

Houston Business

A Perspective on the Houston Economy

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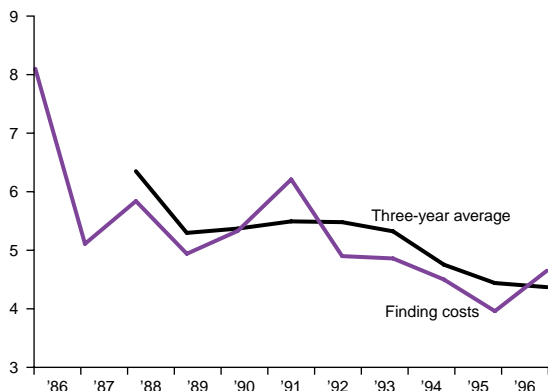
Oil Field Costs Rising Fast

Two years of oil prices at \$20 per barrel and natural gas at \$2 per thousand cubic feet (Mcf) have generated tremendous profits for oil and gas producers. By 1995, the industry had achieved efficiencies that allowed it to thrive at \$17 per barrel for oil and \$1.70 per Mcf for natural gas, so the higher prices of 1996–97 have created huge cash flows. Not prone to pass such profits on to stockholders, oil producers are making a determined effort to drill these profits back into the ground. In 1996, the number of oil and gas wells drilled jumped 21.8 percent compared with the year before, and in 1997 the number has increased 17.7 percent. Footage drilled and the number of working rotary rigs are up even more.

A consequence of increased activity has been a shortage of oil-related equipment and skills and a large increase in the cost of drilling. Figure 1 shows the cost of finding and developing a barrel of oil in the United States from 1986 to the present. In the 1990s, these costs declined 20 percent—from \$5.50 to \$4.40. These hard-won gains were the product of technological advances in the industry, such as three-dimensional seismic imaging, that widened exploration opportunities and raised the industry's success rate. Other technologies—coiled tubing and measurement-while-drilling, for example—cut costs associated with drilling. Lower finding costs also were the result of difficult management decisions, such as reducing the workforce and turning to new suppliers via outsourcing.

The data for 1996 show a significant increase in finding costs. This increase, which is likely to be repeated in 1997 and perhaps beyond, is propelled by higher labor and drilling costs. This article looks at the factors driving oil field cost

Figure 1
U.S. Finding and Development Cost
 Constant dollars per barrel of oil equivalent (\$92)



SOURCE: John S. Herold Inc. and calculations of the author.

increases as well as the need to raise costs more if the industry is to expand much further. We can argue the wisdom of further expansion—it depends on your outlook for energy prices over the next several years. But the point this article makes is simple: if increases in oil field capacity occur, they will entail significantly higher costs.

LAND RIGS AND OTHER EQUIPMENT

Land rigs provide the best example of the industry's dilemma. In 1982, as the industry was poised on the edge of the oil bust, Reed Tool's annual October survey of U.S. drilling rigs revealed that 5,000 rigs were available and ready to work in the United States, but only half that number were active. By 1986, only 1,000 rigs were working, although the inventory of available equipment was near 3,000. For any rig producer, the inventory of stacked and ready rigs became the major competitor. By the 1990s, the capital investment in these rigs, which were financed in many cases by Texas and Oklahoma banks, had long since been written off. So whether employed intact or cannibalized as parts, these rigs subsidized the industry's drilling costs for a decade.

Last year, Reed Tool found only 1,670 rigs were available to work, and 1,425 rigs were working. The gap has almost certainly narrowed even more in 1997. Indeed, a better balance between supply and demand is indicated in Figure 2 by the 50 percent increase in day rates for land rigs since mid-1995. The supply of parts from these excess rigs is drying up, as used mud pumps or serviceable substructures are no longer readily available.

When will we build new land rigs? Not until day rates rise further. For example, the engineering economics of a 2,000-horsepower rig capable of drilling to 20,000 feet indicate it would cost \$12.5 million to build; at a 15 percent rate of return to capital, the daily rental rate to justify this rig would be \$16,600—roughly double the current rate for such rigs.¹ Is it unreasonable to demand a 15 percent rate of return? Similar returns are demanded by the producers that want the rig, and the risk of building a rig in the volatile oil markets of the 1990s is as high as ever. Whatever the long-term wisdom of oil industry expansion may be, it is clear that such growth would come at higher drilling and finding costs than those enjoyed even today.

