Petroleum Prices

by Professor James M. Day

WHEN OIL AND GAS PRICES SOAR and hurt pocketbooks, the question inevitably arises: Why? Economists, consumer groups, and media pundits all offer theories. The following is my basic view on the complex factors affecting oil and gas prices.

The petroleum industry consists of exploration and production, refining (manufacturing), transportation, and marketing. Independent companies may be involved in only one or two parts of the petroleum industry. Large petroleum companies, such as Exxon-Mobil, are considered "integrated" if they are involved in all four segments. That, however, does not mean they are self-sufficient. They must obtain crude oil from independent producers, other major multinational oil companies, and foreign state-owned entities. Today, the United States imports 58 percent of its crude oil and petroleum products. Imports are expected to exceed 60 percent in 2005, and we currently lack sufficient refining capacity to meet our growing demand for gasoline, heating oil, heavy oils (to generate electricity), plastics, and synthetics, such as nylon and rayon. Only 2 percent of the world's oil reserves are found in the United States, despite the fact that America consumes 26 percent of the world's production. With the high costs of exploration and production, the risks are huge. In 2003, a consortium of eleven multinational giants agreed to a $10 billion exploration joint venture in Azerbaijan and a $3.6 billion pipeline through Georgia to the port at Ceyhan, Turkey.

Economics and History

SINCE EDWIN L. DRAKE DRILLED THE FIRST OIL WELL in 1859, Adam Smith's law of supply and demand has dominated oil prices. Drake sold his first crude oil for $30.00 per barrel (equal to $650.00 per barrel in 2003). By the end of 1860, seventy-five wells were producing, and the price fell to $4.00 a barrel. With more wells on stream by the summer of 1861, the price fell to ten cents a barrel. During the Civil War, there was rampant inflation and a shortage of whale oil and no camphene from the South's pine forests for kerosene lamps. This caused the price to climb above $10.00 a barrel. After the Civil War, the price collapsed to $1.00.

Two years after Drake's discovery, another element entered the pricing picture - traders. Today, they are the Wall Street firms, such as Goldman Sachs and J.P. Morgan Chase, and international banks, such as the Bank of America and Germany's Deutsche Bank, and who can forget the now bankrupt Enron. Since 1983, the New York Mercantile Exchange (Nymex) has traded future and forward contracts in crude oil and petroleum products with colorful names denoting the risk, such as Boston Bingo (heating oil) and Russian Roulette (gas oil). Another major exchange is London's International Petroleum Exchange.

Traders act on their perception of future market prices by betting on forward contract and future prices over days, months, and years in advance. Few major oil companies are traders. They consider the Nymex too volatile, but may hedge the price to cover the price fluctuations of a cargo of crude oil from the Mid East that takes 45 days to reach Texas.

Weather reports sent the price of heating oil and natural gas soaring in December 2003 based on predictions of January's cold snap. On February 2, 2004, a refinery fire, news that a major pipeline would be shut down for maintenance, and low crude oil

inventories sent crude oil prices leaping 5.8 percent (from $1.93 to $34.98 per barrel). The same day, predictions of cold weather easing in the Northeast and Midwest sent natural gas prices dropping from $6.012 to $5.53 per million BTUs.

The most volatile prices occur during expectations of war. The day before the 1991 Gulf War, the price of crude oil hit $32.00 a barrel. The following day, traders watched the smart bombs hit and the price drop to $20.30 per barrel. They were betting that the war would be short-lived and Mid East oil was not in jeopardy. There is always speculation before meetings of the Organization of Petroleum Exporting Countries (OPEC), and the prices can rise or fall on expectations of cuts or increases in OPEC

production. Civil unrest and strikes by petroleum workers in the OPEC nations of Nigeria and Venezuela raise prices periodically as well. One reason crude oil prices began to rise in 2003 was the U.S. dollar falling against the Euro, as oil prices are based on the weak dollar.

Nymex crude oil prices set the benchmark price of West Texas Intermediate (WTI) crude oil in Cushing, Oklahoma, a major pipeline hub. Natural gas is based on the price at the pipeline hub in Henry, Louisiana. Neither necessarily reflects the exact prices at which oil and gas may actually be sold. Nymex transactions are generally "paper barrels," meaning no oil is actually bought or sold, while Oilmen buy and sell oil in real "wet barrels." The number of paper barrels is often ten times the number of wet barrels actually purchased, yet the Nymex spot market WTI quote may be the basis for purchase contracts, adjusted only for sulfur content and °API gravity, as noted below.

Localities	Sale Price **Before Tax** $ per gal	SalePrice **AfterTax** $ per gal	**Percent Tax** Total Tax as a Percentage of Sale Price
Washington D.C.	1.344	1.728	22%
Baltimore, Md.	1.349	1.768	24%
Norfolk, Va.	1.287	1.661	23%
New York, N.Y.	1.389	1.900	27%
Los Angeles, Ca.	1.479	1.987	26%
San Antonio, Tx.	1.195	1.579	24%
Tulsa, Ok.	1.225	1.579	22%

** Average prices per gallon for regular gasoline as reported by the Oil & Gas Journal on March 10, 2004*

During the 2001 California "energy crisis," it was discovered that natural gas traders and producers manipulated natural gas prices by reporting false prices. On January 28, 2004, six firms agreed to pay a total of $50 million to settle Commodity Futures Trading Commission charges that they reported fictitious prices.

