

Volatility at the Pump

Where do high gas prices come from?

BY BETTY JOYCE NASH

Drivers curse high gas prices. Over the summer of 2010, prices hovered around \$2.80 per gallon, climbed in late autumn, and then spiked in March 2011 as revolutions in the Middle East disrupted supplies. Gas prices remained above \$3.50 for 29 weeks in a row by late October.

A \$10 per barrel increase in crude oil raises pump prices by about 25 cents per gallon, according to Jeff Lenard of the National Association of Convenience Stores (NACS). Those stores retail about 80 percent of the gasoline sold in the United States.

The extra quarter adds up to \$35 billion annually. That causes people to spend less on other goods or save less when they need to pay more for gas; the \$10 more per barrel not only further subtracts from GDP, since almost half of U.S. oil comes from abroad, but diminishes estimated multiplier effects from spending on domestic goods and services. This lowers net consumer spending by about the same \$35 billion, a 0.2 percent decline of GDP, in a \$15 trillion economy, according to economist James Hamilton of the University of California at San Diego.

Refinery costs, distribution and marketing costs, varying fuel specifications, and taxes also influence prices, along with the weak dollar. Other influences: seasonal variations in consumption, production, imports and inventories, along with trading speculation. But the biggest determinant by far is the price of crude oil, roughly 68 percent of the retail price at current price levels, according to the U.S. Energy Information Administration (EIA).

Supply Matters

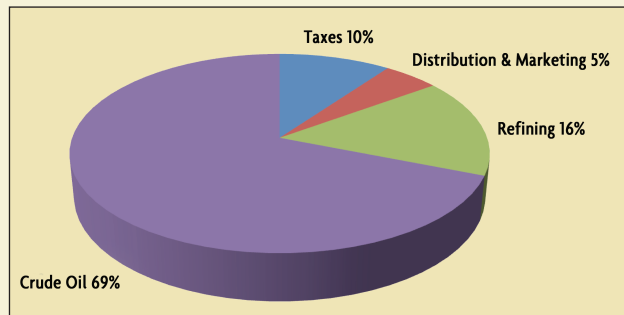
The current run-up in oil prices began as world economies started to emerge from the latest recession. Their energy needs grew. Between 2003 and 2008, crude prices also escalated because of intensified demand and stagnant production. That sent prices to \$147 per barrel in 2008 before dropping to less than \$40 per barrel as the global recession reduced demand.

Today, in the developing nations of Brazil, India, and especially China, demand has fueled the price hikes. In China, energy needs rose by 12 percent in 2010. U.S. demand rose 1.9 percent over the first six months of 2011 compared to the same period in 2010. Summer also accelerates demand as people take more vacation trips.

Risks and reductions create uncertainty about supply, and that affects prices. Turmoil in Libya and other Mideast nations has influenced supply, and an April price spike also reflected events closer to home — Mississippi River flooding and resulting refinery outages.

The United States produced the most oil, worldwide,

What's Included in a \$3.80 Per-Gallon Price of Regular Gas?



SOURCE: U.S. Energy Information Administration

until the early 1970s when Texas oil production started to decline. The United States imported 49 percent of its oil in 2010, according to the American Petroleum Institute (API): 25 percent from Canada, 12 percent from Saudi Arabia, and smaller percentages from Mexico, Venezuela, Algeria, Nigeria, Iraq, Russia, and elsewhere. Instability in oil-producing nations threatens supply and raises world market prices. The Arab oil embargo in 1973, the Iranian revolution in 1978, the Iran-Iraq war in 1980, and the Persian Gulf conflict in 1990 all boosted U.S. prices.

Refinery to Retail

The nation's 148 refineries heat crude oil to change it into a gas, and then condense it into liquid gasoline and other petroleum products. The process accounts for about 13 percent of the per-gallon gasoline price. Refinery capacity in January 2011 was at a 29-year high, despite many refineries having shut down since the 1970s. Existing facilities have expanded, according to Tim Hogan of the National Petrochemical and Refiners Association. "In some cases, [shutdowns occurred] because that facility was not economical and did not want to make investments in new equipment," he says.

It's unclear the extent to which refiners will continue to expand, Hogan says, because biofuel mandates have reduced production at refineries. Gasoline-ethanol blends account for more than 90 percent of the gasoline sold in the United States; blends of up to 15 percent have recently been approved for some later model vehicles, though that gas is not yet sold at the pump. Increased volumes of ethanol and other renewable fuels displaces the need for more refinery capacity. (Ethanol refineries are typically located in the Midwest, near corn producers.)

