentage of Funds from Operations of LPCs (4)
1971	0.18	0.18	--	--
1972	0.20	1.20	-0.45	-2.63
1973	0.07	0.47	-0.24	-1.57
1974	1.67	8.80	1.64	8.64
1975	1.14	3.26	1.13	3.26
1976	1.77	7.72	1.23	5.28
1977	1.71	8.05	1.60	7.76
1978	0.46	1.83	0.30	1.32
1979	7.81	27.79	5.36	19.10
1980	4.24	14.54	3.80	13.29
1981	2.20	9.19	1.70	7.16
1982	0.64	1.96	-2.61	-7.98
1983	1.37	3.68	6.66	1.77
1984	22.27	71.37	4.72	15.14

indication of trends in acquisition activity in the data on total acquisitions and the acquisitions net of divestitures reported in Table 10.

3. Comparison of Merger Activity Between Large Petroleum Companies and Other Large Companies

The 1982 Report included a comparison of acquisition activity of large petroleum companies with that of petroleum-related and non-petroleum companies. The principal purpose was to determine whether the acquisition activity of large petroleum companies over the period 1979-1981 differed substantially from the acquisition activity of other large firms. In the present study, this comparison has been extended to include data through 1984.

a. Background Information on the Three Groups

The petroleum group in this comparison comprises the 16 LPC's identified earlier plus Marathon Oil and Amara Hess, two petroleum firms not among the Fortune 100 in 1971 but that had joined the Fortune 100 by 1979. The acquisition activity of this group is compared with that of 16 "petroleum-related" companies and with 18 "non-petroleum" companies. Both comparison groups were drawn from the Fortune 100. The petroleum-related companies are those firms in the 1979

Fortune 100 that had some but relatively limited interests in the domestic oil industry compared with the petroleum companies.³⁰ The selection of the petroleum and petroleum-related companies followed the same general protocol used to select the original 16 LPC's. For all Fortune 100 firms with available information, the firms' domestic 1978 crude oil production and January 1, 1979 refinery capacity were calculated relative to their sales and assets. Firms that ranked as highly as the original 16 LPC's were added to the petroleum group, and the remainder with lesser petroleum interests were classified as petroleum-related; there were 16 firms in this group. The 18 non-petroleum companies were randomly selected from the remaining 1979 Fortune 100 companies. As in the 1982 Report, the analysis for the updated comparison is confined to transactions of \$15 million or more in current dollars that were reportable under the Hart-Scott-

³⁰ As an example of the differences in the petroleum interests between the petroleum and the petroleum-related companies, the petroleum companies produced on average 340,000 bbl/day of crude oil per firm while all but two of the petroleum-related companies produced less than 25,000 bbl/day (in 1978). For a fuller discussion of the selection criteria and comparative data on the petroleum activities of the sample firms, see the 1982 Report, pp. 52-56.

Rodino Act. The members of the three groups of firms are identified, and comparative 1979 and 1984 Fortune 500 data for them are listed in Table 11 (parts A to F). Summary statistics for the three groups are presented in Table 12.

b. Acquisitions by the Three Groups

Table 13 shows for each year the number of whole company acquisitions, the number of total acquisitions, and the number of divestitures for each group of companies. Based on counts of transactions, it does not appear that there have been consistently larger numbers of acquisitions by the petroleum companies than by the comparison groups during the study period. For whole company acquisitions, petroleum companies acquired 26 companies for 1979-1981, compared with 37 whole company acquisitions by petroleum-related firms and 13 by non-petroleum companies. In 1982-1984, petroleum companies made 11 whole company acquisitions compared with 18 such transactions for petroleum-related companies and 19 for non-petroleum companies. Over the entire 1979-1984 period, there were 37 whole company acquisitions by petroleum companies,

TABLE 11A

18 Leading Petroleum Companies, 1978:
1978 and 1983 Comparative Assets,
Sales and Fortune Rankings
(values in current dollars)

Company	Rank	1978		Rank	1983	
		Assets (\$ million)	Sales		Assets (\$ million)	Sales
Amarada Hess	49	3435	4701	39	6217	8369
Ashland Oil	44	2886	5167	45	4108	7852
Atlantic Richfield	13	12060	12298	12	23282	25147
Cities Service	51	4005	4661	N.A.	N.A.	N.A.
Continental Oil	18	7445	9455	N.A.	N.A.	N.A.
Getty Oil	79	4718	3515	24	10385	11600
Gulf Oil	9	15036	18069	11	20964	26581
Marathon Oil	52	3758	4509	N.A.	N.A.	N.A.
Mobil Oil	4	22611	34736	3	35072	54607
Phillips Petroleum	26	6935	6998	16	13094	15249
Shell Oil (US)	14	10453	11063	13	22169	19678
Standard Oil of CA	6	16761	23232	9	24010	27342
Standard Oil of IN	12	14109	14961	8	25805	27635
Standard Oil of NJ	2	41531	60335	1	62963	88561
Standard Oil of OH	43	8326	5198	25	16362	11599
Sun Oil	23	5498	7428	17	12466	14730
Texaco	5	20249	28608	6	27199	40068
Union Oil of CA	35	5525	5955	31	9228	10066

Sources: Fortune 500 Directory, 1979 and 1984. Sales are for year shown. Assets are end-of-year values. Company names are those used in 1970.

Note: N.A., Company merged, and separate data are no longer available.

TABLE IIB

18 Leading Petroleum Companies, 1978:
1978 and 1983 Comparative Assets,
Sales and Fortune Rankings
(values in constant dollars: 1978=100)

Company	Rank	1978		Rank	1983	
		Assets (\$ million)	Sales		Assets (\$ million)	Sales
Amarada Hess	49	3435	4701	39	4324	5821
Ashland Oil	44	2886	5167	45	2857	5462
Atlantic Richfield	13	12060	12298	12	16194	17491
Cities Service	51	4005	4661	N.A.	N.A.	N.A.
Continental Oil	18	7445	9455	N.A.	N.A.	N.A.
Getty Oil	79	4718	3515	24	7223	8069
Gulf Oil	9	15036	18069	11	14582	18489
Marathon Oil	52	3758	4509	N.A.	N.A.	N.A.
Mobil Oil	4	22611	34736	3	24395	37983
Phillips Petroleum	26	6935	6998	16	9108	10607
Shell Oil (US)	14	10453	11063	13	15420	13687
Standard Oil of CA	6	16716	23232	9	16701	19018
Standard Oil of IN	12	14109	14961	8	17949	19222
Standard Oil of NJ	2	41531	60335	1	43795	61600
Standard Oil of OH	43	8326	5198	25	11381	8068
Sun Oil	23	5498	7428	17	8671	10246
Texaco	5	20249	28608	6	18919	27870
Union Oil of CA	35	5525	5955	31	6419	7002

Sources: Fortune 500 Directory, 1979 and 1984. Sales are for year shown. Assets are end-of-year values. Company names are those used in 1970.

Note: N.A., Company merged, and separate data are no longer available.

TABLE 11C

16 Leading Petroleum-Related Companies, 1978:
1978 and 1983 Comparative Assets,
Sales and *Fortune* Rankings
(values in current dollars)

Company	Rank	1978		Rank	1983	
		Assets (\$ million)	Sales		Assets (\$ million)	Sales
Allied Chemical	84	3228	3268	29	7647	10351
Armco	54	3096	4357	87	3609	4165
Borden	68	2166	3803	85	2720	4265
Continental Group	67	2997	3944	68	3653	4942
Dow Chemical	27	8789	6888	28	11981	10951
E.I. Dupont	16	8070	10584	7	24432	35378
Esmark	38	2116	5827	88	3662	4037
General Electric	8	15036	19654	10	23288	26797
Georgia Pacific	53	3344	4403	51	4979	6469
Grace (WR)	59	3268	4310	53	5035	6220
International Paper	62	4099	4150	80	5617	4357
ITT	11	14035	15261	20	13967	14155
Monsanto	45	5036	5019	52	6427	6299
Occidental Petroleum	33	4609	6253	14	11775	19116
RJ Reynolds	47	4616	4952	23	9874	11957
Tenneco	19	10134	8762	19	17994	14353

Sources: *Fortune 500 Directory*, 1979 and 1984. Sales are for year shown. Assets are end-of-year values. Company names are those used in 1978.

TABLE IID

**16 Leading Petroleum-Related Companies, 1978:
1978 and 1983 Comparative Assets,
Sales, and Fortune Rankings
(values in constant dollars: 1978=100)**

Company	Rank	1978		Rank	1983	
		Assets (\$ million)	Sales		Assets (\$ million)	Sales
Allied Chemical	84	3228	3268	29	5319	7200
Armco	54	3096	4357	87	2510	2897
Borden	68	2166	3803	85	1892	2967
Continental Group	67	2997	3944	68	2541	3437
Dow Chemical	27	8789	6888	28	8334	7617
E.I. Dupont	16	8070	10584	7	16994	24608
Esmark	38	2116	5827	88	2547	2808
General Electric	8	15037	19654	10	16198	18639
Georgia Pacific	53	3344	4403	51	3463	4500
Grace (WR)	59	3268	4310	53	3502	4326
International Paper	62	4099	4150	80	3907	3031
ITT	11	14035	15261	20	9715	9846
Monsanto	45	5036	5019	52	4470	4381
Occidental Petroleum	33	4609	6253	14	8176	13296
RJ Reynolds	47	4616	4952	23	6868	8317
Tenneco	19	10134	8762	19	12516	9983

Sources: Fortune 500 Directory, 1979 and 1984. Sales are for year shown. Assets are end-of-year values. Company names are those used in 1978.