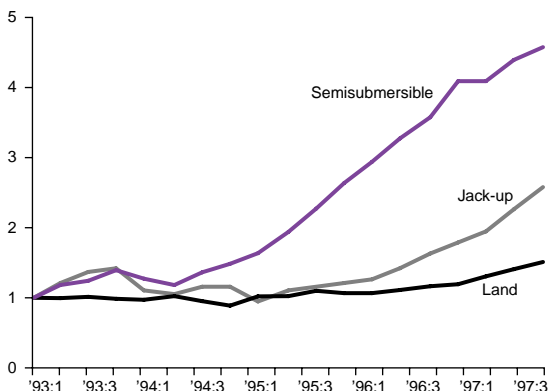
Offshore rigs provide another example of what is happening to costs in the oil fields. The day rates for these rigs turned upward earlier and rates rose much faster than for land rigs (Figure 2). Offshore activity in the Gulf of Mexico has been spurred not only by higher natural gas prices, but also by new opportunities in the deep waters and subsalt regions of the Gulf. So far, however, new rigs are being built in small numbers and, despite higher day rates, are headed only for the tightest, most profitable offshore niche markets, such as deep water (for example, semisubmersibles rather than jack-ups). Most new rigs will leave the shipyard under long-term contracts.

OIL-SPECIFIC SKILLS

How do we reconcile a decade of downsizing with the current shortage of skills? In 1975, the industry employed 359,000 workers

Figure 2
Day Rates for Land and Offshore Rigs

Index: 1993:1 = 1



in oil production, oil service and related machinery industries. By 1982 the figure had more than doubled to 812,000. But today the number is back at 365,000—close to 1975 levels. However, as fast as the number of workers fell, other measures of basic oil field activity fell even faster: the number of wells drilled, the footage drilled and the number of working rigs. In other words, relative to basic measures of activity, the industry has become more labor-intensive.

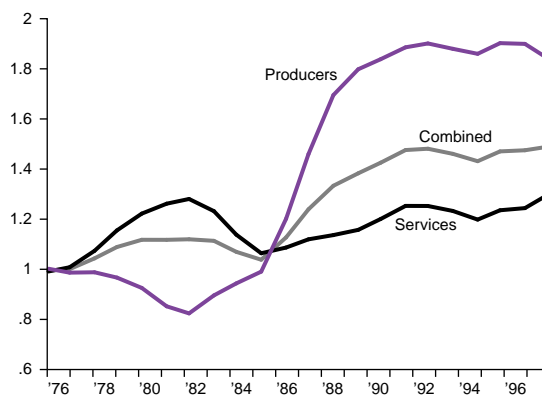
Figure 3 shows the total wages paid to employees subject to wage and salary laws by producers and service companies, measured in constant 1992 dollars. The figure is expressed per foot drilled and smoothed as a three-year average. It shows the industry becoming more labor-intensive after 1985, and the chart looks similar if expressed per well drilled or per working rig. The jump in 1985 might be blamed on the collapse in drilling, but the ratio stays up for the following decade. By 1995, producers paid 90.1 percent more in wages per foot drilled than they did in 1985, and service companies paid 16.3 percent more.

For workers exempt from wage laws, compensation costs are not available, but we can count the number of jobs, many of which are managerial and professional. Employment of these workers follows a pattern similar to that of hourly workers. By 1995, the number of jobs was up 53.6 percent per foot drilled for producers and 91.9 percent for oil service companies.

How do we reconcile this pattern with the declines in overall employment? We look to technology. Studies from the American Petroleum Institute indicate that if the industry were to redrill the same wells today that it drilled five or 10 years ago using the same methods, these wells would be drilled much more efficiently. However, the same wells would be drilled differently today. More upfront geological assessment would be done, more resource-intensive horizontal and directional wells would be drilled, and today's mix of wells would favor more expensive offshore drilling. Some new technology, such as measurement-while-drilling and coiled tubing, works to save resources per foot drilled. But on the whole, new oil field technology has increased skill requirements in the industry and raised the number of hours expended per foot of drilling.

