

STEO Supplement: Summer 2006 Motor Gasoline Prices

This supplement to the July 2006 *Short-Term Energy Outlook* (STEO) examines the various factors that have contributed to this summer's high gasoline prices and discusses how they may continue to impact markets over the next several months.

EIA's forecast of the retail price of regular gasoline for the summer 2006 driving season (April 1 through September 30) has been revised steadily upwards from \$2.62 per gallon in the April *STEO* to \$2.88 per gallon in our current forecast. No more than 14 cents of this 26-cent increase in the forecast gasoline price can be attributed to higher crude oil prices.

Since November 2005, we had been forecasting monthly average 2006 motor gasoline prices to peak in May and then begin to decline. The retail price of regular gasoline in EIA's weekly survey did hit a peak of \$2.95 per gallon on May 15, but the subsequent decline was both shallow and short-lived. Prices have risen sharply over the past 2 weeks and on July 10 reached \$2.97 per gallon.

Retail gasoline prices can be broken down into the following three basic elements:

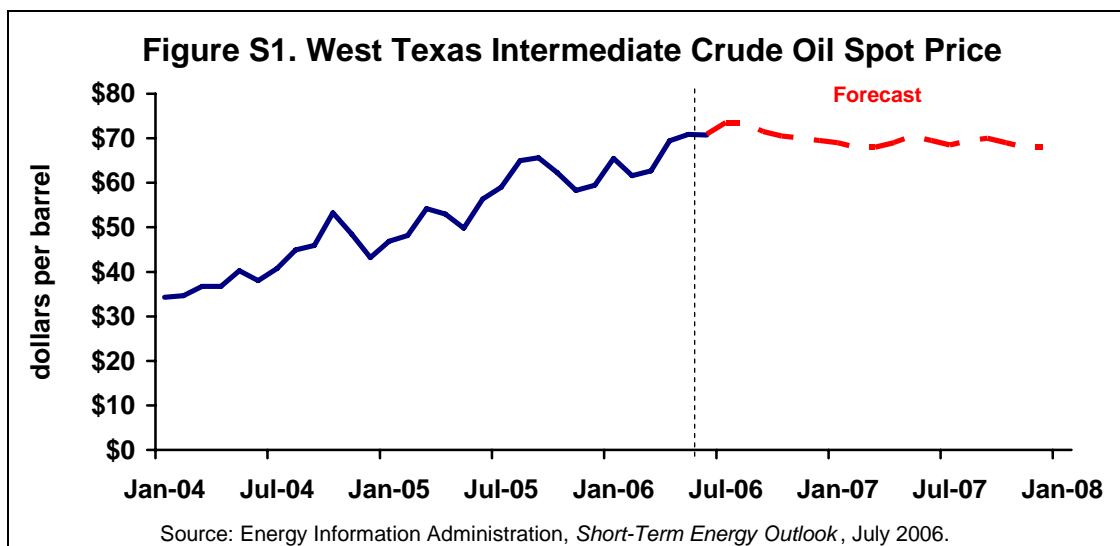
1. Crude oil costs – the West Texas Intermediate (WTI) crude oil spot price at Cushing, Oklahoma, is used in this analysis as the benchmark crude oil price.
2. Wholesale and retail price spreads – the wholesale price spread is the difference between the wholesale price of gasoline (refiner price of gasoline for resale)¹ and the spot price of crude oil. The retail price spread is the difference between retail price of gasoline (less taxes) and the wholesale price of gasoline.
3. Taxes – including Federal, State and local excise, sales, gross receipts, or other taxes applied to petroleum products (taxes on crude oil are included under crude oil costs).

Section 1 reviews the impact of rising crude oil prices on motor gasoline prices. Section 2 examines several factors that have contributed to the higher wholesale

and retail price spreads, namely the U.S. gasoline supply and demand balance, the international gasoline balance, and the growing role of ethanol in the gasoline market. Taxes, which contribute about 47 cents per gallon to retail gasoline prices, have not changed significantly over the last year and is not reviewed in this analysis.

1. Crude Oil Price

Over the last few years the price of crude oil has been trending upwards (Figure S1), driven by several market conditions that have been discussed in recent editions of the *STEO*. While the monthly average crude oil price is expected to peak in the next two months, the continuing tight world crude oil and refined product markets may yet result in large price increases in the event of any unexpected reduction to the actual or perceived level of supply.