TABLE 11E

18 Non-Petroleum Companies, 1978:
1978 and 1983 Comparative Assets,
Sales and Fortune Rankings
(values in current dollars)

Company	Rank	1978		Rank	1983	
		Assets (\$ million)	Sales		Assets (\$ million)	Sales
Aluminum Co of America	65	4167	4052	65	6267	5263
American Can	66	2478	3981	117	2831	3346
American Home Products	94	1862	3063	73	3086	4857
Bethlehem Steel	34	4933	6185	69	4457	4898
Boeing	40	3573	5463	27	7471	11129
Coca Cola	56	2583	4338	48	5228	6991
Dresser Industries	95	2355	3054	112	3245	3473
Goodyear Tire & Rubber	22	5231	7489	32	5986	9736
LTV	42	3720	5261	78	4406	4578
McDonnell Douglas	63	3098	4130	42	4792	8111
Procter & Gamble	20	4984	8100	22	8135	12452
Ralston Purina	64	1898	4058	71	2101	4872
Raytheon	88	2061	3239	59	3729	5937
Republic Steel	82	2585	3479	145	2867	2701
Rockwell International	37	3535	5833	43	5231	8098
Textron	89	1988	3231	134	2105	2980
United Technologies	32	4074	6265	18	8720	14669
Westinghouse Electric	29	6318	6663	34	8569	9533

Sources: Fortune 500 Directory, 1979 and 1984. Sales are for year shown. Assets are end-of-year values. Company names are those used in 1978.

TABLE IIF

**18 Non-Petroleum Companies, 1978:
1978 and 1983 Comparative Assets,
Sales and Fortune Rankings
(values in constant dollars: 1978=100)**

Company	1978			1983		
	Rank	Assets (\$ million)	Sales	Rank	Assets (\$ million)	Sales
Aluminum Co of America	65	4167	4052	65	4359	3661
American Can	66	2478	3981	117	1969	2327
American Home Products	94	1862	3063	73	2147	3378
Bethlehem Steel	34	4933	6185	69	3100	3407
Boeing	40	3573	5463	27	5197	7741
Coca Cola	56	2583	4338	48	3636	4863
Dresser Industries	95	2355	3054	112	2257	2416
Goodyear Tire & Rubber	22	5231	7489	32	4164	6772
LTV	42	3720	5261	78	3065	3184
McDonnell Douglas	63	3098	4130	42	3333	5642
Procter & Gamble	20	4984	8100	22	5658	8661
Ralston Purina	64	1898	4058	71	1461	3389
Raytheon	88	2061	3239	59	2594	4130
Republic Steel	82	2585	3479	145	1994	1879
Rockwell International	37	3535	5833	43	3639	5633
Textron	89	1988	3231	134	1464	2073
United Technologies	32	4074	6265	18	6065	10203
Westinghouse Electric	29	6318	6663	34	5960	6631

Sources: Fortune 500 Directory, 1979 and 1984. Sales are for year shown. Assets are end-of-year values. Company names are those used in 1978.

TABLE 12

**Comparative Size Data for
Petroleum, Petroleum-Related, and
Non-Petroleum Companies, 1978 and 1983**

**a. Average Assets and Sales
(values in millions of current dollars)**

Group	Number of Firms	1/1/79 Assets	1978 Sales	1/1/84 Assets	1983 Sales
Petroleum	18	11408	14494	20888	25939
Petroleum- related	16	5915	6965	11488	9791
Non-petro- leum	18	3414	4882	4957	6868

**b. Percentage of Fortune 100 Assets and Sales
Held by Each Group, 1978 and 1983**

Group	Number of Firms	1/1/79 Assets	1978 Sales	1/1/84 Assets	1983 Sales
Petroleum	18	35.0	32.5	34.3	33.5
Petroleum- related	16	16.1	13.9	20.1	13.5
Non-petro- leum	18	10.5	11.0	9.8	10.6

Source: Calculated from Tables 11A to 11F.

TABLE 13

**Number of Acquisitions by Petroleum,
Petroleum-Related and Non-Petroleum Companies,
1979-1984**
(acquisitions greater than \$15 million
in current dollars)

Acquisition Type/Year	Petroleum Companies	Petroleum- Related Companies	Non-Petroleum Companies
Whole Company Acquisitions			
1979	8	15	6
1980	10	10	5
1981	8	12	2
1982	2	9	5
1983	3	7	8
1984	6	2	6
Total Acquisitions			
1979	13	18	7
1980	19	18	7
1981	16	27	7
1982	6	12	13
1983	8	15	14
1984	23	13	11
Total Divestitures			
1979	9	10	3
1980	2	11	4
1981	9	19	6
1982	12	19	11
1983	14	19	2
1984	12	22	13

55 by petroleum-related companies, and 32 by non-petroleum companies.

Examining total acquisitions in Table 13, the petroleum companies made 48 total acquisitions in the 1979-1981 period, compared with 63 for the petroleum-related companies and only 21 for the non-petroleum companies. From 1982-1984, the petroleum companies made 37 total acquisitions, compared with 38 by the non-petroleum group and 40 by the petroleum-related group. Over the entire period, the petroleum companies made 85 total acquisitions, whereas the petroleum-related companies made 103, and the non-petroleum companies, 59. Thus, the petroleum companies made fewer total acquisitions than the petroleum-related firms and more than the non-petroleum firms. For the period 1982-1984, the petroleum companies made almost the same number of total acquisitions as the non-petroleum companies and fewer than the petroleum-related firms. Compared with the 1979-1981 period, petroleum and petroleum-related firms decreased the number of their

acquisitions during 1982-1984, whereas the non-petroleum firms increased theirs.³¹

Acquisition activity based on the various measures of transaction size for the period 1979-1984 are presented for the three groups of firms in Tables 14 and 15. As discussed in the Appendix, these data have been adjusted to reflect differences in the numbers of firms in each group. As in the case of the number of acquisitions, the data on the value of acquisitions also present a mixed picture. Table 14 presents the data for whole company acquisitions. Table 15 presents the data for total acquisitions and total acquisitions net of divestitures.

Examination of Table 14 suggests that the value of whole company acquisitions by the petroleum and the petroleum-related firms exceeded that of the non-petroleum group. For the period 1982-1984, the market value of whole company acquisitions averaged \$12.3 billion per year for petroleum companies, \$3.57 billion per year for the petroleum-related companies, and \$1.42 billion per year for the non-petroleum companies. For the entire 1979-1984 period, whole company

³¹ Over 1979-1984, the petroleum companies made 58 divestitures, petroleum-related companies 100 divestitures, and non-petroleum companies 39 divestitures.

TABLE 14

**Whole-Company Acquisitions by
Petroleum, Petroleum-Related, and
Non-Petroleum Companies,
1979-1984¹**

(values in millions of current dollars)

Measure of Acquisition Activity/Year	Petroleum Companies	Petroleum- Related Companies	Non-Petroleum Companies
Market Value			
1979	5,978	3,189	1,548
1980	1,469	1,481	937
1981	3,145	12,167	751
1982	112	8,171	1,685
1983	1,504	2,448	1,019
1984	35,330	101	1,561
Assets			
1979	2,013	2,998	1,673
1980	2,290	3,185	427
1981	5,195	15,368	624
1982	337	10,864	2,165
1983	824	4,633	1,033
1984	44,196	93	3,466
Sales			
1979	1,755	4,064	2,509
1980	2,798	1,170	709
1981	5,117	28,699	637
1982	1,038	14,850	1,597
1983	500	5,784	1,505
1984	51,122	176 [®]	3,614

¹ Data adjusted for differences in number of firms in each group.

TABLE 15

**Market Value of Total Acquisitions
by Petroleum, Petroleum-Related and
Non-Petroleum Companies,
1979-1984¹**
(values in millions of current dollars)

Measure of Acquisition Activity/Year	Petroleum Companies	Petroleum- Related Companies	Non-Petroleum Companies
Market Value of Total Acquisitions:			
1979	7,129	3,665	1,618
1980	5,263	2,142	986
1981	4,412	13,399	929
1982	986	8,276	2,964
1983	1,969	3,044	1,605
1984	38,743	2,778	2,295
Market Value of Total Acquisitions Net of Divestitures:			
1979	6,172	2,208	1,500
1980	4,823	446	786
1981	-4,452	11,943	709
1982	-10,304	6,723	1,862
1983	950	-864	1,350
1984	8,233	-9,758	619

¹ Data adjusted for differences in number of firms in each group.

acquisitions averaged \$7.92 billion per year for the petroleum companies, \$4.59 billion for the petroleum-related companies, and \$1.25 billion for the non-petroleum companies. Excluding 1984 (so to eliminate the possibly distorting effect of three large mergers in 1984), whole company acquisitions over the period 1979-1983 by large petroleum companies averaged \$2.44 billion per year. The comparable figures for the petroleum-related and non-petroleum companies are \$5.49 billion per year and \$1.19 billion per year, respectively.

The data on total acquisitions presented in Table 15 again suggest that the petroleum and petroleum-related group made somewhat larger acquisitions than non-petroleum firms, but at the same time they balanced these acquisitions by divesting other assets. In 1982-1984, petroleum companies' total acquisitions averaged \$13.9 billion per year, petroleum-related companies' \$4.7 billion per year, and non-petroleum companies' \$2.29 billion per year. For the full 1979-1984 period, petroleum firms averaged \$9.75 billion per year of total acquisitions, petroleum-related companies \$5.55 billion per year, and non-petroleum companies \$1.73 billion per year. For 1979-1983, which does not include the three large acquisitions

in 1984, total acquisitions annually averaged \$3.95 billion for petroleum companies, \$6.11 billion for petroleum-related companies, and \$1.62 billion for non-petroleum companies.

