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THE COMBINED EFFECTS OF PRORATIONING, THE DEPLETION ALLOWANCE AND IMPORT QUOTAS ON THE COST OF PRODUCING CRUDE OIL IN THE UNITED STATES*

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I have been studying the U.S. petroleum industry on and off for the last twenty years. Except during the very first few years of this period—just after the price of crude oil jumped from about $1.20 to about $2.60 a barrel, in 1946 and 1947—the industry has complained persistently that the price of oil was too low, and that such price increases as it had been able to obtain were being wiped out by a constant increase in finding and production costs. Since 1957 it has been able to point also to declining exploratory and developmental drilling and more recently to a declining ratio of proved reserves to production as evidence of this cost-price squeeze. You will recognize that complaints such as these are now being used to justify the price increases just put into effect during this past month. Industry spokesmen have been asking not just for price increases, but also for tighter controls on imports and even increases in the percentage depletion allowance—I have seen serious suggestions that it ought to be raised to 33% from the present 27½%—all in order to remedy the cost-price squeeze and to induce a greater exploratory effort.

The purpose of my testimony is to try to show that these apparently unfavorable developments of the last several years have been not chance misfortunes that have befallen this industry, but the inevitable consequences of its own economics, on the one hand, and of the complex system of governmental controls and preferential income tax arrangements under which it operates, on the other; that if we were so foolish as to let the price of oil rise, or to do the other things the domestic producers ask, in order to encourage or help them, the same processes would inevitably reassert themselves: costs would again rise; efforts to breach or circumvent the import

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controls would intensify; drilling would once again fall off; the industry would be right back where it is today; but the American public would be worse off.

Let me put the economic principles that I propose to enunciate just as baldly and clearly as I can. What I am saying is that in this industry: (1) costs are as high as they are *because* of the depletion allowance and the other advantages the industry enjoys under the federal income tax laws, *because* of the controls we have imposed on production and imports and *because* price is as high as it is; (2) if, then, we were to raise price even farther, increase percentage depletion, tighten the screws on imports even more, then costs would rise even more.

Perhaps the clearest way of supporting these propositions would be to make a quick survey of the industry's history during the last twenty years, to show how these processes have in fact operated in the past.

The first postwar decade was dominated by the following combination of interrelated factors: (1) general inflation, which involved both a sharp increase in the demand for oil and a general belief that oil in the ground was an excellent hedge against the declining purchasing power of the dollar; (2) the steep price increases of 1946-47, attributable to the sharp postwar increases in demand and the much slower adaptation of supply, exploration and development which was seriously retarded by the shortages of the war years; (3) the enormously increased contribution of the federal income tax laws to the incentive to explore for and develop oil supplies.

The last may need a word of explanation. The strength of the incentive provided by the depletion allowance, the privilege of expensing intangible well-drilling costs, and by the difference between the tax treatment of capital gains and ordinary income depends on how high the normal income tax rates are. So the rise in the corporation tax rate from 19% in 1939 to 52% after the war (with excess profits tax rates even higher) made these arrangements far more attractive than they had been before. Similarly, when the highest individual income surtax rate was up at 91%, it meant that when anyone in that bracket spent a dollar to drill a dry hole it cost him only 9¢; the government paid the other 91¢.

The result of these circumstances was an enormous increase in well-drilling activity; total exploratory wells drilled rose from 5,600 in 1945 to 10,000 in 1950 and 16,200 in 1956. The drilling of developmental wells increased from 19,000 to 41,000 over the

same eleven-year span. The consequence was, of course, a sharp increase in production capacity.

It was clear from a fairly early point, as we will shortly see, that the expansion of capacity was outpacing the growth in demand. Why then did it continue? There were two main reasons: the enormously increased value of the tax allowances, and the system of state-enforced production control known as prorationing to market demand. In 1948 the State of Texas permitted those of its wells that were subject to production control to produce at their prescribed quotas for the entire 366 days in the year; in 1949, with a mild recession in the economy at large, Texas allowables were reduced to 278 days—or about 25%! Days of permitted production were cut again in 1950, to 230; increased to 261 in 1952, during the Korean war, but during the mild recession year of 1954 they were cut to only 194 days; by 1958, the first full year after the reopening of the Suez canal, they were down to 122, and in 1962, the low point, production was permitted only 97 days in the entire year.