As a rule-of-thumb, a \$1.00-per-barrel increase in the price of WTI crude oil is expected to increase the price of gasoline by about 2.4 cents per gallon. Consequently, the increase in the average price of WTI crude oil from \$63.19 per barrel in the 3rd quarter of 2005 to an expected average of \$72.85 per barrel in the 3rd quarter of 2006 adds about 23 cents per gallon to the price of gasoline.

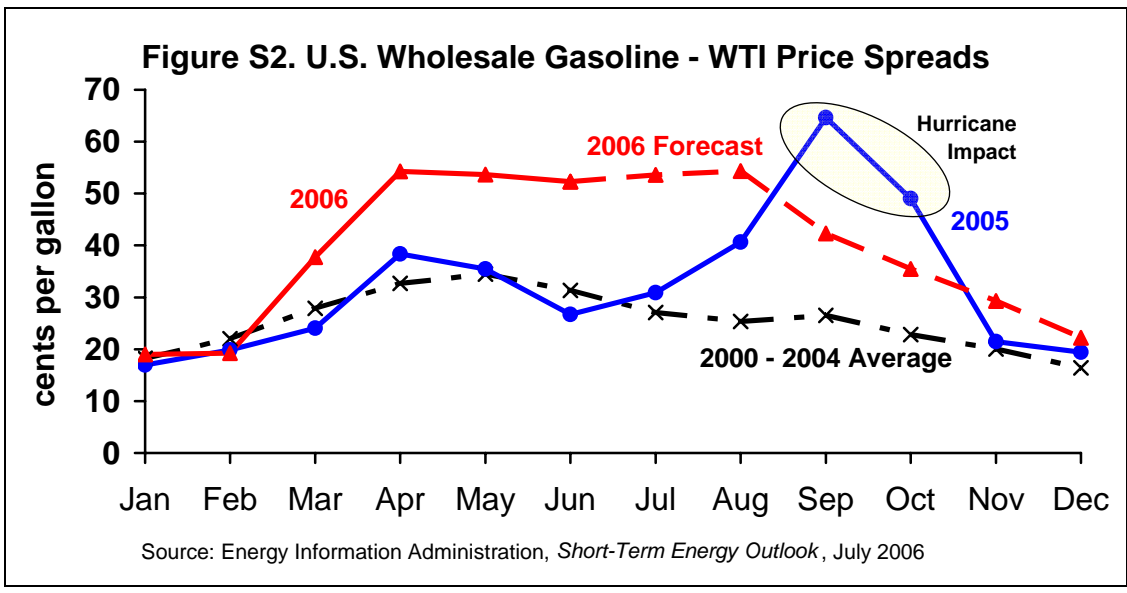
2. Wholesale and Retail Gasoline Price Spreads

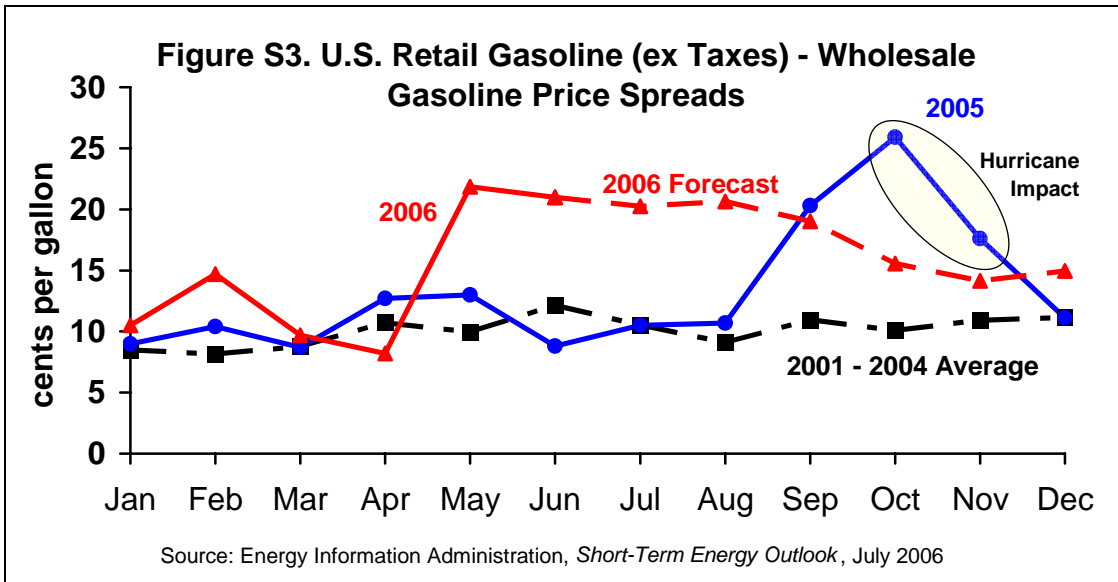
While EIA and other forecasters did not foresee the steady rise in crude oil prices over the last 2 years, EIA's forecasts of wholesale and retail spreads have