The average transaction size also reflects the tendency of the petroleum and petroleum-related firms to engage in large acquisitions. For 1982-1984, the average transaction for total acquisitions is \$1.13 billion for petroleum companies, \$352.4 million for petroleum-related companies, and \$180.6 million for non-petroleum firms. Over 1979-1984, acquisitions for petroleum firms average \$688.3 million per transaction, for petroleum-related firms \$323.3 million per transaction, and for non-petroleum firms \$176.2 million per transaction. For 1979-1983, which excludes the effect of the three large acquisitions by petroleum firms in 1984, the average total acquisition transaction is \$318.7 million for petroleum firms, \$339.2 million for petroleum-related firms, and \$168.8 million for non-petroleum firms.³²

³² Comparing Tables 14 with 15 shows an interesting pattern. In 1982-1984, 88.6 percent of petroleum company total acquisitions were in the form of whole company acquisitions, compared with 76.0 percent for petroleum-related, and 62.1 percent for non-petroleum companies. Over the whole 1979-1984 period, petroleum companies made 81.2 percent of their
(continued...)

While the petroleum and petroleum-related groups were making substantial acquisitions, Table 15 shows that they also were making substantial divestitures over the 1982-1984 period. In this most recent period, total acquisitions less divestitures by the petroleum companies averaged \$373.7 million per year of net divestitures, and petroleum-related companies disposed of \$1.30 billion per year in net divestitures.³³ In contrast, the non-petroleum companies averaged \$1.28 billion per year of net acquisitions. Total acquisitions net of divestitures for the full 1979-1984 period annually averaged: \$903.7 million for the

³²(...continued)

total acquisitions as whole company acquisitions, petroleum-related companies 82.7 percent, and non-petroleum companies 69.8 percent. To the extent that whole company acquisitions receive greater public attention, the proportionally greater whole company acquisition activity by petroleum and petroleum-related firms could contribute to a perception of greater acquisitiveness.

³³ If Beatrice Foods' acquisition of all of Esmark, Inc. had not been treated in Table 15 as a divestiture by Esmark, the 1984 value for acquisitions net of divestitures of petroleum-related companies would have been -\$6.958 billion, and the petroleum-related group would have averaged \$366.33 million per year in net divestitures over 1982-84.

petroleum companies, \$1.78 billion for the petroleum-related companies, and \$1.14 billion for non-petroleum companies.³⁴

c. Adjustments for Firm Size

Interpreting these data is necessarily difficult because of the short period covered and the diversity of the firms included in the analysis. As the data on acquisitions net of divestitures and, to a lesser extent, the data on average acquisitions per year, apart from 1984, suggest, petroleum firms do not always engage in more acquisition activity than the other two groups. However, there is one difference among the three groups which could have an important influence on interpreting the acquisition activity reported in Tables 13 to 15. The petroleum

³⁴ In 1984, two of the three large transactions (Standard Oil of California's purchase of Gulf and Texaco's acquisition of Getty) were intragroup transactions among the petroleum companies. As such, they leave the figure for acquisitions net of divestitures unaffected, because the value of the acquisition for the acquiring firm is cancelled by the value of the divestiture for the acquired firm. Hence, there is no need to correct for a possibly distorting effect of the unusually sizeable transaction. Nonetheless for completeness, the averages per year, over 1979-1983, for acquisitions net of divestitures were negative (or net divestitures) \$562.2 million for petroleum companies, positive (or net acquisitions) \$4.10 billion for petroleum-related companies, and positive \$1.24 billion for non-petroleum companies.

companies are far larger on average than the firms in the two other groups. This fact is reflected by the figures in Table 12.

While the differences in firm size may be somewhat less likely to influence the number of acquisitions by the firms in each group, it seems likely to affect the absolute size of their acquisitions. To control for this possibility, the various measures of the value of acquisitions by the firms in each group are expressed as percentages of corresponding size-measures of the firms within that group. For example, the market value of total acquisitions (or the market value of total acquisitions net of divestitures) for each group is expressed as a percent of the total market value (at the beginning of the year) of the companies within the same group.³⁵ The results are presented for whole company acquisitions in Table 16 and for

³⁵ Although the effect of using the same threshold value of \$15 million for the firms in each group would probably be negligible, this potential influence on the results is taken into account in Tables 16 and 17. In each year, the threshold for acquisitions by companies in the non-petroleum group is taken as \$15 million. The threshold for the petroleum group (or petroleum-related group) is adjusted each year by multiplying \$15 million by the ratio of the market value (or assets) of the petroleum group (or petroleum-related group) to the market value (or assets) of the non-petroleum group.

TABLE 16

**Market Value, Assets and Sales of
Whole-Company Acquisitions as a Percentage
of Market Value, Assets and Sales of
Petroleum, Petroleum-Related and
Non-Petroleum Company Groups,
1979-1984**

Measure of Acquisition Activity/Year	Petroleum Companies	Petroleum- Related Companies	Non-Petroleum Companies
Market Value of Acquisitions as a % of Group Market Value			
1979	6.36	6.76	4.36
1980	1.09	2.70	2.62
1981	1.47	18.24	1.63
1982	0.07	12.78	4.12
1983	1.03	3.23	1.90
1984	19.98	0.10	2.40
Assets of Acquisitions as a % of Group Assets			
1979	0.98	2.82	2.72
1980	0.93	2.60	0.61
1981	1.79	11.42	0.81
1982	0.10	6.63	2.61
1983	0.22	2.63	1.21
1984	11.75	0.05	3.88
Sales of Acquisitions as a % of Group Sales			
1979	0.51	2.67	2.38
1980	0.90	0.70	0.60
1981	1.12	17.18	0.54
1982	0.20	7.81	1.27
1983	0.10	2.90	1.28
1984	10.95	0.09	2.93

total acquisitions and total acquisitions net of divestitures in Table 17.

Tables 16 and 17 reveal a generally mixed pattern. Except for the effect of the three very large mergers of 1984, acquisitions by the petroleum companies relative to the overall size of these companies declined over the 1979-1984 period. This is so for both whole company and total acquisitions. Relative acquisition activity of the petroleum-related firms peaked in 1981 and 1982. There is no apparent pattern for the non-petroleum companies.

To check for more consistent tendencies in the data, the geometric means of the market-value-based measures were computed for the entire period 1979-1984, and for the two three-year subperiods 1979-1981 and 1982-1984.³⁶ The results are presented in Table 18. The petroleum-related firms seem to have engaged in greater acquisition activity (relative to the size of these firms) than either the petroleum firms or the non-petroleum firms.

³⁶ The geometric mean is based on the logarithms of the percentage figures. The geometric mean is considered to be the preferable measure of central tendency for ratio measures in which the denominators have substantially different magnitudes.

TABLE 17

**Total Acquisitions and Total
Acquisitions Net of Divestitures as a
Percentage of Market Value of Petroleum,
Petroleum-Related and Non-Petroleum Company Groups,
1979-1984**

Measure of Acquisition Activity/Year	Petroleum Companies	Petroleum- Related Companies	Non-Petroleum Companies
Market Value of all Acquisitions as a % of Group Market Values			
1979	7.59	7.76	4.55
1980	3.89	3.90	2.76
1981	2.06	20.10	2.02
1982	0.61	12.94	7.25
1983	1.34	4.05	2.99
1984	21.91	2.81	3.53
Market Value of all Acquisitions Net of Divestitures as a % of Group Market Values			
1979	6.57	4.68	4.22
1980	3.56	0.81	2.20
1981	-2.08	17.91	1.54
1982	-6.39	10.52	4.56
1983	0.65	-1.15	2.52
1984	4.66	-9.87	0.95

TABLE 18**Transaction Values as Percentage of Acquiring
Firms' Market Value, Geometric Means for
Groups of Years, 1979-1984****a. Whole Company Acquisitions
as a Percentage of Firms' Market Value**

Firm type	Petroleum	Petroleum- Related	Non-Petroleum
Years:			
1979-1981	2.17	6.93	2.65
1982-1984	1.13	1.60	2.66
1979-1984	1.56	3.33	2.65

**b. Total Acquisitions
as a Percentage of Firms' Market Value**

Firm type	Petroleum	Petroleum- Related	Non-Petroleum
Years:			
1979-1981	3.93	8.47	2.94
1982-1984	2.62	5.28	4.25
1979-1984	3.21	6.69	3.53

Whole company and total acquisitions for both the petroleum and petroleum-related companies relative to the size of these firms generally declined in 1982-1984 compared with 1979-1981, notwithstanding the very large acquisitions by the petroleum group in 1984. Overall, acquisitions by the petroleum companies were less important, relative to the size of those firms, than were the relative size of acquisitions of the petroleum-related companies. Petroleum company acquisitions were of roughly comparable relative size as those of non-petroleum companies.

4. Summary

To sum up, the petroleum companies increased their acquisition activity subsequent to 1978 compared with earlier years. An important part of this increase is accounted for by several particularly large acquisitions, especially those occurring in 1984. However, as the figures in the previous section suggest, this increase in acquisition activity appears no greater, proportionally, than increases in such activity elsewhere in the economy. Apart from 1984, acquisitions by the petroleum companies declined relative to the size of these firms when compared with the petroleum-related and non-petroleum

companies. For the 1982-1984 period, the petroleum companies as a group had net divestitures of \$560 million.

The pattern of acquisitions is also of some interest. Recently, the petroleum companies appear to have been selling non-energy assets and concentrating on whole company acquisitions of energy-related firms. Acquisitions by petroleum-related firms follow a similar, but less pronounced, pattern. The pattern suggests that the conglomeration movement among large petroleum companies may be past, and to the extent that the present acquisitions increase specialization, the possibility that they enhance efficiency cannot be dismissed.