These sharp production cutbacks insulated the market price from the consequences of the increasing surplus capacity—almost completely until 1958, with a high degree of success to this very day. In a free market, the price would soon have begun to fall, to whatever extent necessary to stop the excessive inflow of capital. Here, instead, in the face of almost continuously growing excess capacity, price was actually increased, once in mid-1953, again in January 1957—raised by leading producer-buyers at times of temporary increases in demand, then held at the higher level (although widespread erosion did occur after 1957) by sharp cutbacks of allowable production when demand fell off.

We should note in passing that the system of state production controls thus serves to permit the leading producers of crude oil to fix their own prices and make them stick. The typical pattern is for buying prices to be posted in each field by the leading purchaser—who happens typically to be the largest producer as well. When, taking into account what the market will bear, trends in cost and the like, such a buyer posts an increase and other leading producer-buyers elsewhere decide to follow, it is they that raise the price but it is the state regulatory agency that enforces the increase by putting into effect whatever restraints on production prove to be necessary for the purpose.

Not surprisingly, the lead is usually taken by the major companies which produce the greater proportion of their own crude oil

requirements. Amusingly, The Wall Street Journal's story characterizes the company that led the latest increase, Texaco, as "the nation's leading marketer of gasoline and one of the nation's largest buyers of crude oil." It might have been somewhat more relevant to have pointed out that Texaco was in 1967 the nation's second largest *producer* of crude oil as well.

Melvin deChazeau and I showed many years ago (in our Integration and Competition in the Petroleum Industry p. 222) that, under simplified but not unreasonable assumptions, the advantages under the tax laws of earning one's profits in crude oil production rather than in refining are such that a company would be better off with a raised price of crude oil, even though product prices were absolutely unchanged, so long as it produced over 77% of its requirements. That is, even though it had to buy up to 23% of its crude oil needs at the higher price, while its selling prices were absolutely unchanged, it would be better off, the greater losses in its refining operation being outweighed by the lesser gains—lesser before tax but greater after tax—in its production operations. I think a more realistic estimate of this point of indifference would be 80%, under the present corporation income tax. But of course no one expects product prices to remain absolutely unchanged in the face of whatever increase in the crude oil price finally emerges. If product prices go up by one-half as much as the crude oil price, any refiner will be better off so long as it produces more than 40% of its needs.

In light of these considerations, it is of interest to look at the 1967 crude oil self-sufficiency ratios of the first five companies to raise their crude oil buying price, according to the first eight days of stories in The Wall Street Journal (the ratios are of their net U.S. and Canadian production of crude oil and natural gas liquids to their U.S. and Canada refinery requirements and are taken from the First National City Bank's January 1969 *Energy Memo*): Texaco (slightly over 80%), Kerr-McGee (63%), Gulf (73½%), Continental (93%), and Humble (71½%). And here is the list, also in chronological order and from the same source, of refiners that followed Texaco in raising the price of gasoline but *not* in posting higher prices of crude oil, with their corresponding self-sufficiency ratios: Phillips (56½%), American Oil (58%—the ratio for its parent, Standard of Indiana), Sinclair (40½%), Sunray DX (54%). No wonder that the Journal reported many small refiners, who buy most of their crude, as being "very upset" about the price rise, and Sinclair as explaining its refusal to follow on the ground that refining and marketing margins had been de-

pressed in recent years, and stating that it would raise its crude oil price only when satisfied that the gasoline price increase would hold.

But this is a diversion from the main story I want to tell—which has to do with the impact on costs of a crude oil price increase enforced by state-ordered cutbacks in production (and, later, by import quotas).

The cutbacks in allowable production were of course not painless; far from it. But since the total demand for oil was probably relatively unresponsive to price, the industry was better off with a higher price and reduced output than it would have been with uncontrolled production and the markedly lower price that this would have brought about. So this method of adjusting output to demand encouraged a greater and longer-continued inflow of capital than would have taken place had price been free to reflect the increasing imbalance between capacity and consumption.

The interesting thing for us to note is that the price increases of 1953 and 1957 were both "justified" by evidence of rising costs of finding, developing and producing oil. But—and this is the main point I want to emphasize—those rising costs were the inevitable consequence of the tax incentives and production control systems under which the industry operates. Why so? Clearly, first, the greater the tax preferences and the higher the price of oil, the farther it pays explorers to go looking for it in marginal areas, developing marginal—i.e., high-cost—reservoirs, and producing from marginal—i.e., high-cost—wells. And the larger bonuses and royalties it will pay explorers to offer leaseholders for the privilege of looking for oil on their land. All of these mean higher costs.