generally been more reliable (not counting last year's hurricane impact). However, price spreads this summer have remained persistently above the projections made in the April *STEO*.

The wholesale gasoline-crude oil price spread (Figure S2) generally peaks around May before slowly falling back through the end of the year. Last year was unexceptional through the end of July. The U.S. gasoline market began tightening in early August as the wholesale gasoline-crude oil price spread rose by about 20 cents per gallon over the first half of the month. Hurricane Katrina pushed the price spread upward by as much as 80 cents per gallon at the end of August, 2005. Because Hurricanes Katrina and Rita hit as the peak driving and gasoline demand season was ending, the refining industry was able to recover, with the wholesale-crude price spread falling back to normal levels by November. The retail-wholesale price spread pattern is similar (Figure S3).

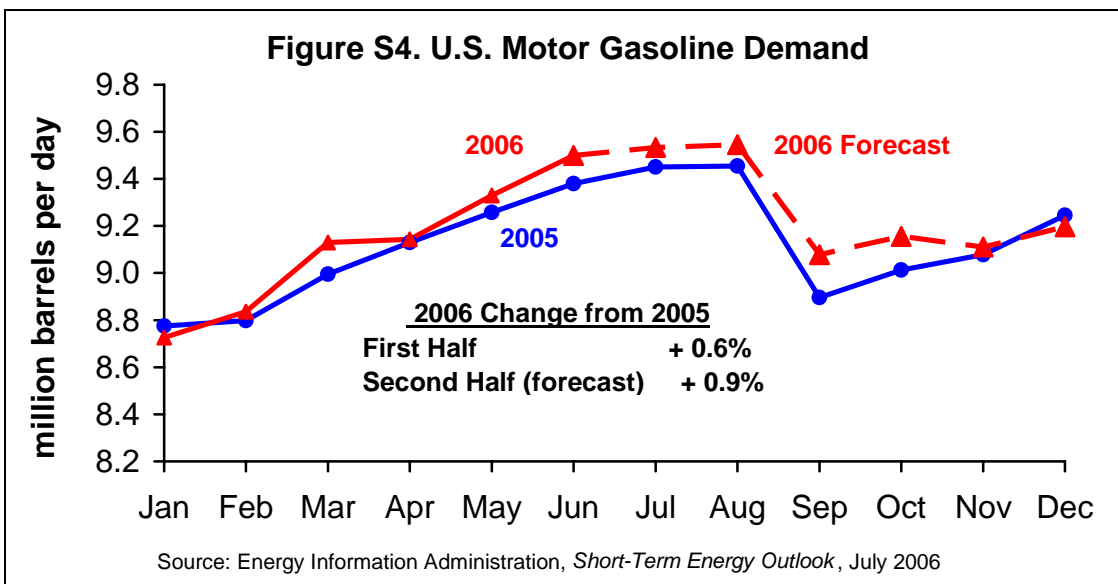
The summer of 2006, however, has evolved very differently for both price spreads. By April 2006, the wholesale gasoline - crude oil price spread was about 15 cents per gallon above last year and holding. The retail-wholesale gasoline price spread in May rose to about 8 cents per gallon above last year's level and also has not yet fallen. EIA now expects these high price spreads to continue at least through August, after which the normal seasonal decline in gasoline demand may begin to bring some relief to the market.

