FRBSF WEEKLY LETTER

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# Crude Oil and the Price of Unleaded Gasoline

Before rebounding in the past few weeks, oil prices dropped to their lowest levels since the 1986 price collapse during the first three quarters of 1988. Despite the sharp drop in crude oil prices, however, retail gasoline prices remained steady or rose slightly, reflecting little of the change in crude oil costs.

Some of this divergence between crude oil and retail gasoline prices is the result of transitory supply shocks. For example, a major fire caused the closure of a Shell Oil refinery at the beginning of the Summer. Moreover, hurricane damage in the Gulf of Mexico exacerbated capacity problems and forced oil companies to import larger volumes of more costly foreign gasoline.

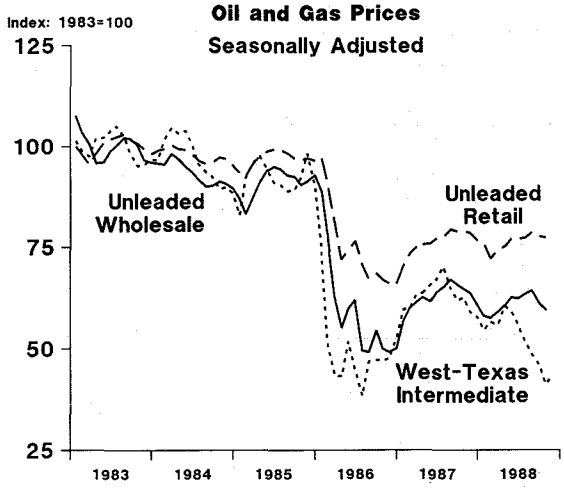
Long-term trends in the industry's structure, however, also have contributed to the weakening link between crude oil and gasoline prices. This *Letter* focusses on some of these factors. The evidence suggests that changes in the competitive environment at the refinery level may make gasoline prices less sensitive to changes in crude oil prices. In particular, total refinery capacity has fallen in recent years. Moreover, a spate of mergers and acquisitions within the industry has decreased the number of producers and increased the level of industry concentration. These developments have effectively reduced competition in the production of gasoline products. Reduced competition, in turn, insulates gasoline prices from changes in crude oil prices, allowing refiners to boost profit margins when crude oil costs fall.

This change in the industry's competitive environment also means that profits of oil companies with both crude oil and refining operations are less likely to rise and fall with crude oil prices. In fact, the increased emphasis on "downstream" operations (such as refining, retailing, and petrochemical products) has made it possible for oil companies and oil producing countries with refining capacity (notably Saudi Arabia, Kuwait, and Venezuela) to benefit from lower oil prices.

**Oil prices—then and now**

In the past, retail prices of gasoline typically followed the lead of crude oil prices. When crude oil prices fell, a sizable proportion of this decline tended to be passed through to retail prices. Of course, changes in refinery technology, increasing octane levels, and seasonal swings in gasoline consumption, among other things, caused the spread between the two prices to vary from month to month, but, in general, the two prices moved in the same direction. In contrast, movements in the prices of oil and of gasoline have diverged in 1988. Between February and early October 1988, crude oil prices fell nearly 24 percent, while retail prices of unleaded gasoline actually rose. This behavior reflects a fundamental change from that observed in previous years, as shown in Chart 1.

**Chart 1**
**Oil and Gas Prices**
**Seasonally Adjusted**




The chart also suggests that the recent behavior of retail gasoline prices cannot be explained simply by a change in the relationship between wholesale and retail prices. Although the spread

between retail and wholesale prices has increased since 1985, that spread did not increase appreciably in the last eighteen months. Instead, the reduced passthrough in the current episode of falling crude oil prices applies to wholesale prices of gasoline, as well as to retail prices.

Statistical analysis of the relationship between crude oil prices and the retail price of unleaded gasoline confirms that the behavior of the post-1987 market is significantly different from that of prior years. In the period between 1983 and 1986, a 10 percent change in crude oil prices led to a 5.5 percent change in retail unleaded gasoline prices. In contrast, in the 1987–88 period, a similar change in crude oil prices led to only a 1.7 percent change in the price of retail unleaded gasoline.

Moreover, the estimates suggest a higher average markup for unleaded gasoline at current crude oil prices. In the pre-1987 period, a $15 crude oil price eventually would yield a retail price for unleaded gasoline of 84 cents per gallon. In the post-1987 market, the same price of crude oil would yield a retail gasoline price of 94 cents per gallon, a ten cent increase in margins.

**Changes in refining capacity**

Refiners' ability to set higher gasoline prices relative to crude oil prices largely is the result of tightened supplies in the oil product market. Since 1980, world oil refinery capacity has fallen by 11 percent. Operable capacity in the United States has fallen from nearly 19 million barrels per day in 1981 to under 16 million barrels per day this year.

