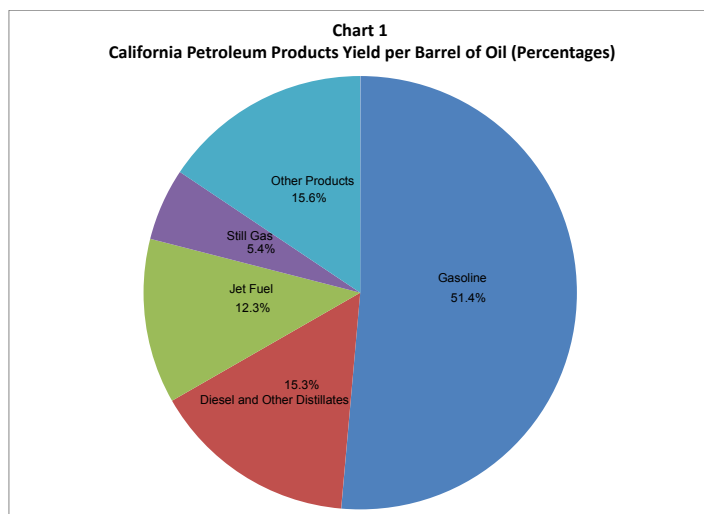
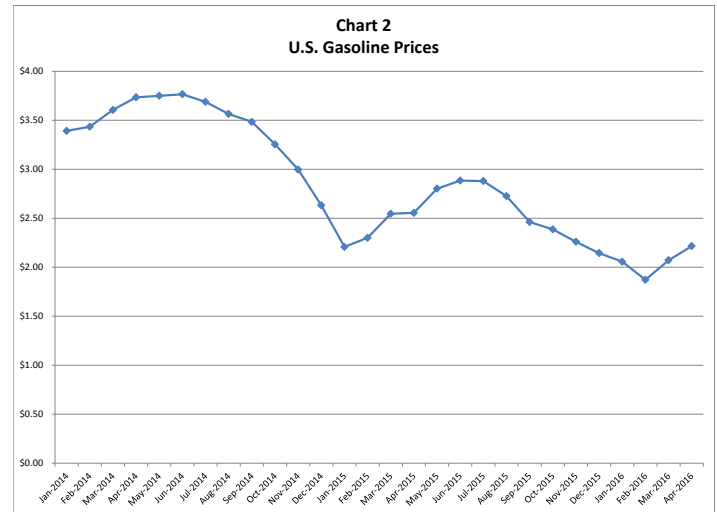


Factors Behind Gas Price Trends in Recent Years

Refined Petroleum Products

Gasoline is one of the dominant products resulting from refining crude oil. As shown in Chart 1, an average barrel of crude oil refined in California yielded 51.4 percent gasoline, 15.3 percent diesel, 12.3 percent jet fuel, along with various other petroleum products.¹ While some variation in these percentages is possible, there are technical limitations. As a result of producing many joint products from a barrel of oil, refineries are limited in how they can respond to demand changes in the market for any one product without creating imbalances in related markets.



Declining Gas Prices

As shown in Chart 2, gas prices have declined 37 percent from June 2014 to May 2016. This edition of the *Economic Perspective* examines factors behind this decline and compares U.S. and California gas price declines over this period.²

Factors Affecting Gas Prices

According to the U.S. Energy Information Administration (EIA), the retail price of gasoline includes four main components:

- The cost of crude oil
- Refining costs and profits
- Distribution and marketing costs and profits
- Taxes

The EIA notes that the last two components tend to be relatively stable, but the first two components, especially crude oil prices, tend to be much less stable.³ The EIA notes further:

The cost of crude oil is the major contributor to the retail price of gasoline. The cost of crude oil as a share of the retail gasoline price varies over time and also varies among regions of the country. Crude oil prices are determined by both demand and supply. World economic growth is the most significant factor affecting demand.⁴

¹ "Petroleum Products Yielded from One Barrel of Crude oil in California," *Energy Almanac*, California Energy Commission, http://energyalmanac.ca.gov/gasoline/whats_in_barrel_oil.html

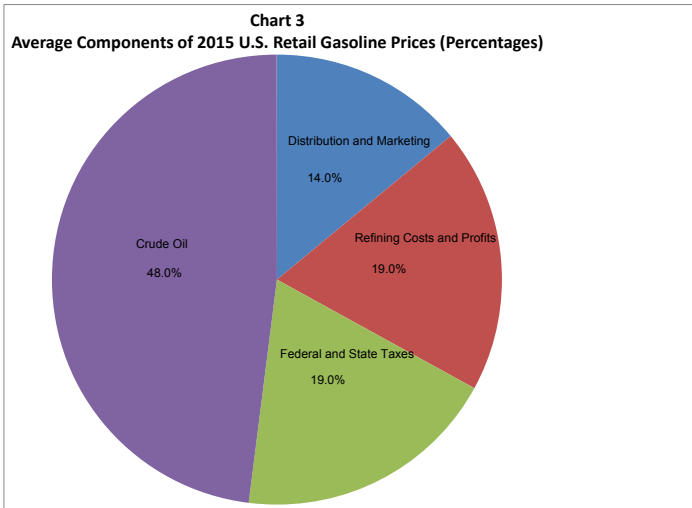
² Unless otherwise indicated, all data cited in this article are from the U.S. Energy Information Administration (EIA), <http://www.eia.gov/>