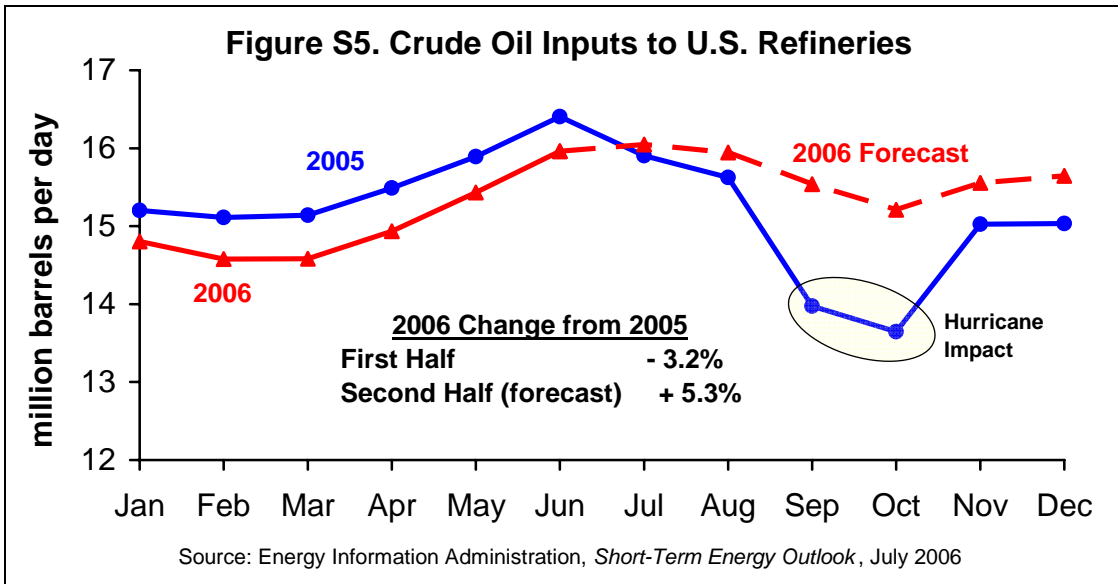




A. U.S. Gasoline Supply and Demand Balance

One key driver of the high price spreads this summer is the balance between the U.S. production and consumption of motor gasoline over the last 6 months. While gasoline consumption continues to grow (Figure S4), crude oil processing rates at U.S. refineries over the first 6 months of this year were more than 3 percent lower than the same period last year (Figure S5).