Taxes

NO DISCUSSION OF PRICES IS POSSIBLE without mention of taxes, especially gasoline taxes. The federal tax on gasoline is 18.4 cents per gallon; and every state and many localities also assess gasoline taxes. The District of Columbia tax in January 2004 was 20.0 cents per gallon for regular gasoline (87 octane), included in the average pump price of $1.532. Thus, the total tax was 25 percent of the pump price. The Maryland tax was 23.5 cents a gallon, while Virginia's was only 19.0 cents. New York City taxes were 32.7 cents a gallon, and Los Angeles taxes were 32.4 cents. In the oil state of Oklahoma, the tax was only 16.0 cents.

Costs and Profits

EVERY PRODUCER IS ASSUMED TO MAKE A PROFIT or else the oil wells will be shut down until crude oil prices rise to a profitable level. The gross profit is the spot market price less production and exploration costs, which varies in the United States from $5.00 to $15.00 a barrel. Mid East flush production can be less than $2.00 per barrel. The cost of crude oil transportation to the refinery is borne by the producer, primarily by pipeline from the major oil fields and by truck from remote small fields. Tanker costs for imported crude oil are paid by the refiner-purchaser.

Petroleum refiners and chemical companies are the major crude oil purchasers. As no two crude oils are identical, the price varies according to the value of the products that can be refined into gasoline, jet fuel, heating oil, plastics feedstock, and various other resources. One of the principal characteristics affecting the purchase price of crude oil is its sulfur content. The oil is referred to as “sweet” if it is comprised of less than one percent sulfur and “sour” if more than one percent. WTI was quoted at $4.28 per barrel above West Texas Sour on February 2, 2004, because the sulfur is environmentally objectionable, corrosive, and must be removed. The second major property affecting the price of crude oil is the °API gravity. Lighter crude oil is more valuable and expensive because of its capability to produce more light end products, such as gasoline and naphtha. A refinery’s construction cost depends on its ability to refine crude, from simple distillation to complex catalytic cracking of hydrocarbon molecules, and hydrotreating to isomerization to increase the volume of light ends, remove impurities, and meet EPA gasoline and diesel fuel emission limitations and refinery plant standards. Complex refineries cost hundreds of millions of dollars.

In December 2003, the average refinery operating cost on the Gulf Coast was $3.85 per barrel and its operating margin was $2.02. On the West Coast, the refinery cost was $4.91 and the margin was $5.09. These basic refinery costs do not include state environmental quality standards and EPA required gasoline additives, which add to the cost. California's stringent environmental standards are a cause of high prices in Los Angeles. A refinery must

bear the costs of storage tanks for crude oil and the various products and pipelines to transport the products to wholesale terminals, sometimes over great distances, which explains the difference in price between San Antonio and the Northern cities noted above.

Retail marketing takes place downstream from the refinery where there is a local market, either from a wholesale terminal to independent marketers ("jobbers") or an integrated oil company marketer. Both have operating and transportation costs and must earn a profit. Major terminal costs include storage tanks to handle three grades of gasoline (octane levels of 87, 89 and 92-plus), which are further broken down to oxygenated and non-oxygenated (depending on EPA regulations). Additional storage tanks are required in states with higher environmental standards than the EPA's. Terminals must blend gasolines and add additives. Delivery by tank wagon trucks adds to the costs along with labor, maintenance, and overhead.

Your local branded gasoline station operator may own his station, lease it from a refiner, or be an employee of the refiner-owned station – except in a few states that bar refiners from operating stations. Most gasoline stations are small businesses and purchase the gasoline from an independent terminal operator or a refinery-owned terminal. They earn profits by selling gasoline, motor oil, tires, batteries, foodstuffs, and auto repair. Nationally, a gasoline station's average profit ranges from three to four cents a gallon, but is higher in the District of Columbia because of the lack of competition, as Washington College of Law (WCL) students can attest if they have filled up at the Exxon station on the corner. But averages can be misleading - America's national income includes Bill Gates and the person who flips Big Macs at McDonald's.

As a rule, a gasoline station owner sets the pump price according to the proverbial "what the traffic will bear" (i.e., what the consumer will bear). Street traffic, competition, and income demographics of an area are key. As real estate agents are fond of saying, "it's location, location, location." Thus, rent and property taxes are major costs that curtail a station's profits. But does this explain why the Exxon station down the street from WCL charges over 30 cents a gallon more than the five stations located within six blocks of my home in Arlington, Virginia?

It is difficult, if not impossible, for the public to determine the precise profits made in the many segments of the petroleum industry and the culprits causing high gasoline prices. Certainly, traders and OPEC shoulder part of the blame. But to some extent, consumers share the blame as well. It appears residents of wealthy areas prefer convenience to lower gasoline prices. During 2003, the national average price of gasoline was $1.41 per gallon (including a tax of $0.41). The price of Evian water was $1.61 per gallon. One answer to the American public's puzzle may be found by spelling Evian backwards. BLB

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