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# REGULARIZING PETROLEUM INVESTMENT

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HUMBLE OIL AND REFINING COMPANY

THE possibilities of achieving greater stability in capital expenditures depend upon the nature of the industry, the circumstances encountered during the business cycle, and the financial situation. Among the characteristics of the petroleum industry that affect the stability of its capital expenditures, the following appear to be particularly important: a strong growth trend; the large number of wells, service stations, and similar facilities involved; the competitive development resulting from the discovery of a large new field; and the great reliance on funds generated within the business in the financing of new investments.

The demand for petroleum products in the United States has increased at an average rate of 5 per cent annually over several decades. Only in five years since 1920 has there been a decrease in domestic demand for petroleum, and in only one year was the decrease greater than 3 per cent. The prospect of increasing demand should be a favorable factor in planning investments with some degree of regularity.

The capital expenditures of the industry are made up of some large, and many relatively small, investments. Major refinery units, tankers, and large pipelines involve large sums and are built irregularly. Regular annual investments include those for many service stations, over 40,000 wells, and many small gathering lines and similar facilities that involve from \$25,000 up to \$100,000 as a rule, although some of these facilities occasionally cost much more than \$100,000. The opportunity for regularization of investment is better in this situation, therefore, than for industries with few capital projects.

The competitive development following the discovery of large new oil fields may work against efforts to increase stability in drilling expenditures. The search for oil may be carried on regularly but the discovery of the very large fields is erratic. Once a great field is found, the pace of drilling is usually set by the character of lease ownership, regardless of the business cycle. From the standpoint of regularization of investment, however, it is interesting to note that major discoveries may have a favorable influence on drilling during a decline in business activity. For example, the huge

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East Texas field was found in 1930 and the largest field of recent years (Scurry County) was developed rapidly in 1949.

Earnings retained in the business and funds recovered from previous expenditures by depreciation and similar charges are mainly relied upon in the financing of new investments in the petroleum industry. It is exceptional among the large oil companies for the amount of outside funds secured (through new equity financing or borrowing) to amount to as much as 25 per cent of the capital expenditures over a five-year period. Even during the postwar years of heavy capital expenditures, 1946-1950, twenty principal oil companies raised from outside sources an amount equal to only 15 per cent of their capital expenditures. Consequently, fluctuations in earnings will tend to affect new investment correspondingly unless working capital is used as a cushion or outside funds are used when earnings decline, which means increasing dependence on external funds.

Regularization of capital expenditures in any industry depends upon ability and willingness to finance investment in surplus capacity during a depression, and upon having sufficient capacity in a boom to be able to postpone major expansion. During the depression of the thirties the petroleum industry did expand productive capacity far beyond immediate needs, to the great benefit of the nation later, in World War II. If additional capacity is needed during the top phase of the cycle to take care of immediate requirements, as was the case for the petroleum industry in 1948, large capital expenditures must be made regardless of the apparent desirability of waiting for a more favorable time in the business cycle. In such a case, customer relations may be a more important consideration than economic stability.

The preceding preliminary general observations provide a background for consideration of the record of capital expenditures in the petroleum industry during recent cycles. For the periods of 1936-1940 and 1946-1950, statistics on capital expenditures for thirty principal oil companies are available in the studies by Joseph E. Pogue and Frederick Coqueron, of the Chase National Bank. For the cycle of 1928-1932, however, only meager statistics on individual companies and on the expenditures for drilling are available.