Finally, it should be noted that analysis of acquisitions (and divestitures) alone may only partly illuminate the matter of economic concentration. To the extent that acquisitions are internally financed, they represent a rearrangement of existing assets of the firm without enhancing the total assets available to it. Assets purchased when the market is high and subsequently resold when prices have fallen will appear in the data series as a net acquisition, when in fact they represent the opposite, because the firm has lost in the process. Thus, while the large petroleum companies have engaged in many sizeable

transactions in the last 14 years, their relative position in the economy continues to be influenced by other factors, such as relative energy prices, success in exploration and development of new oil reserves, and their ability to manage the assets they have acquired.

SECTION 3:

Concentration in Crude Oil and Refining

The 1982 Report contained information on concentration at different production levels in the oil industry and how concentration was changed by the recent mergers and acquisitions. To some extent, the 1982 Report examined concentration in four major functional levels of the oil industry: crude oil (production and reserve ownership), refining, transportation (of crude oil and refined products), and marketing (of refined products at wholesale and retail). In this update, recent information is given on concentration in crude oil reserves and production (world-wide and domestically) and in domestic refining.³⁷

³⁷ We did not update information on pipeline concentration. The Department of Justice recently published a report on this subject, and because of the complex nature of pipeline ownership arrangements, changes in petroleum company ownership do not necessarily translate into changes in pipeline concentration. (See, U.S. Department of Justice, Antitrust Division, "Oil Pipeline Deregulation: Report of the U.S. Department of Justice," May, 1986.)

We also did not update the information on concentration in gasoline distribution because of data limitations. As noted in (continued...)

1. Crude Oil

There are literally thousands of crude oil producers in the U.S. and few possess market shares of as much as five percent of total production. National concentration in the ownership of domestic crude reserves is quite low, and mergers involving even the largest U.S. producers have not reached the thresholds identified in the DOJ guidelines.³⁸

³⁷(...continued)

the 1982 Report, pp. 251-256, data are available only on a state-wide basis, but competition in distribution is determined more on the basis of terminal markets, the boundaries of which do not coincide with state borders. Moreover, institutional characteristics of the distribution system, such as swaps and exchanges, impart biases to the available state-level data which could either over- or understate the extent of concentration in a jurisdiction.

³⁸ In 1982 the U.S. Department of Justice (DOJ) issued a set of merger enforcement guidelines setting forth criteria under which it would review proposed mergers for possible antitrust enforcement action. (The guidelines were subsequently revised in 1984.) See: "Merger Guidelines Issued by Justice Department, June 14, 1984, and Accompanying Policy Statement," Antitrust and Trade Regulation Reporter, Special Supplement, no. 1169 (June 14, 1984).

One of the guidelines criteria is the height of and changes in the Herfindahl/Hirschman Index (HHI) of market concentration, calculated by summing the values of the squared market shares of each firm in the market. See: Richard A. Miller, "The Herfindahl-Hirschman Index as a market structure variable: an exposition for antitrust practitioners," The Antitrust Bulletin, vol XXVII, no. 3 (Fall, 1982), pp. 593-618.

National concentration must be assessed in light of the fact that U.S. crude prices have been largely governed by prices in the international market since the elimination of import controls in the early 1970's. Although the control of crude oil production and reserves is somewhat more concentrated in the world as a whole than in the U.S., mergers of private oil companies have had little effect on international concentration. This is because the major players in the international market are the national oil companies of other countries that control the pricing and production of oil within their own borders.

There are two circumstances in which mergers may affect competition in crude markets. First, there are some domestic regional markets in which crude prices could potentially be affected by changes in the competitiveness of the local suppliers. Second, the pricing policies of OPEC are constrained in part by the activities of non-OPEC producers and probably in part by the ability of refiners to exploit the incentive of individual OPEC producers to expand output. If acquisitions of major non-OPEC oil companies by OPEC members served to enhance OPEC's ability to maintain non-competitive prices, these acquisitions would give rise to antitrust concerns.

Most regions of the world are either net importers or net exporters of crude oil, and local prices are generally determined by world market prices and transportation costs. The U.S. as a whole relies on imported crude to meet refining demand. Imports as a percentage of the oil processed by U.S. refineries declined from 44.5 percent in 1979 to 26.8 percent in 1984.³⁹ If account is taken of refined product imports, roughly 33 percent of domestic refined product demand was met by foreign crude in 1984.⁴⁰ This level of imports into the U.S. implies that domestic prices are generally determined in the world market (although there may be some local submarkets). An attempt by U.S. Gulf Coast crude producers to raise domestic crude prices, for example, would be ineffective because any increase in Gulf Coast crude prices would lead to increased imports.⁴¹

³⁹ See EIA Petroleum Supply Annual, 1984, pp. 20-21.

⁴⁰ Non-strategic-petroleum-reserve crude oil imports plus net refined product imports divided by total refinery runs of crude oil plus net refined product imports.

⁴¹ This need not be true if a quota were imposed on crude oil imports. The imposition of restrictions on crude and product imports could substantially change the relevant markets used in antitrust analysis.

a. Concentration in the International Market

Since 1973, changes in the level of world crude oil prices have largely reflected changes in OPEC's policies and in its members' ability to function jointly. The output levels of OPEC members for selected years since 1974 are shown in Table 19. It can be seen that OPEC's share of world crude oil and natural gas liquids production has fallen from nearly 53 percent in 1974 to only slightly over 31 percent in 1984, reflecting the steady increase in non-OPEC production.

Concentration in crude oil can be measured on the basis of either reserves or production.⁴² Production data provide an accurate indicator of market control in the short-run. However, the share of production by a firm in a given year does not necessarily reflect its ability to maintain this share in the

⁴² "Reserves" can be defined in a variety of ways. In general, reserves are volumes estimated to exist in known deposits, and which are believed to be recoverable in the future through the application of present or anticipated technology. As defined by the Department of Energy, "proved reserves" are those volumes of crude oil which geological and engineering data demonstrate with reasonable certainty to be recoverable in the future, under existing economic and operating conditions. This classification of reserves is used in this Report. Other categories of reserves, including "probable reserves" and "speculative reserves," generally include deposits for which there is less certainty of recoverability.

TABLE 19
OPEC Share of World Crude Oil
and NGL Production¹
(thousands bbl/day)

Country	Year			
	1974	1979	1981	1984
Saudi Arabia ²	8610	9835	10248	5000
Iran	6067	3178	1389	2184
Venezuela	3060	2425	2157	1863
Kuwait ²	2596	2595	1185	1224
Nigeria	2255	2302	1433	1419
Iraq	1971	3487	1005	1214
Abu Dhabi ³	1750	1450	1159	778
Libya	1541	2132	1175	1124
Indonesia	1375	1631	1700	1541
Algeria	1059	1293	1018	963
Dubai ³	232	360	358	352
Gabon	202	203	151	152
Ecuador	177	214	211	258
Sharjah ³	50	15	9	120
Ras Al Khaimah ³	0	0	0	6
OPEC	30,945	31,120	23,198	18,198
NON-OPEC	27,787	34,833	36,565	40,131
WORLD	58,732	65,953	59,763	58,329
% OPEC	52.7	47.2	38.8	31.2

¹ Source: Energy Information Administration, International Energy Annual, Tables 8 and 9 except as noted.

² Includes 1/2 of neutral zone production.

³ Sources: Crude and condensate production, The Oil and Gas Journal, Dec. 31, 1984; Dec. 28, 1981, Dec. 31, 1979, Dec. 30, 1974. Natural Gas Liquids Production, The Oil and Gas Journal, July 15, 1985, and July 19, 1982. The International Petroleum Encyclopedia, 1980 and 1975.

future, or to expand output in response to higher prices. While reserves are somewhat more difficult to measure than production, they provide a better long-term indicator of market structure and of the relative ability of producers to expand output. It can be seen in Table 20 that OPEC members accounted for nearly two-thirds of world crude oil reserves at the end of 1973 and that there has been little change in this figure over the last decade.

Analysis of concentration in the world crude oil market is complicated by the wide variation across countries in the ability of private companies to exercise property rights or to control prices and output. In the U.S., Canada and a few other countries, the working interest owner (the oil company) determines crude oil output and selling prices. In these countries, individual private producers are the relevant entity for analysis of market concentration.⁴³ In Mexico, OPEC

⁴³ This overstates the case. During the 1970's, government regulations severely constrained the operation of the free market in crude oil. It could also be argued that several state regulatory bodies in the U.S. were the relevant actors for purpose of antitrust analysis when market demand prorationing was in effect. The tables in the text abstract from these considerations and treat private oil companies as the relevant actors in the U.S. and Canada.

TABLE 20

OPEC Share of World Crude Oil Reserves¹
(billions of barrels, December 31)

Country	Year			
	1973	1978	1981	1984
Saudi Arabia ²	140.8	168.9	167.9	171.7
Kuwait ²	72.8	69.4	67.7	92.7
Iran	60.0	59.0	57.0	48.5
Iraq	31.5	32.1	29.7	44.5
Libya	25.5	24.3	22.6	21.1
Abu Dhabi	21.5	30.0	30.6	30.5
Nigeria	20.0	18.2	16.5	16.7
Venezuela	14.0	18.0	20.3	25.8
Indonesia	10.5	10.2	9.8	8.7
Algeria	7.6	6.3	8.1	9.0
Ecuador	5.7	1.2	0.9	1.4
Dubai	2.5	1.3	1.3	1.4
Sharjah	1.5	0.0	0.3	0.5
Gabon	1.5	2.0	0.5	0.5
Ras Al Khaimah	0.0	0.0	0.0	0.1
TOTAL OPEC	415.3	439.6	433.1	473.1
TOTAL NON-OPEC	212.6	202.0	237.6	225.6
TOTAL WORLD	627.9	641.6	670.7	698.7
% OPEC	66.1	68.5	64.6	67.7

¹ Sources: The Oil and Gas Journal, Dec. 31, 1984; Dec. 28, 1981, Dec. 25, 1978, Dec. 31, 1973.