Second, if you hold price far above the cost of efficient producers and raise after-tax returns on investment in any industry above those of other industries, then, so long as entry is free, capital will pour in. And if, when this produces excess capacity, you protect profits by cutting back production and maintaining price, then capital will keep coming in. Until what point? Until the cost burden of excess capacity is *just sufficient* to eliminate the artificial stimulus to investment that created it in the first place. Until, that is, profits are reduced by the low levels of capacity utilization just enough so that new entrants no longer see the likelihood of earning supernormal profits. The higher the price or the greater the depletion allowance, the more capital will pour in, and the more excess capacity investors will tolerate before a new equilibrium is produced. The gradual erosion after 1947, 1953 and 1957 of the

benefits of the higher price and of the tax laws, caused by the rise in costs, was not an unhappy accident; it was the inevitable result of the increased investment that they themselves attracted.

Suppose a price of $2.85 a barrel, maintained by production restrictions, is far above the average cost of production from new wells. Then obviously, with free entry, new wells will be drilled, production capacity will increase, and output will have to be cut back if that price is to be maintained. How long will the process continue? *Until average production cost rises to $2.85 too*—as allowable production from each well is cut farther and farther short of its lowest-cost point. If instead the price were permitted to drop, as it would in a competitive market, then in the long run investment and additions to capacity would fall off relative to demand and the utilization of capacity would increase until the average cost of production at the margin was reduced to the new, lower price. No wonder, then, that the industry could point to steadily increasing costs in apparent justification of the 1953 and 1957 price increases; or that the price increases in turn brought only temporary relief: *the higher prices caused the higher costs.*

Actually, the burden of excess capacity is not shared equally by all wells and firms in the oil industry. The inequality of sharing merely further underlines my contention that the system of production controls equates cost to price rather than price to cost. There are hundreds of thousands of wells in the industry, with widely divergent production costs. Some young, flush, flowing wells could, if uncontrolled, account for the preponderant share of national needs at a price well below the present level—perhaps at $2.00, perhaps less. Others have costs far above this level; many would shut down entirely if price fell much below $3.00. When a cartel faces the necessity for putting quota restrictions on output, it inevitably faces the question of how it is going to distribute the restrictions. I know of no governmentally-enforced cartel, especially in a democracy, where each man has a vote, that does not feel the need for keeping everyone or almost everyone in business. What this means, in almost universal practice, is that the greater burden of restraint is made to fall on the big, comparatively efficient producers. The numerous small, comparatively inefficient ones are kept in business by giving them quotas that would not be justified if the intention were to produce the total output decided upon at minimum cost. In the case of oil, hundreds of thousands of low-output wells—though not all of them by any means are marginal in economic terms—are completely free of control so long as their output remains below the maximum cut-off point. The cutting back of out-

put of the lower-cost wells, imposing on them the vastly disproportionate burden of excess capacity, is the way in which price is sustained at its non-competitive level and costs are equated (upward) to that cartel-sustained price.

This inherent tendency of cartelization to protect the production of the higher-cost firms has another, also economically irrational, manifestation in the oil industry. Production allowables vary with the depth of the producing reservoir; the deeper the reservoir, the larger the allowable. For example, the 1965 Texas yardstick provides an allowable under 40-acre spacing of 74 barrels a day for wells of less than 2,000 feet depth, 157 barrels for wells at 9,000 to 9,500 feet and 400 barrels a day at 14,000 to 14,500 feet. This sounds quite reasonable to people brought up in the medieval tradition of just price. After all, costs of production are much greater at the greater depths, and producers could not survive, in those deep wells, with 74 barrel-a-day allowables. But this is only another way of saying that the higher the cost, the larger the share of the market a firm should be given. Put that way it does not seem quite so obvious or just, and in economic terms it is utterly irrational. But it is another way in which costs are raised to price in this industry, rather than, as in a competitive market, price reduced to the (marginal) cost of the most efficient firms able to supply the quantities demanded.