### *Boom and Depression, 1928-1932*

Although demand did not decrease more than 12 per cent between 1929 and 1932, there was a much larger decrease in operations

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because of the usual tendency to add to inventories in a boom and to reduce them in a depression. The average price per barrel of crude oil decreased from \$1.27 in 1929 to \$0.65 in 1931. The combined drop of volume and price resulted in a decrease of nearly 60 per cent in the value of crude oil production. A corresponding decrease occurred in expenditures for drilling and in the number of well completions, as shown by the following tabulation:

TABLE 1  
PETROLEUM INDUSTRY OPERATIONS

	<i>Domestic demand</i> (1)	<i>Domestic oil production</i> (2)	<i>Net exports</i> (3)	<i>Refinery runs</i> (4)	<i>Value of production</i> (millions) (5)	<i>Number of wells completed</i> (6)	<i>Expenditures for drilling<sup>a</sup></i> (millions) (7)
	<i>(millions of barrels)</i>						
1928	861	947	63	913	\$1,055	22,331	
1929	940	1,063	54	988	1,280	26,356	\$302
1930	926	953	51	927	1,070	21,240	260
1931	903	897	38	895	551	12,432	145
1932	835	822	29	820	680	15,021	186

<sup>a</sup> Includes cost of drilling dry holes.

Sources: Cols. 1-5 from Bureau of Mines Annual Summaries; col. 6 from *Oil and Gas Journal*; col. 7 from Department of Commerce.

The decrease in capital expenditures for refining, transportation, and marketing during the Great Depression was apparently even more severe than in those for production, judging from the experience of a few large companies for which data are available on capital expenditures by departments for the years 1928-1932. Drilling in East Texas forced some expenditures by the companies owning leases there, but for other operations new investments by these companies virtually came to a halt. Two large integrated companies reported a decline in total capital expenditures between 1929 and 1932 of nearly 70 per cent, while the decline in their new investments in production was much smaller.

*Recovery and Recession, 1936-1940*

The recovery in business following 1932 included substantial expansion in petroleum operations. By 1937 new records surpassing those of 1929 had been achieved in domestic crude oil production and refining. As is usual in a boom, supply began to outrun demand by 1937. Consequently, the recession of 1938 was felt immediately in

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the petroleum industry and extended into 1939 and 1940. It was not until 1940 that crude oil production exceeded the records of 1937.

TABLE 2  
U.S. PETROLEUM INDUSTRY DATA  
1936-1940

	<i>Domestic demand</i>	<i>Domestic oil production</i>	<i>Net exports</i>	<i>Refinery runs</i>	<i>Number of wells completed</i>	<i>Expenditures for drilling</i>
	<i>(millions of barrels)</i>					<i>(millions)</i>
1936	1,093	1,145	75	1,069	25,888	\$297
1937	1,170	1,331	116	1,183	32,560	413
1938	1,137	1,267	139	1,165	27,149	368
1939	1,231	1,319	130	1,238	26,839	366
1940	1,327	1,412	47	1,294	30,040	401

In 1937 there was an increase for the industry of 16 per cent in crude oil production and 26 per cent in well completions. The decrease in 1938 was about 5 per cent in production and about 15 per cent in drilling. Refinery runs increased rapidly in the years 1935-1937 and showed only a slight decrease in 1938 before attaining new record levels in 1939-1940. To meet demands, it was necessary to expand facilities substantially in 1937. Capital expenditures for this purpose by thirty oil companies consequently increased that year and remained relatively stable through 1940. Capital expenditures for marketing and transportation also showed only minor fluctuations in this period.

TABLE 3  
DATA FOR THIRTY OIL COMPANIES  
1936-1940

	<i>Net crude oil production</i>	<i>Refinery runs</i>	<i>Net income</i>	<i>Capital expenditures</i>			
				<i>Production</i>	<i>Refining</i>	<i>Other</i>	<i>Total</i>
	<i>(millions of barrels)</i>			<i>(millions)</i>			
1936	512.4	894.1	\$412	\$370.3	\$59.6	\$146.8	\$576.7
1937	590.6	963.2	573	462.5	96.0	183.5	742.0
1938	544.2	926.0	300	355.7	88.3	127.8	571.8
1939	567.9	977.5	321	319.7	98.6	159.0	577.3
1940	620.0	1,028.5	377	331.2	97.5	172.9	601.6

Total capital expenditures by thirty oil companies moved in phase with income but with a much smaller fluctuation. From 1936 to 1937

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there was an increase of 28.7 per cent in capital expenditures compared with 39.1 per cent in net income. The declines between 1937 and 1938 were 22.9 per cent and 47.6 per cent, respectively, for these two items.