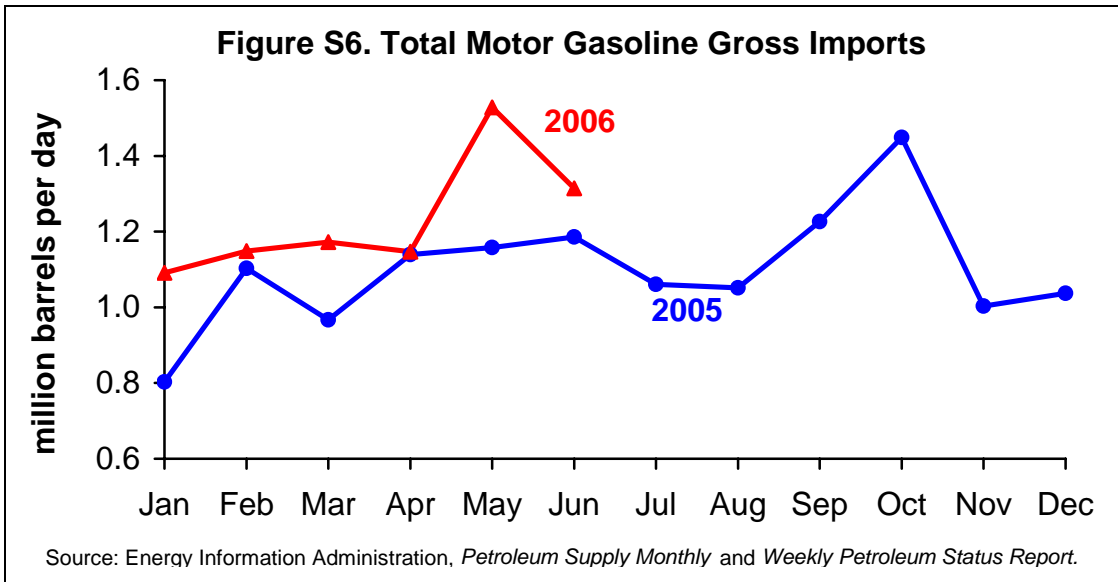




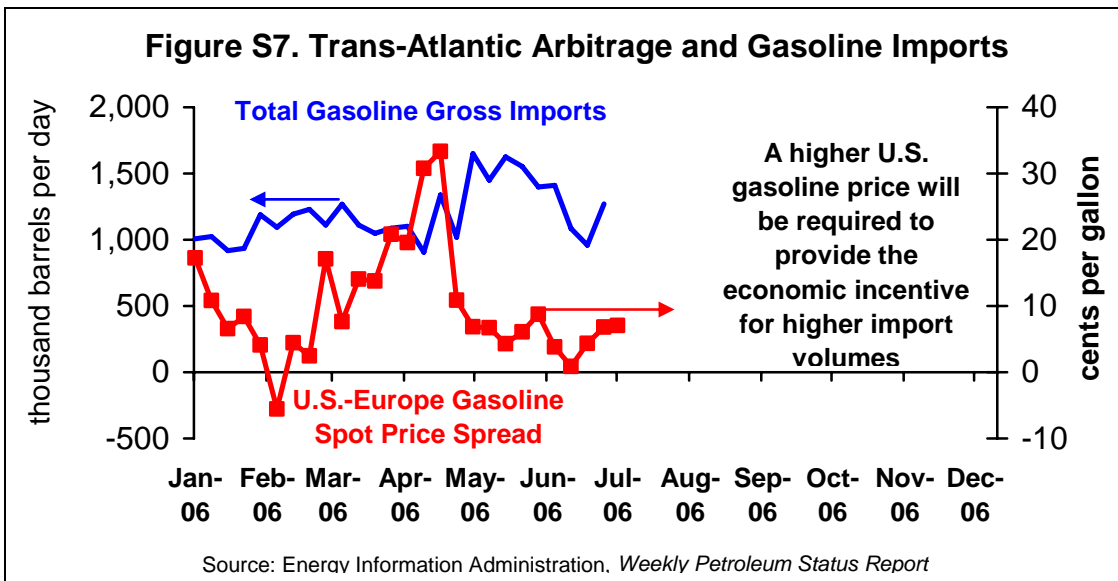
There are several reasons for the decline in domestic refinery processing rates. A number of refineries were still shut down or operated at reduced rates because of hurricane damage. Others pursued maintenance schedules that had been deferred from last fall, while others installed equipment to meet the new Tier 2 gasoline and ultra-low-sulfur-diesel regulations. The shutdowns this year lasted longer than expected.

B. International Gasoline Balance

The U.S. gasoline market was again helped through the shortfall in domestic supply by a surge of product imports. Gross imports of finished gasoline and gasoline blend stocks in May 2006 even exceeded the level of imports recorded last October following the hurricanes (Figure S6).



The increase in the wholesale gasoline-crude oil price spread in March and April because of the tightening U.S. market motivated foreign refiners to increase their supply of gasoline to the U.S. market. The difference between the U.S. gasoline and Europe gasoline spot prices rose to over 30 cents per gallon by mid-April (Figure S7). Within two weeks imports surged, and total gasoline imports set a record the week of May 5, 2006, averaging 1.649 million barrels per day (bpd).



The growth in demand for shipments to U.S. markets also drove up gasoline prices overseas. The tight U.S. gasoline market expanded overseas. As U.S. prices stayed high, European spot prices rose until the U.S.-Europe spot price spread fell. World gasoline inventories, particularly in Europe, have been pulled down,

putting additional upward pressure on world gasoline prices. The consequence of a tight European gasoline market is that the response of foreign gasoline supply to an unexpected disruption to domestic gasoline production this summer may be constrained. In particular, the surge in gasoline imports similar to what occurred following Hurricanes Katrina and Rita may not be possible this year.