From the refinery, about 168,000 pipeline-miles send various fuel blends to product depots around the nation. Most states in the Fifth District use gas piped from the Gulf

Coast, including Texas and Louisiana; in 2010 about 26 percent of the gasoline produced in the United States came from the Gulf Coast, according to the EIA. Other ingredients may be blended into gasoline at the refinery.

Gas prices at the pump also vary according to “boutique” fuel formulas that federal regulations require in certain regions and metro areas. Hot-weather blends reduce the volatile organic compounds that contribute to smog — the incremental cost of production is estimated at roughly 5 cents per gallon or less. Fuel requirements vary by location. The District of Columbia, for example, uses reformulated gasoline, or RFG. Pipelines carry the different blends, and computer controls route fuels that may bypass Virginia, for instance, and go all the way to New Jersey.

At the Pump

It takes about seven to 10 days for an oil price increase to reach the pump, according to Lenard of the NACS. Competition for customers determines the timing and amount. Distance from gas depots, for instance, affects prices because deliveries cost more with distance. The markup on gas is about 15 cents per gallon at convenience stores, and about 3 cents of that is profit to the retailer.

People consider price first when shopping for gas, according to consumer research published by NACS, with nearly one-third of respondents in consumer surveys saying they will reroute trips to save as little as 3 cents per gallon. That knowledge makes retailers cautious. “Retailers know they can’t pass on the whole increase,” says Lenard. Convenience stores use gas to generate traffic inside the store, he explains, and so they first assess the local competition. If the retailer raises gas prices by 10 cents and the competition doesn’t, traffic plunges, not just at the pump but inside the store. “People won’t say, ‘They have a terrible gas price but I’m still getting a sandwich.’”

Pump prices also depend on the gas source and the stores’ supplier contracts. Branded gasoline offers fewer highs and lows, especially if the store is affiliated with an oil company. Contracts ensure the branded stores get served first. Unbranded stores may sell cheaper gas when supplies are

plentiful, but may charge more when supplies tighten because they are forced to pay more on the spot market.

The demand for gasoline responds to price, although not very much. From 2007 to 2010, vehicle miles traveled in the United States have stayed roughly constant at around 3 trillion miles.

Demand for gasoline may react less to price today than in the 1970s, according to Jonathan Hughes, Christopher Knittel, and Daniel Sperling of the University of California at Davis. They estimated the average per capita demand for gasoline in the United States from 1975 to 1980 and from 2001 to 2006, both periods of similarly high prices. The results suggest drivers in the later period responded less to increases. People may depend more on cars for daily transportation, because of long commutes, today than in the 1970s and 1980s. Drivers also may respond more slowly to short-term price increases because they now drive more fuel-efficient cars.

Elasticity of Supply

As gas prices escalated, to nearly \$100 per barrel, so have drilling and calls for more exploration. While drilling in the western Gulf of Mexico will continue under new regulatory safeguards, a year after the BP oil spill, the eastern Gulf and the Atlantic coast’s outer continental shelf remain under a drilling moratorium.

In August, the Department of the Interior granted Royal Dutch Shell conditional approval to drill four exploratory wells next summer in the Beaufort Sea off the Arctic National Wildlife Refuge.

North Dakota and Montana are cashing in on oil in an area known as the Bakken Formation. Recent horizontal drilling technologies fracture shale and release oil.

Oil’s high prices have revived prospects for oil leases in an area 50 miles off Virginia’s coast, despite the moratorium. No one knows yet how much oil to expect there; the potential for oil in that location is based on old estimates from the 1970s, says Mike Ward of API’s Virginia office. A seismic investigation can’t happen before a “lease sale,” which allows energy companies to bid for rights to explore.

“Estimating undiscovered resources in areas with little previous drilling is as much art as science,” says energy consultant Michael Lynch of Strategic Energy & Economic Research Inc.

Even if oil were discovered there today, it could take years to enter the supply chain. In Prudhoe Bay, Alaska, production of oil found in 1968 did not begin until 1977. Exxon’s recent discovery of two reserves in the Gulf of Mexico must be studied, verified, and permits authorized.

Saudi Arabia holds a fifth of the world’s oil reserves and production capacity. It’s also the world’s largest exporter. U.S. supply represents only about 2 percent of world supply, too small to affect global prices very much. But U.S. drilling has expanded, reversing a 30-year decline. By 2009, proven oil reserves had gone up about 8.6 percent over 2008 for a total of about 22 billion barrels.

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