### *Postwar Experience, 1946-1950*

The war created a great increase in demand for petroleum products, but the shortage of steel drastically limited construction of new facilities to keep pace with demand. The petroleum industry was able to fuel a major war without requiring large amounts of steel because of the reserve productive capacity developed during the thirties under a system of state conservation regulations, including regulation of production in accordance with market demand in order to prevent waste.

Demands for petroleum quickly increased to new record levels in the postwar period despite the decline in military consumption. Relative to coal and commodity prices generally, prices of petroleum products remained so attractive that domestic oil consumption increased nearly 18 per cent between 1946 and 1948. Without an adequate breathing spell in which to rebuild reserve capacity, the petroleum industry had to undertake a tremendous program of capital expenditures. Capacity finally began to outrun demand in the latter part of 1948, and there was some decrease in operations in 1949, but drilling remained high and operations again increased sharply in 1950.

TABLE 4  
U.S. PETROLEUM INDUSTRY DATA  
1946-1950

	<i>Domestic demand</i>	<i>Domestic oil production</i>	<i>Net exports</i>	<i>Refinery runs</i>	<i>Number of wells completed</i>	<i>Expenditures for drilling (millions)</i>
	<i>(millions of barrels)</i>					
1946	1,793	1,852	15	1,730	29,228	\$ 650
1947	1,990	1,990	5	1,852	33,098	773
1948	2,114	2,167	— 53	2,031	39,778	1,049
1949	2,118	1,999	—116	1,944	39,038	1,064
1950	2,372	2,154	—198	2,095	43,279	1,279

It may be noted that in 1951 petroleum industry operations will again set new records in practically every phase of operations. Expenditures for drilling as estimated by the Department of Com-

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merce (which are understated in recent years because well costs have not been adjusted fully for the effect of deeper drilling) will increase for the ninth consecutive year. Capital expenditures by thirty oil companies will also show an increase in 1951, although they declined substantially in 1949 and 1950.

TABLE 5  
DATA FOR THIRTY OIL COMPANIES  
1946-1950

	<i>Net crude oil production</i>	<i>Refinery runs</i>	<i>Net income</i>	<i>Capital expenditures</i>			
				<i>Production</i>	<i>Refining</i>	<i>Other</i>	<i>Total</i>
	<i>(millions of barrels)</i>			<i>(millions)</i>			
1946	923.8	1,413.6	\$ 762	\$ 674.3	\$189.4	\$324.6	\$1,188.3
1947	992.1	1,519.9	1,219	879.0	349.5	508.6	1,737.1
1948	1,113.7	1,716.5	1,929	1,260.9	513.5	541.6	2,316.0
1949	947.9	1,668.1	1,407	1,128.6	388.5	456.1	1,973.2
1950	1,016.2	1,804.2	1,739	1,064.5	248.6	353.4	1,666.5

Expenditures for refining and other facilities (transportation, marketing, and miscellaneous) this time proved more erratic than those for production. Peak expenditures, excluding production in 1948, were about one-fourth more than the year before or after, and more than twice as high as expenditures in 1946. This fluctuation reflects the difference in the nature of investments in refining and transportation as against production. Capital expenditures in production are primarily for the drilling of thousands of wells, but in refining and transportation they are for relatively few extremely expensive units. New distillation and cracking equipment in refining and new pipelines in transportation frequently involve investments in excess of \$15 million for a single unit and its related facilities. Several years may be required from the initial planning of a unit to its final completion. As usual in building new facilities, it is wise to make the expansion large enough to minimize the cost per unit of capacity. Once such an expansion has been made, several years may elapse before further expenditures of similar size are required. Consequently, investments in refining and transportation are inherently erratic and apparently tend to be initiated in the rising phase of the cycle, rather than in a recession or trough when capacity is more than adequate to meet demands.