C. Ethanol

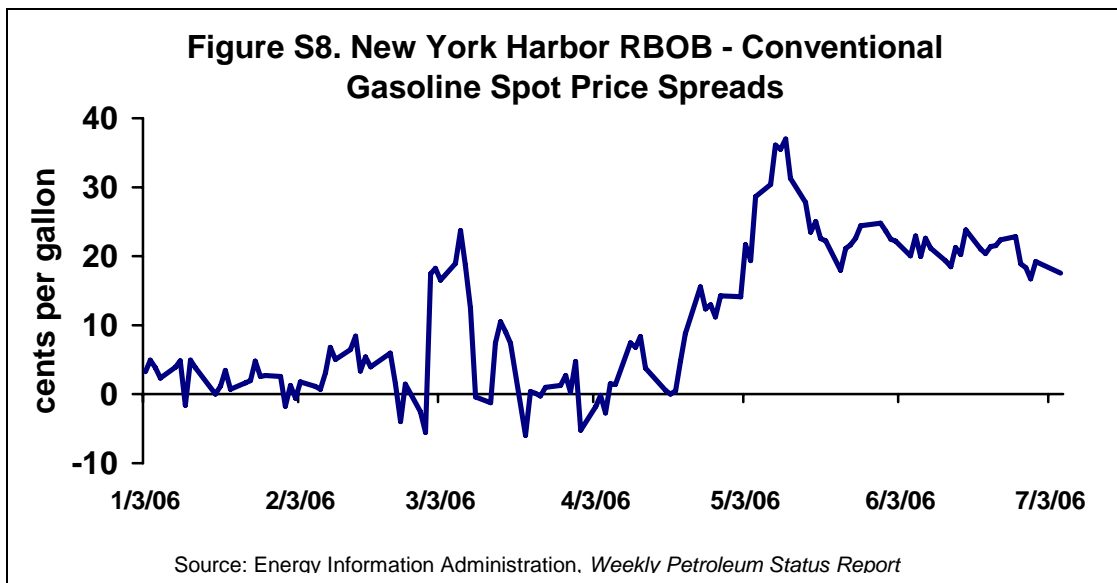
Gasoline prices were expected to increase this year because of the increase in production and distribution costs associated with the phase-out of methyl tertiary butyl ether (MTBE) from the gasoline pool. ²

The transition from MTBE to ethanol has contributed to higher gasoline prices in two ways. First, gasoline blended with ethanol is more costly and difficult to produce at refineries. Second, the increase in demand for ethanol this year has exceeded the increase in supply such that the price of ethanol has risen significantly above the price of gasoline. While the impact of these two factors on gasoline prices was expected to be greatest during the transition months of early summer the expected improvement in these markets has not yet materialized.

The difficulty U.S. refiners have had over the last 6 months supplying the gasoline market discussed above is perhaps most noticeable in the reformulated gasoline (RFG) markets. Just about every area in the United States that uses RFG (about 1/3 of total gasoline demand) is using a blending component called Reformulated Blendstock for Oxygenate Blending (RBOB) to which ethanol is added to create the finished RFG. Because blending ethanol increases the vapor pressure of gasoline it is more costly to produce RBOB for ethanol blending than for MTBE blending. Moreover, as companies move to ethanol-blended RFG they experience some loss in production capability in the summer months (about 5-6 percent outside of California), due to changes necessary to accommodate ethanol's higher blending vapor pressure and to meet limits on toxic emissions.

The tightness in the RFG market is reflected in the price spread between RBOB and conventional gasoline. Based on the transitions from MTBE to ethanol in Chicago, California, Connecticut and New York before this year, we expected the RBOB-conventional gasoline price spreads of about 6 to 9 cents per gallon with short-term price spikes of up to 30 cents per gallon lasting only about 1 month during the switch from winter-grade to summer-grade gasoline in early Spring.