Figure 3
Total Wages Paid per Foot Drilled

Constant 1992 dollars per foot drilled
Index: 1974 = 1



SOURCE: Energy Information Administration and Bureau of Labor Statistics. Data smoothed as a three-year moving average.

Moreover, to achieve the same additions to oil and gas reserves as those of a decade ago, fewer wells and fewer feet would be drilled, and fewer rigs used. It has been these declining activity levels that have put downward pressure on the total number of oil production jobs.

This more intensive use of labor also explains how the industry so quickly ran into labor constraints as it increased activity in the past two years. A sharp, short-run increase in the number of wells drilled now implies a much sharper rise in the number of hours to be worked. Seemingly overnight, the industry is working 24 hours a day to overcome shortages of machinists, welders, geophysicists and managers experienced in assessing and directing projects.

Finally, for those who look to a long-term expansion in the industry, the mountain to be climbed is higher than expected. If higher oil and natural gas prices are to lead an industry expansion, they must be high enough to attract labor as well as capital back into the industry. The inventory of excess oil field skills—like that of the surplus rigs from the 1980s—is now exhausted. Employees are no longer a subsidized and expendable commodity. Expansion from now on would entail higher wages, intensive training and the development of specific industry skills.

NOTES

¹ Eugene M. Isenburg, "Onshore Rig Surplus Diminishes as Demand Rises," *Oil and Gas Journal*, September 22, 1977, Table 1, p. 63.

Economic conditions remain excellent in Houston, with virtually every statistic pointing to strong local expansion. The official figure for wage and salary employment growth for the past 12 months is 2.6 percent. However, to an undercount of 20,900 jobs in the last quarter of 1996 we can now add another 5,775 in the first quarter of 1997. This means—assuming the counts in the second and third quarters are accurate—employment growth in Houston has been closer to 4 percent in the past year.

RETAIL AND AUTO SALES

Retailers continue to report good conditions locally, with any slowdown attributed to the seasonal lull before the holidays. Auto sales continue to grow, making for the best September in Harris County history. September sales were up 21 percent over September 1996, and sales were up 9 percent on a year-to-date basis.

ENERGY PRICES

Crude oil prices spent much of August and September in a tight range between \$19.25 and \$19.75 per barrel. The end of the driving season and the highest monthly levels of OPEC production since 1979 gave oil markets reason to weaken, but they remained focused on problems in Iraq and Turkey. Prices jumped to \$22 in early October when President Clinton sent an aircraft carrier to enforce the no-fly zone over southern Iraq.

Natural gas prices have remained surprisingly strong, moving past \$3 per thousand cubic feet in early October, in part because of an unexpectedly strong demand. Electric utility usage of natural gas rose with an unusual number of nuclear plants down for refueling and with hot fall weather in the Midwest and Southeast. Meanwhile, heating demands for natural gas rose with early cold

weather in the West and Northeast. Natural gas inventories remained 3–4 percent ahead of last year but below the normal trend.

REFINING AND PETROCHEMICALS

The driving season was reluctant to end this year, with demand for gasoline reviving in September and pulling wholesale gasoline prices back up over 60 cents per gallon. However, declining gasoline prices and rising crude prices cut into the strong margins refiners enjoyed over the summer. Heating oil inventories are 20 percent above normal, as high levels of gasoline production over the summer produced unusually high levels of heating oil as a by-product.

Petrochemical prices continue to weaken for a number of products as new capacity comes on line in the United States and Asia. Sales of petrochemicals continue at a very high level.

REAL ESTATE

Housing markets in Houston continued their hot streak, unfazed by the arrival of August and an expected seasonal slowdown. August existing home sales hit the second highest level in the city's history (the highest was in July), and the inventory of homes for sale is 9 percent below its year-earlier level. New home sales were up 41 percent over August 1996, and starts were up 26 percent.

Real estate professionals report they are swamped with work by the best market conditions in 15 years. The Houston office market has made big strides in absorption in recent months, and rents are rising faster than inflation for the first time in a decade. As many as 10 new office buildings should be going up in various parts of the city by the end of next year. Industrial real estate remains strong, and the apartment and retail markets are very healthy.

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