² Includes 1/2 of neutral zone reserves.

countries, and most Communist countries, the state oil company determines price and output levels, even if the crude is nominally produced by private companies. In these countries, the relevant actor is the state. In other areas, such as the U.K. and Norwegian North Sea, a mix of private and public control of price and output complicates assessment of the relevant economic actors.

Tables 21 and 22 provide estimates of concentration in world crude oil production (including condensate and natural gas liquids) and reserves (crude and condensate only) based on the assumption that the relevant actors are individual OPEC members, individual communist countries in Europe and Asia, and that the state controls prices and output in the U.K.,⁴⁴ Norway, Mexico, Oman, Qatar, and Egypt. Because the large private oil companies do not break down their production country-by-country throughout the world, it is not possible to calculate precise market shares for private companies in free market producing areas. Since the main free market producing areas are the U.S. and Canada and since data are available for

⁴⁴ This characterization of the U.K.'s oil pricing systems is perhaps not appropriate today, because of recent changes in the tax and royalty system.

TABLE 21

Concentration of World Crude Oil
and NGL Production, 1974-1984¹
(thousands bbl/day)

Producer	Year							
	1974		1979		1981		1984	
	Bbl	share	Bbl	share	Bbl	share	Bbl	share
USSR	9246	15.7	11794	17.9	12265	20.5	12328	21.1
Saudi Arabia ²	8610	14.7	9835	14.9	10248	17.1	5000	8.6
Iran	6067	10.3	3178	4.8	1389	2.3	2184	3.7
Venezuela	3060	5.2	2425	3.7	2157	3.6	1863	3.2
Kuwait ²	2596	4.4	2595	3.9	1185	2.0	1224	2.1
Nigeria	2255	3.8	2302	3.5	1433	2.4	1419	2.4
Iraq	1971	3.4	3487	5.3	1005	1.7	1214	2.0
Abu Dhabi ³	1750	3.0	1450	2.2	1159	1.9	778	1.3
Libya	1541	2.6	2132	3.2	1175	2.0	1124	1.9
Indonesia	1375	2.3	1631	2.5	1700	2.8	1541	2.6
China	1315	2.2	2122	3.2	2012	3.4	2269	3.9
Algeria	1059	1.8	1293	2.0	1018	1.7	963	1.7
Mexico	651	1.1	1611	2.4	2554	4.3	3007	5.2
Qatar	523	0.9	518	0.8	429	0.7	422	0.7
Argentina	425	0.7	486	0.7	508	0.9	476	0.8
Romania	310	0.5	266	0.4	255	0.4	252	0.4
Oman	297	0.5	290	0.4	317	0.5	404	0.7
Dubai ³	232	0.4	360	0.5	358	0.6	352	0.6
Gabon	202	0.3	203	0.3	151	0.3	152	0.3
Ecuador	177	0.3	214	0.3	211	0.4	258	0.4
Egypt	151	0.3	542	0.8	615	1.0	852	1.5
Sharjah ³	50	0.1	15	0.0	9	0.0	120	0.2
Norway	35	0.1	443	0.7	551	0.9	785	1.3
UK	7	0.0	1613	2.4	1861	3.1	2625	4.5
Ras Al Khaimah ³	0	0.0	0	0.0	0	0.0	6	0.0
Shell	N.A.	N.A.	528	0.8	553	0.9	583	1.0
Exxon ⁴	1114	1.9	951	1.4	872	1.5	892	1.5
B. P.	N.A.	N.A.	627	1.0	727	1.2	682	1.2
Texaco	831	1.4	573	0.9	476	0.8	788	1.4
Chevron	500	0.9	401	0.6	403	0.7	754	1.3
Amoco	605	1.0	552	0.8	485	0.8	462	0.8
Arco	411	0.7	538	0.8	540	0.9	655	1.1
Gulf ⁴	576	1.0	493	0.7	438	0.7	0	0.0
Mobil	449	0.8	391	0.6	370	0.6	458	0.6

(continued next page)

Note: N.A., separate data are no longer available.

TABLE 21—Continued

Producer	Year							
	1974		1979		1981		1984	
	Bbl	share	Bbl	share	Bbl	share	Bbl	share
Phillips	256	0.4	263	0.4	266	0.4	316	0.5
Getty	300	0.5	268	0.4	283	0.5	0	0.0
WORLD TOTAL	58732		65953		59763		58329	
Concentration Ratios								
4 Firm	45.9		42.9		45.6		39.4	
8 Firm	60.5		57.2		57.3		52.6	
HHI	678		693		816		653	

¹ Sources: Data by country, except as noted, Energy Information Administration, *International Energy Annual 1984*, Tables 8 and 9. Company data, Annual Reports and 10-Ks. The 1984 data for Texaco, Chevron, Mobil and Phillips includes the estimated production of Getty, Gulf, Superior, and Aminoil prior to their acquisition. The estimates of pre-acquisition U.S. production were obtained from the American Petroleum Institute. Canadian production during the pre-acquisition period was estimated assuming the same relationship between pre- and post-acquisition production. The data for Texaco includes 1,500 b/d of estimated Getty Canadian production prior to Getty's acquisition by Texaco. The data for Mobil includes 18,600 b/d of Superior Canadian production prior to Superior's acquisition by Mobil.

² Includes 1/2 of neutral zone production.

³ Source: see footnote 3, Table 19.

⁴ Includes Canadian oil sands production.

TABLE 22

Concentration of World Crude Oil Reserves¹
(billions of barrels, December 31)

Producer	Year							
	1973		1978		1981		1984	
	Bbls	Share	Bbls	Share	Bbls	Share	Bbls	Share
Saudi Arabia ²	140.8	22.4	168.9	26.3	167.9	25.0	171.7	24.6
USSR	80.0	12.7	71.0	11.1	63.0	9.4	63.0	9.0
Kuwait ²	72.8	11.6	69.4	10.8	67.7	10.1	92.7	13.3
Iran	60.0	9.6	59.0	9.2	57.0	8.5	48.5	6.9
Iraq	31.5	5.0	32.1	5.0	29.7	4.4	44.5	6.4
Libya	25.5	4.1	24.3	3.8	22.6	3.4	21.1	3.0
Abu Dhabi	21.5	3.4	30.0	4.7	30.6	4.6	30.5	4.4
Nigeria	20.0	3.2	18.2	2.8	16.5	2.5	16.7	2.4
China	20.0	3.2	20.0	3.1	19.9	3.0	19.1	2.7
UK	10.0	1.6	16.0	2.5	14.8	2.2	13.6	1.9
Algeria	7.6	1.2	6.3	1.0	8.1	1.2	9.0	1.3
Syria	7.1	1.1	2.1	0.3	1.9	0.3	1.5	0.2
Qatar	6.5	1.0	4.0	0.6	3.4	0.5	3.4	0.5
Ecuador	5.7	0.9	1.2	0.2	0.9	0.1	1.4	0.2
Oman	5.3	0.8	2.5	0.4	2.6	0.4	3.5	0.5
Norway	4.0	0.6	5.9	0.9	7.6	1.1	8.3	1.2
Mexico	3.6	0.6	16.0	2.5	57.0	8.5	48.6	7.0
Dubai	2.5	0.4	1.3	0.2	1.3	0.2	1.4	0.2
Gabon	1.5	0.2	2.0	0.3	0.5	0.1	0.5	0.1
Sharjah	1.5	0.2	0.0	0.0	0.3	0.0	0.5	0.1
Ras Al Khaimah	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
WORLD TOTAL	627.9		641.6		670.7		698.9	
Concentration								
Top 4		56.3		57.4		53.0		53.8
Top 8		72.0		74.0		73.9		74.5
HHI		981		1122		1047		1062

¹ Sources: *Oil and Gas Journal*, December 31, 1984, December 28, 1981, December 25, 1978, December 31, 1973. After factoring out natural gas liquid reserves, no private oil company had U.S. and Canadian net reserves that were greater than or equal to 0.5 percent of world reserves.

² Includes 1/2 of neutral zone reserves.

net production in these countries, private company market shares are computed on the basis of their production in the U.S. and Canada.

Table 21 reports the production of all OPEC members and each other actor accounting for 0.5 percent or more of world crude production in any of the years reported. While the HHI calculations are not exact, because the market shares of many small producers are omitted from the calculation, inclusion of these producers would have very little effect on the HHI. It can be seen that while international crude production was relatively unconcentrated throughout the 1970's and 1980's, there was a significant decline in concentration after 1981. It is also noteworthy that in 1984 the largest private oil producer (Exxon) is the 13th largest crude oil producer overall and accounts for only about 1.5 percent of world production. While the data in the table probably understates the actual significance of private oil companies, it does illustrate that even the largest private oil companies are relatively small actors in the present international crude market.