TABLE 6  
 FLUCTUATIONS IN CAPITAL EXPENDITURES AND NET INCOME AMONG THIRTY OIL COMPANIES  
 1947-1950<sup>a</sup>  
 (dollar figures in millions)

	Capital expenditures			Net income			Capital expenditures		
	Thirty companies	Five most stable	Five least stable	Thirty companies	Five most stable	Five least stable	Thirty companies	Five most stable	Five least stable
1947	\$1,737.1	\$226.3	\$ 864.5	\$1,219.0	\$141.8	\$504.4	90.3	97.2	103.4
1948	2,316.0	249.6	1,059.5	1,929.0	228.3	741.0	120.4	107.2	126.7
1949	1,973.2	225.7	812.8	1,407.0	148.7	523.9	102.6	96.9	97.2
1950	1,666.5	230.1	607.1	1,739.0	175.8	707.7	86.7	98.8	72.6
Average	1,923.2	232.9	836.0	1,573.5	173.7	619.2	100.0	100.0	100.0

<sup>a</sup> "Most stable" and "least stable" companies selected on the basis of the per cent range of the minimum and maximum capital expenditures from the average for the period.



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*Differences among Companies*

Analysis of the capital expenditures of different companies shows significant variations in the stability of capital expenditures, which may reflect either the effect of divergent experience with respect to discovery of new fields, or conscious efforts on the part of management to follow a long-term program regardless of temporary fluctuations in business and income. The diversity in pattern is indicated by the experience for 1947-1950 of the companies with the most stable, and those with the most erratic, capital expenditures of the thirty oil companies included in the annual financial analyses of the Chase National Bank.

The thirty oil companies as a group experienced a range in capital expenditures from -13.3 to +20.4 per cent from the average for 1947-1950. This compares with a range of -3.1 to +7.2 per cent for the five companies with the most stable capital expenditures and -27.4 to +26.7 per cent for the five companies with the least stable capital expenditures. The differences in stability of new investments were not related to the relative stability of earnings since the five companies with the least stable capital expenditures experienced less fluctuation in earnings than did the five companies with more stable capital investments. The fluctuation in expenditures and earnings for the three groups is summarized in the following tabulation:

TABLE 7  
MAXIMUM DEVIATIONS FROM 1947-1950 CAPITAL EXPENDITURES AND EARNINGS  
(per cent)

THIRTY COMPANIES		FIVE COMPANIES WITH SMALLEST FLUCTUATION IN		FIVE COMPANIES WITH GREATEST FLUCTUATION IN	
<i>Capital</i>		<i>Capital</i>		<i>Capital</i>	
<i>expenditures</i>	<i>Net income</i>	<i>expenditures</i>	<i>Net income</i>	<i>expenditures</i>	<i>Net income</i>
-13.3	-22.5	-3.1	-18.4	-27.4	-18.5
+20.4	+22.6	+7.2	+31.4	+26.7	+19.7

Comprehensive analysis of capital expenditures by individual companies, which cannot be made from published financial statistics, would be required to determine whether the more stable investments in 1947-1950 by some companies were the result of chance or of conscious policy directed at regularizing capital expenditures.

*Conclusion*

Several factors modify the application in petroleum operations of an investment policy designed to effect stable or countercyclical expenditures. Investments in production are largely governed by the discovery of important new fields and the competitive pressures of their development by different operators. Investments in refining and transportation frequently involve very large facilities and expenditures, which make it difficult to prevent wide fluctuations.

Capital expenditures in the petroleum industry have shown fluctuations that follow the usual pattern of the business cycle. Even the relatively mild recession of 1949 brought about a substantial decrease in capital expenditures for refining and transportation, although drilling expenditures were carried on without interruption. While some companies may make progress toward a program of stable expenditures, particularly in drilling and production, circumstances inherent in the operations will probably lead most companies to follow the usual pattern of fluctuation in investments.

