Do U.S. consumers reap benefit from discounted WTI?

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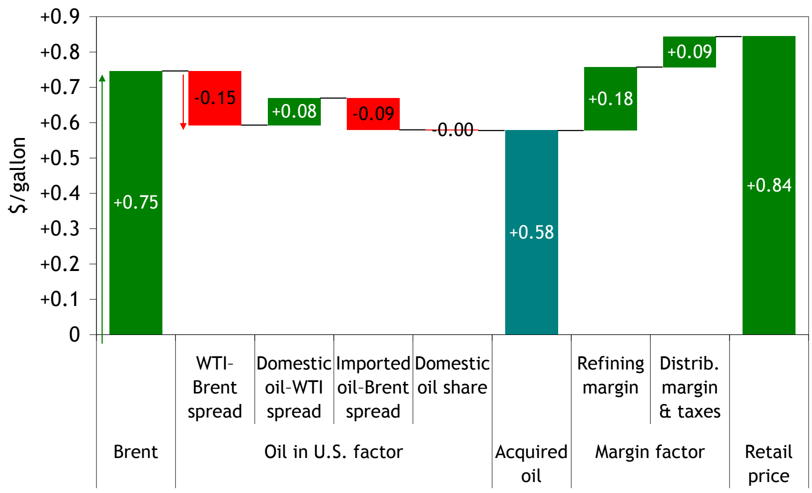
Summary

The spread among the international marker oils has expanded since early 2011. With high stock level, the discount of WTI from Brent reached around $25/bbl. Although it has shrunken somewhat, a price differential of around $17/bbl remained in March 2013. The United States enjoyed the benefit of relatively cheap oil compared with Europe and Asia. Energy cost reduction thanks to discounted oil and cheap natural gas brought about by the shale revolution is favouring the U.S. economy.

The discount of WTI from Brent, however, is on the price of crude oil. It should be noted that WTI production is only 300 kb/d. How much benefit do ***petroleum products*** *consumers such as households and companies in the United States reap from discounted WTI today, when experts have questions on its role as a marker oil?*

In reality, people saw rise in gasoline retail price exceeding the surge in Brent price. This is because refining and distributing margins have expanded as if they offset consumers' benefit from discounted WTI. Similar trend can be found for other petroleum products. Despite the fact that the WTI–Brent spread has expanded, the gasoline price differential between the United States and Europe actually remained unchanged except for short–term fluctuations.

Decomposition analysis of changes in gasoline retail price in U.S. (2010–2012)



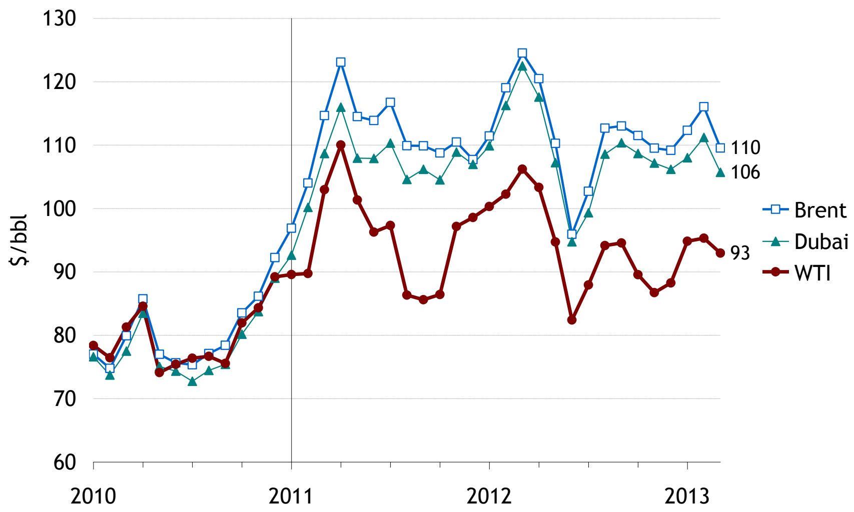
Cumulative benefit from discounted WTI and other crude oils in the country in the last two years is estimated roughly to amount to as much as $110 billion—around $350 per capita. Although consumers in the United States cannot feel the direct benefit in the form of drop of gasoline prices, the benefit itself does not evaporate. The huge benefit contributes to improve oil companies' business performance via expansion of their margins. Indirect benefit is surmised to ripple to the U.S. citizens through expansion of production and employment, and increase in income. The ripple, however, is probably neither universal nor equal.