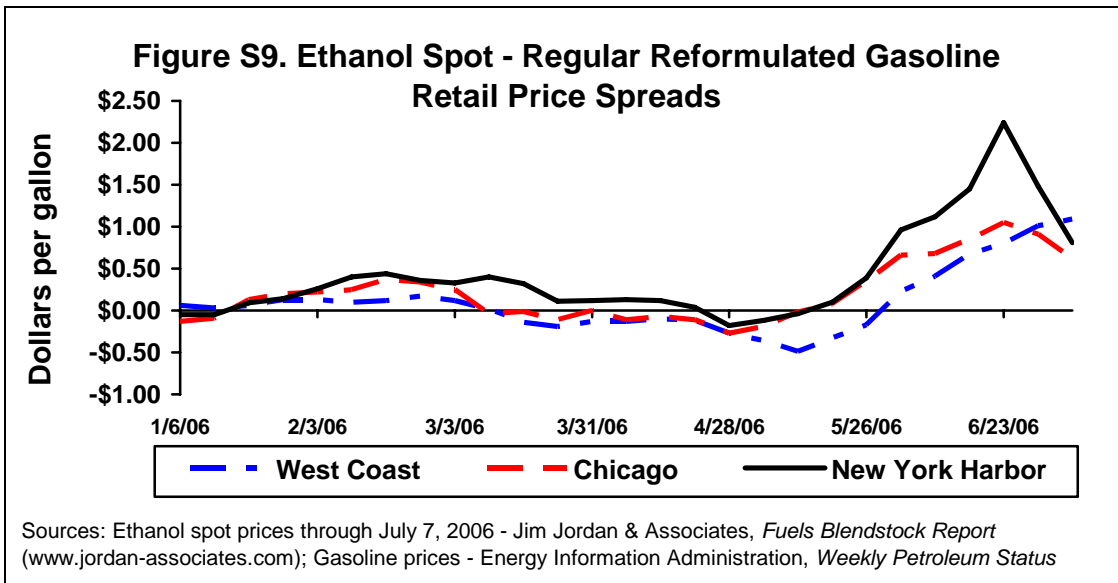
However, the gasoline market tightness and difficulty in producing RBOB has led to sustained high RBOB-conventional gasoline price spreads (Figure S8). As a rule-of-thumb, since RFG represents about one-third of the total U.S. gasoline market an RBOB price premium that is 10 cents per gallon above the expected value would add about 3 cents to the U.S. average gasoline price. An easing of the RBOB price premium may not occur until September when the RFG program changes from the summer to winter phase and vapor pressure restrictions are relaxed.



The demand for ethanol to replace MTBE in RFG markets along the East Coast and in Texas has also tightened the ethanol market. We would normally expect the spot price of ethanol to exceed the wholesale spot price of gasoline by about 50 cents per gallon, the amount of the ethanol tax credit. Taking account of taxes and distribution and marketing costs, ethanol's spot price should be close to the retail price of gasoline. However, since the middle of May the price of ethanol has risen dramatically, with the spot price of ethanol as much as \$2.20 per gallon higher than the retail price of gasoline (Figure S9).

The higher ethanol prices contribute to higher wholesale and retail gasoline prices. Assuming ethanol is blended into RFG at the ratio of 1 gallon of ethanol to 9 gallons of gasoline blendstock (i.e., 10 percent by volume), a \$1.00 per gallon spread between the spot price of ethanol and the retail price of gasoline can add about 10 cents per gallon to the price of reformulated gasoline. Again, since RFG represents about one-third of the total U.S. gasoline market, a \$1.00 higher ethanol price may increase the average U.S. price of gasoline by about 3 cents per

gallon. An easing of the ethanol market may not occur until September at the earliest when the peak driving and gasoline demand season ends.



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¹ The wholesale price of gasoline in this report is measured as the refiner price of gasoline for resale as reported in the EIA Petroleum Marketing Monthly, Table 4 (http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_marketing_monthly/pmm.html). The refiner price of gasoline for resale is a volume-weighted average of spot market prices (the one-time sale of a quantity of product "on the spot," in practice typically involving quantities in thousands of barrels at a convenient transfer point, such as a refinery, port, or pipeline junction), terminal or "rack" prices (sales of product by the truckload, typically about 8,000 gallons, at the loading rack of a product terminal, supplied from a refinery, pipeline, or port) and dealer tankwagon prices (sales of a truckload or less of product, delivered into storage at a retail outlet).

² The challenges of replacing MTBE with ethanol were discussed in EIA's April 2006 [Short-Term Energy Outlook and Summer Fuels Outlook](#) and February 2006 analysis report, "[Eliminating MTBE in Gasoline in 2006.](#)"