³ *What Drives U.S. Gasoline Prices?*, U.S. Energy Information Administration, 2014, <http://www.eia.gov/analysis/studies/gasoline/>

⁴ *Factors Affecting Gasoline Prices*, U.S. Energy Information Administration, http://www.eia.gov/Energyexplained/index.cfm?page=gasoline_factors_affecting_prices

Components of Retail Gas Prices

Percentages of the components of U.S. 2015 retail gas prices are shown in Chart 3. The largest element is crude oil prices, which accounted for 48 percent of gas costs.

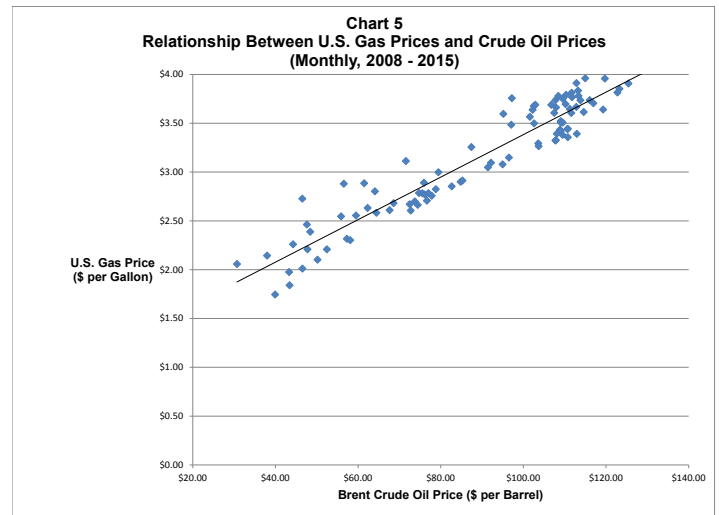
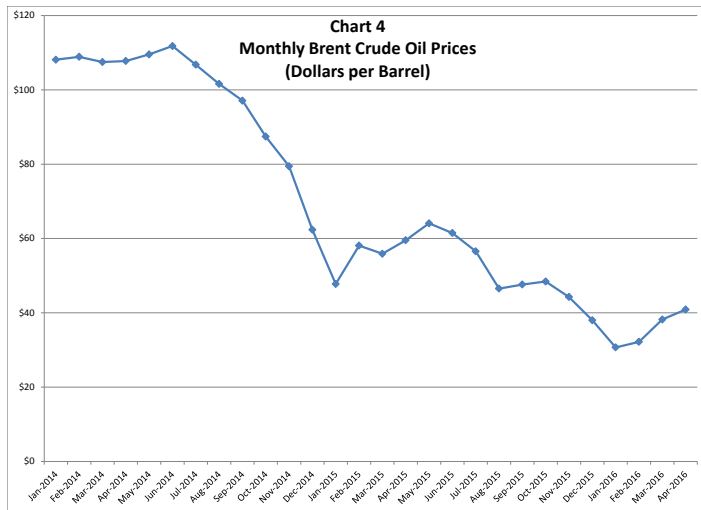


Crude Oil Prices

Chart 4 shows monthly crude oil prices from 2014 through 2016 year-to-date. They followed a similar pattern to gas prices, falling from over \$100 per barrel in early 2014 to about \$47 per barrel in May 2016.

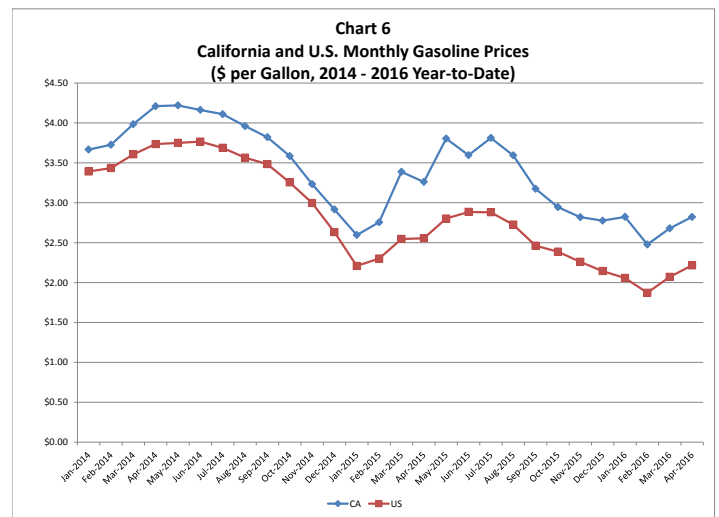
Crude Oil Prices and Gas Prices

A strong statistical relationship exists between U.S. gas prices and world crude oil prices, as seen in Chart 5. Our analysis of monthly data from 2008 through 2015 indicates that Brent crude oil prices explain 90 percent of variation in U.S. gas prices. Over this period, on average every \$1.00 increase in Brent crude oil prices result in a 2.2 cents increase in U.S. gas prices.