Table 22 reports the crude oil reserves of all OPEC members and each other actor accounting for 0.5 percent or more of

reserves in any of the years reported. It can be seen that control of world crude reserves is somewhat more concentrated than crude production, and that the degree of concentration has been relatively stable since year-end 1973. As noted in footnote 1 of Table 22, private oil companies are even less significant in terms of reserve ownership than in terms of production, with no company accounting for 0.5 percent or more of world crude oil reserves in any year.⁴⁵

In interpreting these data, it is useful to keep in mind that both reserves and production depend on the price level. It was the control of low cost reserves and production that permitted OPEC to raise prices in the 1970's.

b. Concentration in Domestic Crude Oil Markets

Domestic crude oil reserves and production are relatively unconcentrated. It can be seen in Table 23 that the four-firm concentration ratio for production in 1981 was 24.8 percent, the eight-firm ratio was 39.6 percent, and the HHI calculated for firms with more than one percent of the market was only 251. It is noteworthy that while the large size (in dollar terms) of oil

⁴⁵ If natural gas liquids are included in reserves two firms have approximately 0.5 percent.

TABLE 23
U.S. Crude Oil, Condensate and NGL Production
by Company 1981, 1984¹

Company	1981		1984	
	Net Production (000 bbls/day)	Market Share (percent)	Net Production (000 bbls/day)	Market Share (percent)
Exxon	752	7.4	778	7.4
Sohio	717	7.0	634	6.0
Arco	540	5.3	655	6.2
Shell	514	5.0	534	5.1
Amoco	437	4.3	409	3.9
Texaco	381	3.7	674	6.4
Gulf	345	3.4	N.A. ³	N.A. ³
Socal	342	3.3	622	5.9
Mobil	316	3.1	366	3.5
Phillips	278	2.7	348	3.3
Getty	268	2.7	N.A. ³	N.A. ³
Sun	217	2.1	194	1.8
Union	168	1.6	169	1.6
Marathon/ US Steel	166	1.6	174	1.7
Cities Service	149	1.5	N.A. ³	N.A. ³
Conoco/Dupont	139	1.4	120	1.1
Occidental			150	1.4
Subtotal	5729	56.0	5827	55.4
U.S. Total²	10181	100.0	10509	100.0

(continued next page)

TABLE 23—Continued

Company	1981		1984	
	Net Production (000 barrels/day)	Market Share (percent)	Net Production (000 barrels/day)	Market Share (percent)
Concentration				
Top 4	2523	24.8	2741	26.1
Top 8	4028	39.6	4672	44.5
HHI		251		282

¹ Crude oil, condensate and natural gas liquids. Sources: 1981 and 1984 Annual Reports and 10K's. The 1984 data for Texaco, Chevron, Mobil, Phillips and U.S. Steel include the estimated 1984 production of Getty, Gulf, Superior, Aminoil and Husky prior to their acquisition. The estimates of pre-acquisition U.S. production were obtained from the American Petroleum Institute. In reporting their production of NGL, many, if not most, oil companies include both production derived from their working interest, plus liquids retained by processing plants owned by the company. The 1982 Report attempted to provide reserve and production data based solely on leasehold crude and natural gas liquids ownership but the authors did not have access to the appropriate data for a number of companies. The production and reserve data in this report do not attempt to exclude natural gas liquids retained by processing plants and therefore differ slightly from that in the 1982 Report. To the extent that the processing plant retains liquids pursuant to a long-term contract with the owner of the gas, the processing plant owner benefits from increases in the price of NGL. On the other hand, the processing plant owner generally does not control the production rate of retained liquids. Indeed, it may be the entity that purchases the gas (a natural gas pipeline for example), rather than the working interest owner, that controls the rate of NGL production in the short-run.

² Sources: EIA, Petroleum Supply Annual 1981, 1984 Table 1, Crude oil field production plus natural gas liquids field production.

³ Merged with another firm and no longer reported.

company mergers and acquisitions in recent years might suggest that these transactions materially altered concentration in U.S. reserves, this clearly has not been the case. Concentration in 1981-1984 has increased only slightly. In 1984, four-firm concentration was 26.1 percent, eight-firm concentration was 44.5 percent, and the HHI was 282.⁴⁶

Table 24 shows U.S. market shares based on reserves, which, as indicated above, are an indicator of future market control.⁴⁷

⁴⁶ These figures are based on the net production of publicly held oil companies. In general, companies do not own the land from which they produce oil. Instead, oil companies typically enter into an oil and gas lease, which allows them to drill wells on the land and produce hydrocarbons. In addition to any fixed fee (bonus) paid for the lease, a producer customarily pays the landowner a royalty share (usually 1/8 or 1/6) of the crude oil produced. The net production figures reported by oil companies in their annual reports exclude the share of the royalty owner. Because the working interest owner controls the rate of production by the royalty owner, it might be more appropriate to base these calculations on gross production and reserves. This data is not reported by most companies, however. If, for purposes of a rough approximation it is assumed that royalties average 13 percent of production, then gross production would be 1.15 times net production, the four-firm concentration ratio would be 30.0 percent, the eight-firm concentration ratio would be 51.2 percent, and the HHI would be 373 in 1984.

⁴⁷ Another reason that market share calculations based on net production and reserve data may not accurately reflect the control of domestic production is that much domestic crude is produced by units. Depending on the provisions of the
(continued...)

TABLE 24

**United States Crude Oil, Condensate and NGL Reserves
by Company, Year-End 1981 and 1984¹**

Company	1981		1984	
	Reserves (million barrels)	Market Share (percent)	Reserves (million barrels)	Market Share (percent)
Sohio	3419	9.5	2903	8.0
Exxon	2822	7.8	2715	7.5
Arco	2549	7.1	2746	7.6
Shell	2208	6.1	2321	6.4
Amoco	1674	4.6	1737	4.8
Getty	1322	3.7	N.A. ²	N.A. ²
Socal	1237	3.4	2186	6.1
Texaco	1120	3.1	1887	5.2
Mobil	898	2.5	1041	2.9
Gulf	865	2.4	N.A. ²	N.A. ²
Sun	716	2.0	745	2.1
Marathon	641	1.8	576	1.6
Union	678	1.9	N.A. ²	N.A. ²
Phillips	473	1.3	659	1.8
Conoco/DuPont	387	1.1	N.A. ²	N.A. ²
Cities Service	564	1.6	N.A. ²	N.A. ²
Subtotal	21,573	59.8	19,381	53.7
U.S. Total ²	36,494	100.0	36,089	100.0
Concentration				
Top 4	10,998	30.5	10,500	29.2
Top 8	16,351	45.3	17,401	48.2
HHI		322		333

¹ Sources: 1981, 1984 Annual Reports and 10K's. The data includes proven developed and undeveloped reserves. See footnote 1, Table 23.

² Sources: E.I.A. U.S. Crude Oil, Natural Gas and Natural Gas Liquids Reserves, 1984 Annual Report, Table 1, p. 5.

³ Merged with another firm, and no longer reported.

This table shows slightly greater concentration in reserves than in production, where again concentration in reserves has not increased significantly from 1981-1984. In 1981, four- and eight-firm concentration ratios and HHI were, respectively, 30.5 percent, 45.3 percent, and 322. In 1984, the corresponding figures were 29.2 percent, 48.2 percent, and 333. The leading firm, Sohio, owned less than ten percent of domestic proven reserves. (Sohio's share is largely attributable to its interest in the field at Prudhoe Bay, Alaska.)

Table 25 presents concentration data for the top four and eight reserve owners as of year-end 1978 through year-end 1984.⁴⁸ It is evident from this data that acquisitions of oil reserves by large oil companies have had a negligible effect on concentration over the years 1979-1984.

⁴⁷(...continued)
unitization agreement, production rates may be controlled by the operator rather than the working interest owner.

⁴⁸ **Certain sources report this data as of January 1 of the subsequent year. We have treated this as year-end data for the previous year to be consistent in the time periods of this report.**

TABLE 25**Concentration of U.S. Crude Oil, Condensate and Natural Gas Liquids,
Reserve Ownership: 1978 to 1984
(as of December 31 each year)**

	1978	1979	1980	1981	1984
Total Reserves¹	38,127	36,425	36,533	36,494	36,089
<u>Top Four Firms</u>					
Year-end reserve² ownership in millions bbl	12,275	11,684	11,346	10,998	10,685
Percent of total reserves	32.2	32.1	31.1	30.1	29.6
<u>Top Eight Firms</u>					
Year-end reserve² ownership in millions bbl	18,595	17,407	16,902	16,351	17,495
Percent of total reserves	48.8	47.8	46.3	44.8	48.5

¹ Sources: API, Market Shares and Individual Company Data for U.S. Energy Markets, various years.

² Source: EIA, U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1985 Annual Report, Table I.

2. Refining

The markets for refinery products may be, at least in the short run, regional rather than national, a feature which would be of importance in the antitrust analysis of acquisitions involving refineries. Moreover, the matter is complicated by the fact that the geographic scope of the refinery products markets may be product specific. For example, lubricating oil moves in a national market, while asphalt is very localized. Gasoline and residual oil trade in more regional markets, but with distinctly different shipping patterns. Not all refineries are capable of producing the same slate of products, nor in the short run do they have equal access to distribution facilities for more specialized products, such as kerosine jet fuel. Consequently antitrust reviews of mergers involving refinery assets must proceed on a case-by-case, product-by-product basis. However, for an overview study such as this, examination of refinery concentration as a whole will suffice to show broad industry trends.

