

GLOBAL FUEL PRICES

A PRIMER

Neven T. Valev

GLOBALPETROLPRICES.COM

WHY PRICES DIFFER ACROSS COUNTRIES

Fuel prices can be broken down into these major components:

- Crude oil cost
- Refining cost
- Distribution cost: wholesale and retail
- Taxes: excise and VAT/sales tax

Most countries around the world have access to crude oil and refined products at roughly the same global prices. Therefore, the main differences in prices across countries are due to the last two components: the cost of distributing the final product and taxes. The distribution cost, however, is a relatively small component of the price in most countries. Hence, the key difference is taxation and especially the level of excise taxes. These are the government levies on each liter or gallon of fuel sold. For example, the price difference between the U.S. and Europe is explained largely by the difference in these taxes.

GASOLINE VS DIESEL PRICES

Gasoline is more expensive than diesel fuel in almost all countries. The difference is about 10 percent, but it varies across countries and over time. Here we discuss several factors contributing to the price spread.

Refining costs: During the process of refining, crude oil is separated into different components and these components are converted through further treatments into gasoline, diesel fuel, and other petroleum products. Diesel fuel is heavier and less volatile than gasoline, which makes it simpler to refine from crude oil. As a result, diesel tends to be cheaper than gasoline. However, the introduction of Ultra-Low Sulfur Diesel (ULSD) over time increased diesel production costs since ULSD requires more refining.

Taxes: Many countries tax diesel and gasoline differently. For example in the U.S. the federal excise tax on gasoline is 18.4 cents per gallon and 24.4 cents per gallon for diesel fuel. In contrast, most European countries tax diesel more lightly than gasoline. Since taxes are one of

the major components of the final consumer prices of fuels, tax policy determines to a great extent the cross-country differences in gasoline and diesel prices.

The spread between diesel and gasoline prices also varies over time with the following factors:

Demand: In contrast to gasoline, diesel fuel is used to power not only cars but also public transportation vehicles, large delivery trucks, off road vehicles, boats, machinery, generators, etc. During periods of economic expansion industrial sector energy demand increases significantly and diesel prices rise more than gasoline prices.

Seasonality: Fuel oil used for home heating is made from the same basic components as diesel fuel. As a consequence diesel prices are affected by heating oil demand. In winter, the demand for heating oil rises and this tends to increase diesel retail prices.

WHY FUEL PRICES CHANGE OVER TIME

There are four key factors that drive short-term fuel price fluctuations.

Crude oil prices

That is by far the most important factor for changes in fuel prices. The price of crude oil is a significant part of the final retail price. More importantly, however, crude oil prices are much more volatile than the other components of the final retail prices. Oil prices can double or decline drastically within the scope of a few weeks and these fluctuations are reflected in pump prices.

The size of the effect differs by country depending on the level of excise taxes. These taxes are a fixed amount per liter/gallon of fuel and do not change with oil price fluctuations. Therefore, if the tax is high and represents a significant portion of the fuel prices, oil price changes would have a limited impact on the final retail prices. For example, a 10 percent change in oil prices leads to about 7 percent change in fuel prices in the U.S. (where taxes are low) and about 3 percent change in the fuel prices in Europe (where taxes are high). Fuel prices in the U.S. are lower but they are also more volatile.

In countries with liberalized fuel markets, it takes about three to four weeks for fuel prices to adjust to a new level of crude oil prices as market participants continue to operate under the old contractual agreements for some time. The greatest impact is in week two. In countries with regulated prices, the lag is a bit longer as governments decide when and how much of the oil price changes to pass on to consumers. And, in oil producing countries, high oil prices may lead to lower fuel prices and vice versa. The reason is that high oil prices improve the government budget which allows the government to subsidize domestic prices. Low oil prices, in contrast, put pressure on the budget and may prompt the government to raise fuel prices.

All of the above applies equally to gasoline and diesel prices. Also, the effects are symmetric in the sense that oil price increases have the same effects as oil price decreases.

Exchange rates

Oil is traded in U.S. dollars. When the domestic currency depreciates, this makes oil imports more expensive even if crude oil prices are unchanged. The reverse happens when the local currency appreciates: imported oil products become cheaper and fuel prices decrease. In fact, the effect on fuel prices of changes in crude oil prices and changes in exchange rates is the same. Whether crude oil prices are 10 percent higher or the dollar is 10 percent more expensive is the same for countries that do not use the U.S. dollar as their currency. However, there is an important difference. Exchange rates are much less volatile than crude oil prices and, in practical terms, the effect of oil prices is more important.

Seasonality

The seasonal variations can sometimes exceed 10 percent of the average cost of fuel. In the Northern Hemisphere, diesel prices are typically higher during harvest time in the fall and during winter when diesel and diesel substitutes are used for heating. Gasoline prices are typically higher in the summer during the holiday travel months.