Keywords: WTI, Brent, spread, discount and gasoline price

Expanded spread among oils

Spread among the international marker oils has expanded since early 2011 (Figure 1). With high oil stock level at Cushing, Oklahoma, the delivery point of West Texas Intermediate (WTI) futures and other factors, WTI has been cheaper than Brent and Dubai. WTI–Brent spread was recorded at around $25/bbl in September 2011. Although it has shrunken somewhat, the price differential of around $17/bbl remained in March 2013. The United States enjoys the benefit of relatively cheap oil compared with Europe and Asia. Energy cost reduction thanks to discounted oil and cheap natural gas brought about by the shale revolution is favouring the U.S. economy.

Figure 1: International marker oil prices



Source: U.S. Energy Information Administration, IntercontinentalExchange, etc.

The discount of WTI from Brent, however, is on the price of crude oil. It should be noted that production of WTI is only 300 kb/d. How much benefit do *petroleum products* consumers such as households and companies in the United States reap from discounted WTI today, when experts have questions on its role as a marker oil?

Gasoline accounts for around a half of oil consumed in the United States, an automobile society, being the most representative petroleum product. It is said that changes in gasoline price affect household consumption—and therefore the U.S. economy—due to its extensive consumption. Therefore, we evaluated how much gasoline price is influenced by discounted WTI from Brent.

Factors of changes in U.S. gasoline price and contribution by discounted WTI

For quantitative analyses, we split gasoline retail price into its cost elements: oil cost, refining margin, distributing margin and taxes (Figure 2). The oil cost can be regarded as compound of Brent price, three spreads characterising oil prices in the United States—(i) WTI–Brent, (ii) domestic crude oil that refineries actually acquire–WTI, (iii) acquired imported crude oil–Brent—, and domestic/imported oil shares.

Figure 2: Cost elements of gasoline retail price

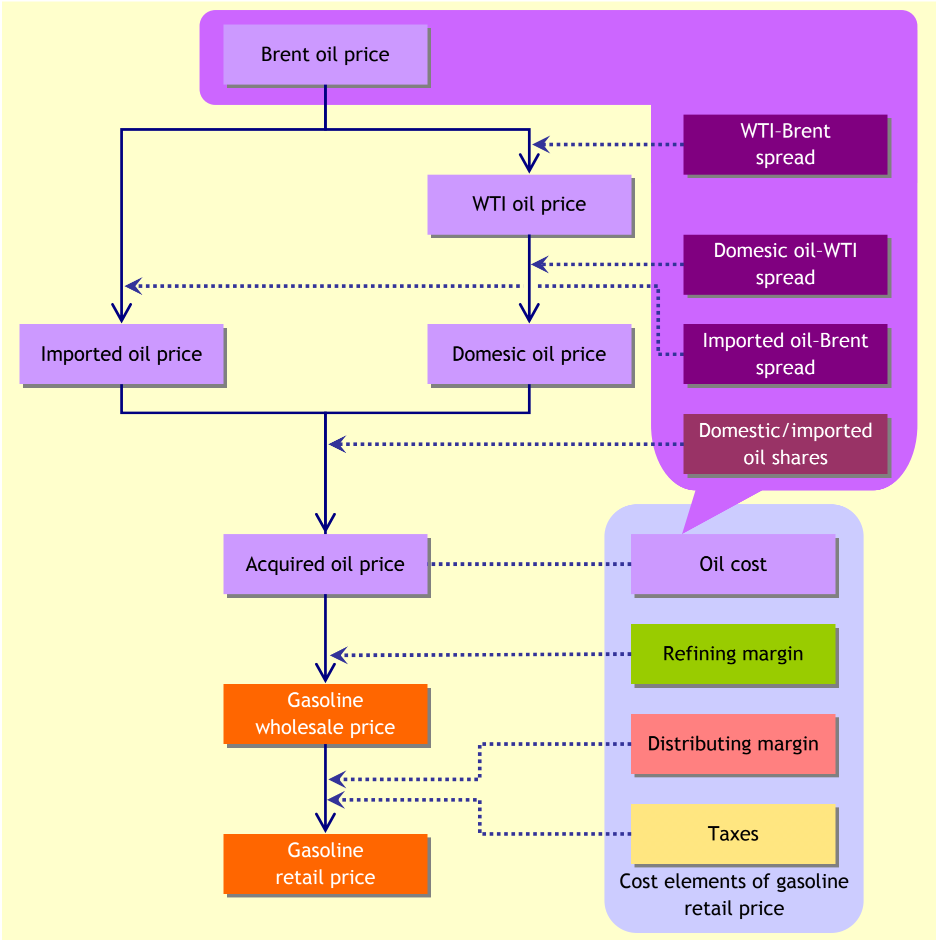
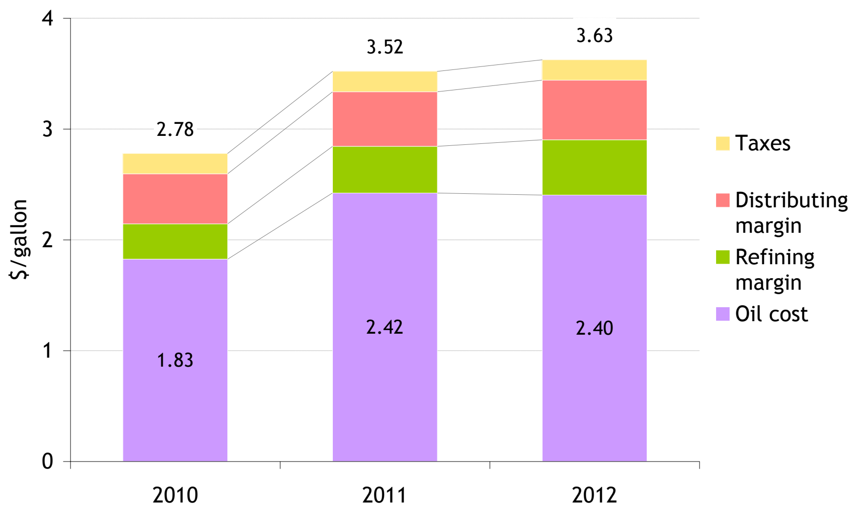


