

Measuring Price Change for Crude Oil, Gasoline, and Fuel Oil in the U.S. Import/Export Price Indexes



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The Bureau of Labor Statistics (BLS) Import Crude Oil Index measures changes in the price of crude oil imported into the U.S. The Import and Export Other Petroleum Products Index measures changes in the price of gasoline and various other petroleum products imported into and exported from the U.S. The Import and Export Fuel Oil Index measures changes in the price of diesel, heating oil, and various other residual fuel oils imported into and exported from the U.S. These indexes were first published in the 1980s on a quarterly basis and then published monthly in the early 1990s. All estimates are preliminary and subject to revision in each of the 3 months after original publication to reflect the availability of additional information. BLS does not publish an export index for crude oil.

Imported Crude Oil Methodology

The Data

BLS uses transaction data gathered from multiple sources. The principal transaction data source is the Department of Energy (DOE) EIA-856 Monthly Crude Oil Acquisition Report (AR.) This AR is a collection of data that lists the costs and quantities of virtually all foreign crude oil acquired for importation into the U.S. for the calendar month. The DOE compiles the data for the AR over a 4-month period. When BLS receives the AR, it contains only a small amount of data for the current month but contains progressively more data for each of the 3 previous months. That is, for the current month, the AR contains only a small number of observations. For 1 month prior to the current month, the report contains more values, but often less than 25% of the total. Two months prior to the current month, the report is often more than 90% complete and it is always 100% complete 3 months prior to the current month.

The Methodology

BLS uses two different methodologies to calculate the Import Crude Oil Index. The first methodology uses the incomplete AR and a regression model to calculate the initial Crude Oil Index. The following month, BLS employs the regression model and the AR data set with more observations to revise the initial calculation. This first revision represents an improvement over the initial estimate because of the increased number of observations.

BLS calculates the initial index and the first revised index using a regression model to estimate the percent change in the price of crude oil. The first input into the model is the incomplete AR. The next input into the regression model is based on DOE weekly crude oil contract price averages that are weighted by estimated import volume. BLS then computes a measure of monthly crude oil price change by calculating the monthly average of these weekly average prices. These two inputs are then used in the BLS regression model to calculate the estimate of the current month's crude oil index.

Internal research has demonstrated that the regression model's estimates are much closer to the final estimate of the monthly percent change in the crude oil import index than are estimates derived from merely aggregating the incomplete data set. From January 1999 to February 2012, the root mean squared error of the model's estimate has been 66 percent lower than the value derived from the limited DOE transaction data and 32 percent lower than the monthly crude oil contract price average percent change. This methodology is used to revise the index the next month when more data become available.

The crude oil index will be revised two additional times using the second methodology. This methodology takes the complete AR data set and employs a modified Laspeyres index formula based upon fixed item weights derived annually by BLS. Because

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the AR data set is more complete than the data used for the first methodology, the data are simply aggregated by BLS into the crude oil index.

Imported/Exported Gasoline and Fuel Oil Methodology

The Import and Export Other Petroleum Products Index is comprised of a variety of petroleum items as well as gasoline data inputs. The procedures explained here refer to the methodology used to calculate the gasoline data input portion of the Other Petroleum Products Index.

BLS uses an average of the daily spot prices for the first 5 business days of the month to calculate the Import and Export Fuel Oil Index and the gasoline data inputs within the Other Petroleum Products Index. *Thomson Reuters News Service* is the source for the following spot prices: conventional regular gasoline for New York Harbor and the U.S. Gulf Coast; low sulfur diesel for New York Harbor; low sulfur diesel for Gulf Coast; low sulfur diesel for Los Angeles; and heating oil for New York Harbor. The prices are published in the *Energy Information Administration's (EIA) Weekly Petroleum Status Report*.

The import indexes for gasoline, diesel, and heating oil differ from the respective export indexes solely because of the different weights associated with the prices for New York Harbor, which is within the East Coast district (PADD 1) and the U.S. Gulf Coast within PADD 3. Most imports come into New York and most exports leave from the Gulf. The weights used in index calculation are derived from the EIA's Petroleum Supply Annual and are updated on an annual basis.

Access the Data

The most recent data for this industry can be found in the U.S. Import and Export Price Indexes Economic News Release (<http://www.bls.gov/news.release/ximpim.toc.htm>). These data are available in a variety of formats on the BLS website (<http://www.bls.gov/mxp>).

Additional Information

Additional information on the U.S. Import/Export Price Indexes can be found in "International Price Indexes," *BLS Handbook of Methods*, Bulletin 2490 (Bureau of Labor Statistics, 1997), Chapter 15. This chapter also is available on the BLS Internet site (<http://www.bls.gov/mxp>) under the topic "Publications." You may contact the International Price Program of the BLS by telephone at (202) 691-7101 or by [email](#).

Additional information on the methodology used to calculate indexes for petroleum products can be found in "Price and Expenditure Measures of Petroleum Products: A comparison", *Monthly Labor Review*, December 2006, Vol.129, No. 12 <http://www.bls.gov/opub/mlr/2006/12/art5full.pdf>.

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