Refining and marketing and distribution costs

The marketing and distribution costs are tied primarily to land and labor costs and do not fluctuate much but tend to rise over time with inflation. This explains why countries have rising fuel prices even if crude oil prices and taxes are the same. Hence, these costs would contribute to a gradual change of prices over time but would not contribute to short-term fluctuations. Refineries shutting down, fluctuating margins, and other disruptions in the supply of fuels would, however, impact fuel prices even if all else stays the same.

OIL PRICE DETERMINANTS

The price of crude oil reflects the equilibrium between supply and demand factors that are at constant interplay on world markets. In classic economic terms, supply side actors (oil-extracting countries and companies) are willing to pump out more petroleum with the rise of its global price. Naturally, demand side players like oil-consuming nations, energy-intensive industries, and households want to buy less crude while price increases last.

However, oil consumption is characterized by low price elasticity in the sense that consumption will probably not drop quickly even if prices rise. There are two important implications of that low price responsiveness. One is that small supply disruptions due to conflicts, natural disasters, and other factors have a large impact on prices. In the short run, the disruptions lead primarily to higher prices with a very limited impact on consumption. This explains the large volatility of crude oil prices.

Also, a cartel of oil producers (OPEC) can exploit the low elasticity. If producer countries agree to limit production even by a small amount, their sales would not decline significantly while the price per barrel of oil would increase substantially. Their revenue from oil sales therefore increases. If this hand is overplayed and oil prices increase too much, eventually demand would drop and revenues would decline but, in principle, OPEC could set production limits to maximize revenue. They, in essence, control the price of oil by deciding on the level of oil production.

In the last decade or so, however, this model does not work so well. The reason is that technological improvements that allow producers to extract oil from hard-to-reach places have

allowed the U.S. to gain a significant oil market share. When oil prices increase, U.S. output can be raised on a relatively short notice putting a cap on oil prices. When prices decline, production is reduced putting a floor on prices. The existence of a marginal player should, in principle, moderate oil prices within a reasonable range but it remains to be seen how this will play out.

As fuel prices ultimately depend on the level of oil prices, it is useful to know where to look for oil price projections. Two sources: the monthly oil price forecasts from the U.S. Energy Information Administration and the monthly oil demand and supply forecasts from the International Energy Agency, provide brief and informative narrative on the topic. Also, a google news search would reveal the recent thinking of various investment banks including Bank of America Securities, Citigroup, Goldman Sachs, and JPMorgan Chase as well as “consensus” surveys by Bloomberg, the Wall Street Journal, and others.

CRUDE OIL BENCHMARKS

Finally, a note on what we mean by “oil prices”. Oils come with different densities (API gravity) and sulfur content which makes them more or less desired by consuming nations and businesses. Hence different oils end up with different market values. Prices of crude oil are also determined by the dynamics of global supply and demand as well as regional geopolitical and economic conditions. To reflect all these considerations, traders use reference baskets of oils also called benchmarks or markers. There are over 160 different benchmarks around the world. Below we discuss the characteristics of the most popular ones.

Brent

Brent, the most widely used benchmark, is historically based on oil extracted from British and Norwegian fields in the North Sea. This benchmark is used for pricing of light sweet crude (low density, low sulfur content) and serves as direct or indirect reference for over 60 percent of global crude oil sales. It is primarily used in Europe, Africa, the Mediterranean, Australia and some Asian countries.

West Texas Intermediate (WTI)

West Texas Intermediate is light sweet crude known as the American benchmark. It is produced in the US, priced at the trading hub in Cushing, Oklahoma and used as reference for pricing of various domestic (Gulf of Mexico, North Dakota) and imported oils (Canada, Latin America). Unlike Brent which is based on off-shore production and seaborne deliveries, WTI is a market physically based on pipeline connections which pass through the storage facilities at Cushing.

Dubai/Oman (Middle East crude)

This benchmark is an average of the price of Dubai and Oman crudes (both light to medium and sour). It is used for pricing of oil coming from the Persian Gulf and the Middle East and bound for markets in Asia. The Dubai/Oman oil is traded on the Tokyo Commodity Exchange under the acronym TOCOM. Unlike Brent and WTI which are sold and bought in US Dollars per barrel, this benchmark uses Japanese yen (JPY) per kiloliter as a main unit of exchange.

OPEC Reference Basket

This is a weighted average of crude oil streams delivered from the members of the Organization of Petroleum Exporting Countries (OPEC). It is calculated by the OPEC Secretariat in Vienna and reflects the output and exports of each state.

ABOUT GLOBALPETROLPRICES.COM

We track retail fuel, electricity, and natural gas prices using data from companies, government institutions, regulatory agencies, statistical institutes, and major media outlets. The fuel price data are collected weekly for over 160 countries. The electricity and natural gas prices are collected for most of these countries on a quarterly basis.

Please, write to Neven Valev at neven.valev@globalpetrolprices.com with any inquiries.