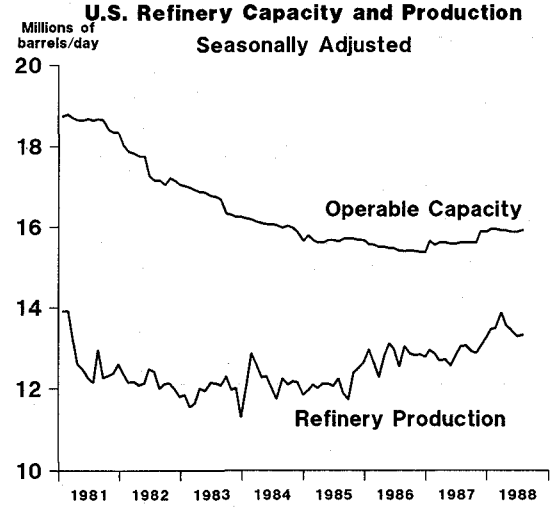
This decline in refinery capacity is the result of major changes in market conditions. One such change was the deregulation of the oil market in the United States, completed in early 1981. Prior to deregulation, the method of allocating below-market priced crude oil favored small refineries, enabling them to compete with larger refineries that enjoyed significant economies of scale and operated at lower unit costs. Following the elimination of these regulatory advantages, many of the smaller and inefficient independent refineries succumbed to competitive pressures.

A change in gasoline consumption in the early 1980s also induced reductions in refinery capacity. The sharp increase in crude oil prices in 1979–80 caused world oil consumption to fall. Between 1980 and 1983, world consumption fell by 2 million barrels per day. The drop in demand, coupled with high crude oil prices, drastically reduced refinery profit margins, and forced many of the refineries to close. For example, in the United States the number of refineries dropped from 303 in 1981 to 182 in 1987.

In recent years, lower oil prices and world economic growth have caused consumption to rise. World oil demand has risen by 1.4 percent per year since 1983, when consumption bottomed out, and consumption is now above the 1981 level.

As shown in Chart 2, refiners have responded to rising consumption by increasing capacity utilization. Since late 1986, production has risen by nearly a million barrels per day. However, refinery capacity has not risen as rapidly, rising only 600,000 barrels per day over the same period. Rising consumption and diminished operable capacity have worked to tighten capacity utilization in U.S. refining. For example, capacity utilization in the United States ran at 86.5 percent in August, nearly the highest rate in the 1980s.

**Chart 2**
**U.S. Refinery Capacity and Production**
**Seasonally Adjusted**




This high level of capacity utilization means that slack capacity is not available, and refiners did not feel pressure to drop product prices for many of their products as crude oil prices declined in 1988. Notably, it has been primarily those prod-

ucts that face competition from close substitutes (such as fuel oil, which competes directly with natural gas) that have led price reductions. In contrast, those that face inelastic demands (motor gasoline and home heating oil) have experienced little downward price pressure.

**Changes in market structure**

In addition to tightening supply conditions, the structure of the market has changed in ways that seem to have reduced competitive pressures on retail prices. In recent years, the domestic industry has become more concentrated because of two primary forces. First, oil price decontrol reduced the number of independent suppliers and led to a concentration of production in the larger refiners.

Second, recent mergers and acquisitions within the industry have tended to reduce direct competition among refiners as well. Attempts to restructure debt associated with these mergers of large oil companies have led those companies to spin off operations, selling refining or retailing networks to other companies. In the process, the major oil companies have tended to become more regional in focus, concentrating their marketing and distribution in the markets where they face less competition. As a consequence of this regionalization, individual markets often have fewer suppliers, increasing the market power of the remaining participants.

**High fixed costs of capacity**

The growing ability of refiners to keep gasoline prices high in the face of falling crude oil prices rests firmly on the high fixed cost of building new refining capacity, which serves as a barrier to entering the refining industry. New refining capacity is simply very expensive and takes years to bring on line.

Upgrading facilities to boost efficiency at existing refineries can yield some increased capacity, but those gains are relatively small. Moreover, idled facilities have been converted to other uses or mothballed. Those facilities generally had obsolete technology and were too small to capture the cost savings from economies of scale anyway.

For these reasons, capacity utilization is likely to tighten until margins become so excessive that new ventures become worthwhile. Even then, it will take a number of years for such investments to increase supply and competition within the market. Currently-planned additions to capacity are not likely to dilute the market power of refining companies, however; new capacity is being brought on line by the companies with the largest current shares of the market. And although margins are higher in recent years, gasoline prices still are relatively low, encouraging continued growth in consumption. Consequently, refinery price-setting power is likely to get stronger in the near term, rather than weaker.

**A change in pricing strategy**

Prices in the gasoline market increasingly will reflect local demand conditions. With a drop in competitive pressure, oil companies are better able to set prices on the basis of the effect of those prices on revenues. This is in contrast to the simple mark-up over input costs that determined prices in the past. Because the demand for gasoline is very insensitive to small changes in retail prices, refiners will be able to maintain higher margins.

In the near term, retail gasoline prices are likely to adjust to changes in crude oil prices more slowly than in the past. Declining consumption of gasoline during the winter months will work to hold down further increases in prices, but refiners will be able to reduce gasoline production and shift to heating oil without generating slack capacity that might put downward pressure on prices.

Over the longer-term, domestic oil companies and oil exporting countries alike will respond to growing capacity shortages by expanding their downstream refinery operations. This should serve to temper refiners' price-setting powers over time.

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