California and U.S. Gas Prices

There is also a strong relationship between California gas prices and U.S. gas prices (see Chart 6). However, California gas prices are higher than U.S. gas prices. Higher state taxes are one factor. According to the American Petroleum Institute, California state gas taxes averaged \$0.59 per gallon on January 1, 2016, while the U.S. average state tax was \$0.48 per gallon, an \$0.11 per gallon differential.⁵ In addition, starting on January 1, 2015, California petroleum refiners became subject to meeting cap and trade carbon allowance requirements. While estimates vary, most analysts believe cap and trade added about \$0.12 per gallon to retail gasoline prices starting in 2015.



⁵ State Motor Fuel Reports, American Petroleum Institute, <http://www.api.org/>

Factors Affecting California Gas Prices

The EIA studied California gas prices in 2003 and many of the reasons cited for California having higher than average gas prices remain relevant today. According to this EIA study:⁶

Gasoline price spikes are not unusual in California. Since the mid-1990s, California has experienced gasoline price run-ups that are more frequent and more severe than price spikes in most of the rest of the United States. Demand growth has caught up with the petroleum supply system in California. Refineries, ports, pipelines and distribution terminals are all experiencing constraints. Many times events, such as refinery outages, that in the past had little impact can push the system out of balance long enough to trigger large price increases. Major factors that contribute to higher prices and volatility in California include:

- The California refinery system runs near its capacity limits, which means there is little excess capability in the region to respond to unexpected shortfalls;
- California is isolated and lies a great distance from other supply sources (e.g., 14 days travel by tanker from the Gulf Coast), which prevents a quick resolution to any supply/demand imbalances; and
- The region uses a unique gasoline that is difficult and expensive to make, and as a result, the number of other suppliers who can provide product to the State are limited.

Predicted California Gas Prices

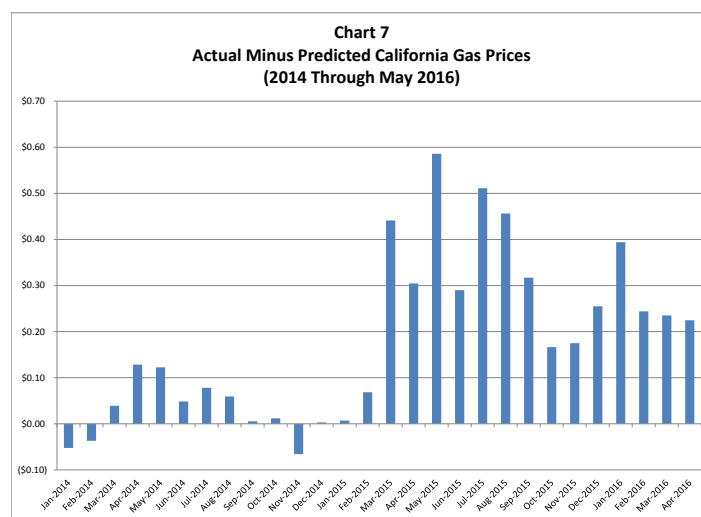
Board of Equalization (BOE) staff estimated the statistical relationship between U.S. and California gas prices using monthly data from 2000 to 2014. (Staff purposely excluded 2015 data to avoid double counting cap and trade costs. However, staff adds these costs (\$0.12 per gallon) to statistical predictions made subsequent to January 1, 2015.)

BOE staff found a strong statistical relationship between U.S. gas prices and California gas prices. U.S. gasoline prices explain 99 percent of the variation in California gas prices over this period. This relationship indicates that, on average (when cap and trade costs of \$0.12 per gallon are added to the estimates) if the U.S. price of gas were \$3.00 per gallon, California gasoline prices would be expected to be \$3.43 per gallon.

Higher Than Predicted 2015 Prices

Using the statistical relationship estimated, staff predicted monthly California gas prices starting in 2014 through 2016 year-to-date. The results are shown in Chart 7.

While the model predicts 2014 prices with relatively small variation, both above and below the average, prices from early 2015 appear to be much higher than those predicted. On average, the model overpredicted 2014 prices by \$0.03 per gallon, and 2015 through 2016 year-to-date prices by \$0.28 per gallon. Unexpected and unusually lengthy refinery outages (such as one caused by a fire at a major refinery in February 2015) and supply and demand forces are likely factors explaining the differences between predicted and actual prices starting in early 2015.



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Current and past issues of this publication are on our website:

www.boe.ca.gov/legdiv/legresearch.htm

Online Resources

For more information about topics covered in this publication and previous issues, please visit any of the websites listed below.

U.S. Energy Information Administration (EIA)

www.eia.gov

U.S. Bureau of Economic Analysis

www.bea.gov

U.S. Census Bureau

www.census.gov

⁶ 2003 California Gasoline Price Study: Final Report, Office of Oil and Gas, Energy Information Administration, https://www.eia.gov/pub/oil_gas/petroleum/analysis_publications/caprice/caprice.pdf