Based largely on an analysis of shipment patterns, the 1982 Report identified a number of possible regional refinery

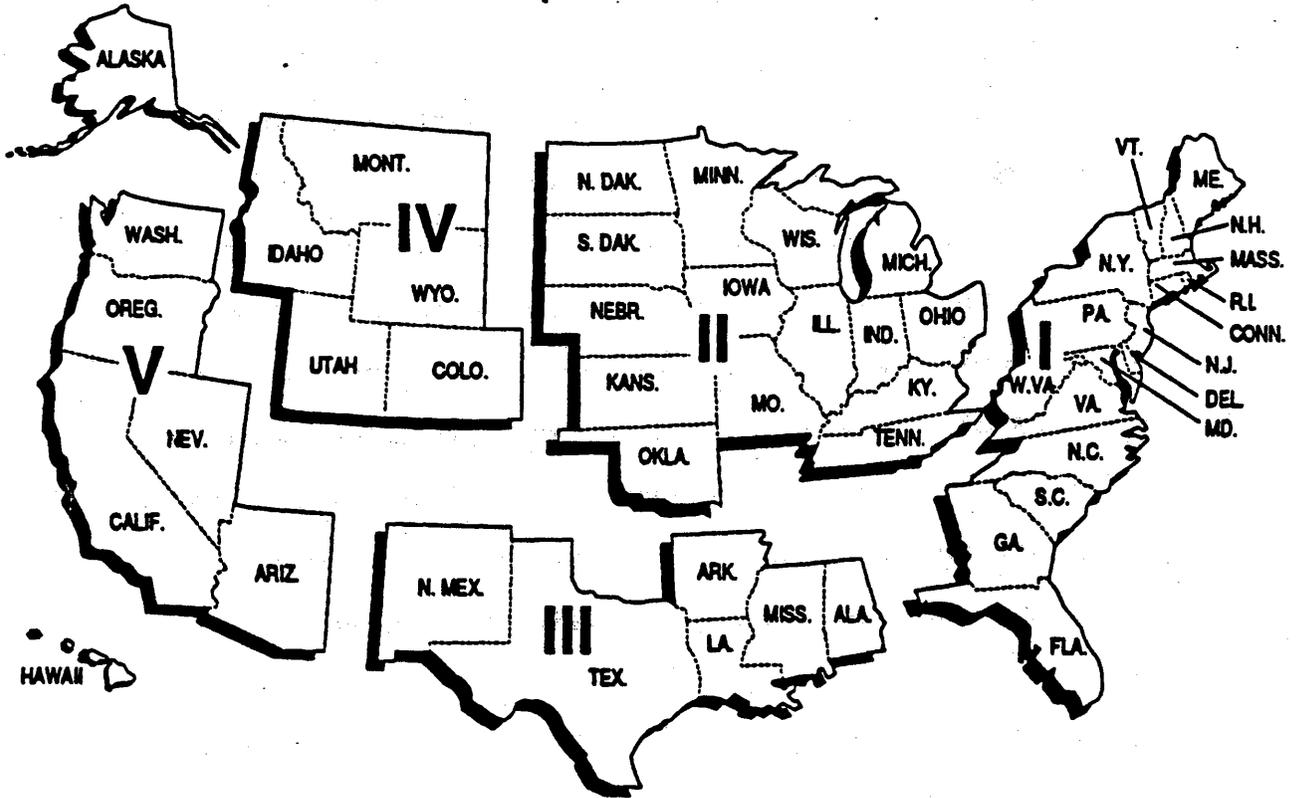
markets within the United States.⁴⁹ While the exact boundaries of these possible markets are difficult to determine, the available data from the Petroleum Administration for Defense Districts (PADDs)⁵⁰ provide a useful starting point. The 1982 Report noted relatively little refined product flowing into or out of PADDs IV and V (excepting Hawaii and Alaska), suggesting that these two may be separate markets. PADD III might also qualify as a separate market due to possible impediments to product flows into the area. However, owing to the significant inflow of refined products from PADD III, PADD I may not be appropriately treated as a separate market but instead should be combined with PADD III. Appropriate treatment of PADD II is more problematic because of complicated shipping patterns: here candidates for relevant

⁴⁹ 1982 Report, pp. 174-188.

⁵⁰ In 1950, the Petroleum Administration for Defense divided the United States into five districts for purposes of collecting and maintaining petroleum industry data. A great deal of petroleum industry data are still reported on a PADD basis. As Figure 1 shows, PADD I comprises New England and the Eastern Seaboard; PADD II is the Midwest; PADD III comprises the Gulf Coast states; PADD IV is made up of the Rocky Mountain states; and the West Coast states plus Alaska and Hawaii constitute PADD V.

FIGURE 1

Petroleum Administration for Defense Districts (PADDs)



Source: Reproduced from U.S. Energy Information Administration, Petroleum Supply Monthly, July, 1988

markets are parts of PADD II (the "Upper Midwest"), all of PADD II, and a combination of PADDs I, II, and III.

Refinery capacity concentration ratios for these various regions are provided in Table 26 for the period year-end 1949 to 1984. Refinery concentration in most areas fell between 1949 and 1979. Two principal exceptions in which there were modest increases in concentration over this period were PADD II and the Upper Midwest region. In PADD IV, four-firm concentration remained virtually unchanged, and eight-firm concentration rose by 1.5 percent.

A comparison of the data for year-end 1981 and 1984 intimate recent increases in concentration in refinery capacity. An increase occurred in all of the specified regions. In PADD V, four-firm concentration increased by 3.9 points between year-end 1981 and year-end 1984 and eight-firm concentration increased by 2.0 points. In PADD IV, four-firm and eight-firm concentration increased by 4.2 and 4.1 points respectively. In PADD III, four-firm and eight-firm concentration increased

Table 26

Regional Refining Concentration Trends, Year-end 1949-1984

Concentration Trends--PADD III ¹ (Alabama, Arkansas, Louisiana, Mississippi, New Mexico, Texas)							
	<u>1949</u>	<u>1959</u>	<u>1969</u>	<u>1979</u>	<u>1981</u>	<u>1984</u>	<u>1984⁰⁵</u>
CR4	49.5	43.7	44.0	36.2	36.8	38.8	42.9
CR8	73.7	65.7	64.8	54.5	55.6	58.1	64.9
Concentration Trends--PADDs I and III ²							
	<u>1949</u>	<u>1959</u>	<u>1969</u>	<u>1979</u>	<u>1981</u>	<u>1984</u>	<u>1984⁰⁵</u>
CR4	46.5	40.9	40.9	35.0	35.1	38.3	44.1
CR8	66.1	59.0	62.3	55.0	54.7	58.4	64.9
Concentration Trends--Upper Midwest ³ (Illinois, Indiana, Kentucky, Michigan, Ohio)							
	<u>1949</u>	<u>1959</u>	<u>1969</u>	<u>1979</u>	<u>1981</u>	<u>1984</u>	<u>1984⁰⁵</u>
CR4	45.3	42.9	47.7	48.7	54.1	58.3	64.2
CR8	70.4	69.0	74.4	75.5	81.6	87.8	90.3
Concentration Trends--PADD II ³							
	<u>1949</u>	<u>1959</u>	<u>1969</u>	<u>1979</u>	<u>1981</u>	<u>1984</u>	<u>1984⁰⁵</u>
CR4	36.7	34.6	38.3	37.4	40.1	42.0	45.9
CR8	55.3	53.5	59.7	60.0	60.8	65.3	69.8
Concentration Trends--PADDs I, II, and III							
	<u>1949</u>	<u>1959</u>	<u>1969</u>	<u>1979</u>	<u>1981</u>	<u>1984</u>	<u>1984⁰⁵</u>
CR4	36.0	31.4	35.2	30.7	29.5	33.0	37.5
CR8	55.7	49.6	58.0	49.2	47.8	54.9	59.2
Concentration Trends--PADD V ⁴ (Arizona, California, Nevada, Oregon, Washington)							
	<u>1949</u>	<u>1959</u>	<u>1969</u>	<u>1979</u>	<u>1981</u>	<u>1984</u>	<u>1984⁰⁵</u>
CR4	60.2	61.9	66.5	54.4	55.9	59.8	59.8
CR8	85.1	89.6	95.2	76.5	79.6	81.6	81.6

(continued next page)

Table 26--Continued

Refining Concentration Trends

	Concentration Trends--PADD IV (Colorado, Montana, Idaho, Utah, Wyoming)						
	1949	1959	1969	1979	1981	1984	1984 ^a
CR4	47.9	47.2	53.5	48.0	53.4	57.6	57.6
CR8	73.8	74.2	81.7	75.3	80.4	84.5	84.5

Sources: Department of the Interior, Bureau of Mines, "Petroleum Refineries including Cracking Plants in the U.S." as of January 1, 1950, 1960, 1970; Department of Energy, Form EIA-87, "Petroleum Refineries in the U.S. and U.S. Territories" as of January 1, 1980, 1982; Energy Information Administration, Petroleum Supply Annual, 1984 vol. 1.

Note: Market share is based on operating crude distillation capacity.