Perhaps we should, before leaving the inefficient allocation of production quotas, confront the possible response that maintaining the market price and exempting marginal wells from production control is required in the interest of conservation. The argument is that if price fell and/or restrictions were imposed on the marginal wells they would become uneconomic and close down; and if they closed down, their oil would be lost forever. To this an economist can only supply the following answers. First, it is not at all clear that wells producing ten or fifteen barrels a day are necessarily high cost and will close down entirely if price is cut or their output regulated. Professor Homan has pointed out that there are 20,000 wells in Pennsylvania producing on the average less than half a barrel a day, and yet they continue to operate. The second, and more important, answer is that conservation is inevitably an economic problem, not a purely physical one. If a $3.00 price is desirable because it keeps certain marginal wells in operation, then obviously a $4.00 price would be even better and a $10.00 price even better than that. Society must make economic choices. It must compare the gains from saving some oil from physical loss with the costs in society's resources of continuing to produce from them. The con-

servation decision is an investment decision like any other; it uses up society's scarce resources. And society cannot avoid deciding whether it is worth the price. It is highly questionable that we are making the best provision for the future to invest the additional resources needed to produce from high-cost wells, when the alternative would be to shut them down and produce our oil from the low-cost wells. We could use the savings, if we wished, to explore for more oil, or to subsidize experimentation in synthetic fuels, or to build more schools, whose pupils might one day learn to dispense with oil.

And even this calculation is unnecessary in the case of the deeper wells. There is no possible benefit in encouraging an earlier exploration and production from greater depth, at the expense of lower-cost production at shallower depths. The deeper oil is not going to disappear, and it makes sense to exploit it only when doing so will use fewer of society's resources than any alternatives available at that time.

To return to our main theme: the rise in cost was itself the result of the excessive investment stimulated by high prices, tax preferences and prorationing. Regarded in this light, the soaring figures of well completions in the first postwar decade, the billions of dollars the industry invested annually in domestic production, were not at all a sign of health. They were a sign of the inefficiency of the industry's governing institutions, which provided an artificial encouragement to the overinvestment that showed up eventually in higher costs of production.

But artificial restrictions on competition, once imposed, almost always have a tendency to intensify and to spread. We have already seen how the production controls had to be drawn tighter and tighter until around 1963. Sooner or later controls would have to be extended to imports as well. Inflated domestic prices and costs of production greatly increased the incentive of American companies to look abroad—American-owned production abroad soared, and American refiners brought in increasing quantities of foreign oil. So while the domestic price was being maintained by intensified production cutbacks in 1954, imports increased sharply and so-called voluntary controls were instituted. When the same thing happened at the higher price level of 1957-58, while prices abroad were dropping under the impact of growing supplies in weakening hands, the pretense of voluntary controls had finally to be dropped, and mandatory controls instituted. Why were they necessary? Because U.S. costs were higher. Why were U.S. costs higher? Because the price was maintained—by production controls and by import quotas.

Import controls were justified also by the argument that they

were needed to continue the stimulus to domestic exploration. Why did the number of exploratory wells drilled in the United States drop 32% between 1956 and 1961? Because of the heavy burden of excess capacity caused by previous exploration and development, the sharp cutbacks in production allowables, and the consequently extended period of time over which explorers could hope to get their money back. And why had these occurred? Because of all the stimuli to exploration previously supplied by our tax laws, by production controls and by higher prices.

Oil industry spokesmen typically defend the depletion allowance by pointing out that their profits after tax are no higher than the average for all industry. Exactly. They could not possibly be, so long as the difficulty of entry here is not above-average. But that is no defense of the allowance. It merely means that it encourages excessive investment in the industry and creates a burden of costly excess capacity. How much excess? Just enough to offset, in higher costs, the stimulus to investment that it provides.

To summarize: price, production control and the depletion allowance determine the equilibrium level of excess capacity in the industry; that is to say, they determine the equilibrium level of cost.

In light of these considerations, it seems to me the current cry in the industry for higher prices, further cutbacks in imports and a higher depletion allowance are steps in precisely the wrong direction. They will, in the end, all of them, produce higher costs. Not only is the temporary benefit that they will confer unjustified, in view of the fact that profits in the oil industry seem very satisfactory, it will not even be in the interest of the industry itself.

Interfuel competition has intensified enormously in the last decade. Of the new homes constructed in 1966, 51% were equipped for heating with gas, 27% with electricity and only 22% with oil. True, oil is still free of effective competition in the transportation market. But synthesis of hydrocarbons from coal seems to be close to commercial feasibility—notice how many oil companies have begun to buy coal properties—and so is exploitation of the Athabasca tar sands. For the oil industry to seek a solution for any present difficulties by trying to crank up another spin of the wheel of the early 1950's is likely to be self-defeating from its standpoint, and much worse than that for the American consumer and economy.