1. Gulf is treated as a subsidiary of Socal, except for the Alliance, Louisiana refinery which is assumed to be owned by Sohio. Final approval of the divestiture of the Alliance refinery to Sohio had not been received from the FTC as of December 31, 1984.
2. Getty is treated as a subsidiary of Texaco, but Texaco's Westville, N.J. refinery is assumed to be owned by Coastal. Final approval of the divestiture of the Westville refinery to Coastal had not been received from the FTC as of December 31, 1984.
3. EIA data records Union Oil's Lamont, Illinois refinery as shut down on December 31, 1984. This was a temporary shut down and the refinery is currently operating. If this refinery were treated as operating on December 31, 1984, CR4 = 54.2 and CR8 = 83.8, for the Upper Midwest, CR4 = 40.1 and CR8 = 62.3, for PADD II, and CR4 = 32.6 and CR8 = 54.2, for PADDs I, II, and III combined.
4. EIA data records Texaco's Wilmington, California refinery, with a capacity of 75,000 bbl/day, as idle on December 31, 1984. This was a temporary shut down and the refinery is currently operating. If this refinery were treated as operating on December 31, 1984, CR4 = 58.0 and CR8 = 82.2. In 1982, EIA listed Pacific Refining's Hercules, California refinery, with a capacity of 85,000 bbl/day, as idle; this refinery was subsequently restarted. If this refinery were treated as operating on December 31, 1981, CR4 = 54.1 and CR8 = 77.1.
5. Data in column 1984^a assumes that Mobil had acquired Marathon, that Texaco did not divest its Westville, New Jersey refinery, and that Socal did not divest Gulf's Alliance, Louisiana refinery.

by 2.0 and 2.5 points respectively.⁵¹ In the combined PADD I and PADD III region, four-firm concentration increased by 3.2 points and eight-firm concentration increased by 3.7 points. For the three regions involving PADD II, four-firm and eight-firm concentration increased respectively by 4.2 and 6.2 points for the Upper Midwest, by 1.9 and 4.5 points for PADD II, and by 3.5 and 7.1 points for PADDs I, II and III combined.⁵²

The data presented in the body of Table 26 are based upon operating crude distillation capacity. From time to time, other

⁵¹ The 1982 Report contained a more detailed examination of capacity for refineries located on the Gulf Coast in Alabama, Mississippi, Texas and Louisiana (see pp. 186-188). This analysis was done to compare concentration of total refining capacity in the Gulf Coast with concentration of only those refineries that produce gasoline. An update of the Gulf Coast gasoline-only refining concentration was not done for the present study. However, concentration figures based on total capacity in this Gulf Coast region were calculated. They show an increase, between year-end 1981 and 1984, in four-firm and eight-firm concentration, rising from 40.3 to 42.0 percent, and from 60.2 to 64.1 percent respectively.

⁵² The HHI did not come into widespread use in antitrust analysis until recently, and thus HHI data cannot be readily calculated for the earlier years shown in Table 26.

There is no simple correspondence between HHI's and four- or eight-firm concentration ratios, because the HHI takes into account the spread in market shares among all the firms, whereas the concentration ratios aggregate the shares of a few firms into a single figure. See: Miller, op. cit., pp. 596-97.

refinery capacity, either individual distillation units or an entire refinery, is temporarily shut down for either economic reasons or longer-term maintenance and may again become available. In most cases, whether this capacity is classified as operating or shut down has little effect on the market share calculations because the capacity involved is small relative to total regional capacity. However, two relatively large refineries were shut down at year-end 1984 but subsequently resumed operations. These were Texaco's Wilmington, California refinery and Unocal's Lamont, Illinois refinery. Footnotes 3 and 4 to Table 26 explain how the market shares reported in the table would have changed had these two refineries been treated as operating at year-end 1984. By including such facilities, four-firm concentration in the Upper Midwest is 54.2 percent (instead of 58.3 percent), in PADD II is 40.1 percent (42.0 percent), and in PADD V is 58.0 percent (59.8). Since there were no similar large refineries idle and subsequently reopened in the Upper Midwest and PADD II at

year-end 1981, the apparent increase in concentration for those regions may be an artifact of the capacity classifications used.⁵³

The capacity shares in Table 26 are measured at the end of the given year, so the data for year-end 1984 reflect the 1984 acquisitions of Getty by Texaco and of Gulf by Socal. However, as noted in Table 26, the data have been adjusted to take into account refinery divestitures that were made to resolve antitrust concerns arising in these acquisitions. These refinery divestitures were made after the end of 1984.

The column at the extreme right of Table 26, labeled 1984*, shows what refinery concentration would have been in the various regions had there been no divestitures relating to the Texaco/Getty and Socal/Gulf acquisitions. It also reflects the effect on concentration if the proposed acquisition of Marathon by Mobil in late 1981 had occurred.⁵⁴ The Table

⁵³ In PADD V, Pacific Refining's Hercules, California refinery, with a capacity of 85,000 bbl/day, was idle on December 31, 1981 but subsequently restarted. This refinery is about the same size as Texaco's Wilmington, California refinery, and hence, the change in concentration in PADD V can not be ascribed to the temporary idling of one large refinery.

⁵⁴ The Texaco/Getty and Socal/Gulf refinery divestitures were the result of antitrust challenge by the FTC. (continued...)

shows that, excepting PADDs IV and V, four-firm concentration in refinery capacity would have been about four to six percentage points higher had there been no refinery divestitures in Texaco/Getty and Socal/Gulf and had Mobil proceeded to acquire Marathon without any refinery divestitures. These transactions, however, would have had no effect on refinery concentration in PADDs IV and V.⁵⁵

⁵⁴(...continued)

Mobil abandoned its attempt to acquire Marathon after Marathon won a preliminary injunction in its own private antitrust suit to block the merger. The FTC had also sought to challenge this merger.

⁵⁵ Since the publication of the 1982 Report the use of the HHI has become much more widespread as an indicator of concentration. For the purpose of comparison with other industries, we present the December 31, 1984 HHI's for refining capacity for the various geographic areas presented in Table 26. They are stated, where applicable, for concentration both before and after the divestitures ordered by the FTC following the Socal/Gulf and Texaco/Getty mergers.

<u>Area</u>	<u>Before Dives- titure HHI</u>	<u>After Dives- titure HHI</u>
Upper Midwest	1116	N.A.
PADD II	692	N.A.
PADD III	656	594
PADD III & I	645	583
PADD III, II, & I	508	482
PADD IV	1082	N.A.
PADD V	1260	N.A.
(ex AK & HA)		

3. Summary

Concentration in crude oil reserves and production, either in the U.S. or world-wide, changed little from year-end 1981 to year-end 1984. In domestic crude oil and refining, concentration increased modestly in some regions. These increases in concentration came partly through closure of smaller refineries that benefited from entitlements to low-cost oil during the period of price controls and partly through horizontal acquisitions among petroleum companies. This latter effect was limited though by the application of focused antitrust interventions. To the extent that refining and distribution margins would have been increased as a result of further growth in regional concentration, consumers may have been benefited by the antitrust actions.

Appendix

Data Explanations

A. Methodological Notes

1. The implicit GNP deflator for activity year y is now given by the value of the implicit GNP index, as given in the 1986 Council of Economic Advisors' Economic Report of the President, for year $y-1$ divided by the Report's value of the index for year 1970. In the 1982 study, the implicit GNP deflator for activity year y was given by the value of the index for year y , as given in the 1982 CEA report, divided by the reported value of the index for 1971. This change makes this deflator consistent with other procedures in the study in which transactions activity in a given year are deflated by values or expressed as a percent of values whose magnitudes were determined at the end of the previous year. This change in the calculation of the implicit GNP deflator does not materially affect any inference that can be drawn from the data.

2. Changes in the number of firms in a group over time and differences in the number of firms in groups in a given year raise difficulties in making comparisons over time and between groups. To address these problems, group-size adjusted data has been presented along with unadjusted data in some tables. Tables 4, 5, 7 and 8, which deal with activity of the large petroleum companies from 1971 to 1984, show group-size adjusted data in parentheses. A group size problem arose in the time series study of large petroleum firms due to the losses as independent entities of Conoco in 1981 and Cities Service in 1982. To normalize for 16 firms at the beginning of each year, 1982 large petroleum company (LPC) activity (adjusted for inflation) was multiplied by $16/15$. Inflation adjusted LPC activity for 1983 and 1984 was multiplied by $16/14$. Data in Tables 9 and 10, which express activity as a percentage of LPC group financial indicators, were not similarly adjusted for changes in the number of firms. The loss of Conoco and Cities Service as independent entities in these tables would be reflected through reducing the number of firms which were summed over in deriving the financial measures of the LPC

group which were used in the denominator of the percentage calculations.

Turning to the cross-section comparison of petroleum, petroleum-related and non-petroleum groups, note that Tables 14 and 15 contain group-size adjusted data throughout. All groups are normalized to 18 firms. Specifically, petroleum-related group activity was multiplied by 9/8 for each year, adjusting for the fact that this group had 16 firms. Between 1979 and 1981 the petroleum group did have 18 firms, but it had a fewer number in more recent years. For 1982 the petroleum group had 17 firms, having lost Conoco in 1981; in 1983 and 1984 the group had 15 firms, having lost Marathon and Cities Service in 1982. As a result, data for the petroleum group in these two tables were multiplied by 18/17 for 1982 activity and by 18/15 for 1983 and 1984 activity. No adjustment was necessary for the non-petroleum group since that group contained 18 firms throughout the 1979-1984 period. Data in Tables 16 and 17 were not similarly adjusted for differences in the number of firms, but as noted above in connection with the LPC series, loss of firms in the sample would reduce the number of firms which were summed over to arrive at group financial measures.

B. Errors in the 1982 Study

In the course of putting together this update, several errors were uncovered in the 1982 study. These errors have been corrected in this update.

First, in Table III-18 in the 1982 study (equivalent to Table 14 in the update) the 1981 asset figure for petroleum firm acquisitions and the 1980 sales figure for petroleum firm acquisitions were inadvertently transposed.

Second, data in Tables III-21 and III-22 in the 1982 study (equivalent to Tables 16 and 17 in the update) were found to be incorrectly computed. The most serious error occurred in the non-petroleum group column. Use of the wrong group-size deflator resulted in a significant understatement of the non-petroleum group's acquisition activity as a percentage of the group financial measures. Much less significant computational

errors, due probably to rounding or transcription mistakes, also occurred in data presented for the two other groups.

Finally, yearly group size financial totals (market value, assets, sales, funds from operations) were recalculated for this update, and in some instances were found to vary slightly from the corresponding group size financial totals used in the 1982 study. Consequently, in both the cross sections and time series analyses, statistic on pre-1982 acquisition activity as a percent of a group financial total will differ slightly from the corresponding data presented in the 1982 study in some instances.