Figure 3: Cost structure of gasoline retail price in the United States



Note: Regular gasoline

Source: Compiled from U.S. Energy Information Administration "Petroleum Marketing Monthly"

Given this methodology, the cost structure of gasoline retail price in the United States is calculated like shown in Figure 3.

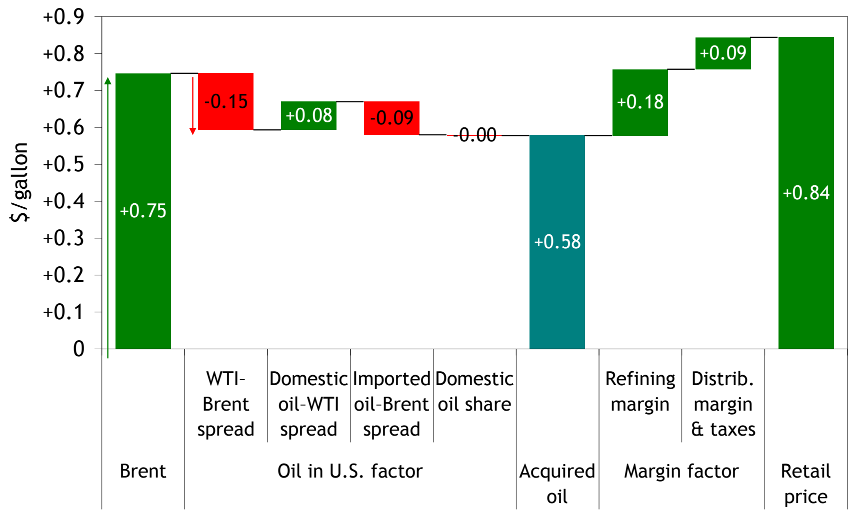
Oil cost accounts for $2.40/gallon[1] of gasoline retail price in 2012 of $3.63/gallon, the biggest cost element like in any other countries except for taxes. This implies that the discounted WTI can affect gasoline price to a certain extent.

Based on the model, inter–temporal changes in gasoline retail price can be decomposed as an equation below:

$$
\begin{aligned}
&\Delta \text{Gasoline retail price} \\
&= \Delta \text{Oil cost} + \Delta \text{Refining margin} + \Delta \text{Distributing margin} + \Delta \text{Taxes} \\
&\approx \Delta \text{Domestic oil price} \times \text{Domestic oil share} + \Delta \text{Imported oil price} \times \text{Imported oil share} \\
&\quad + \text{Domestic oil price} \times \Delta \text{Domestic oil share} + \text{Imported oil price} \times \Delta \text{Imported oil share} \\
&\quad + \Delta \text{Refining margin} + \Delta \text{Distributing margin and taxes} \\
&= \Delta \text{Brent oil price} \\
&\quad + \left(\Delta \text{WTI} - \text{Brent spread} + \Delta \text{Domestic oil} - \text{WTI spread}\right) \times \text{Domestic oil share} \\
&\quad + \left(\Delta \text{Imported oil} - \text{Brent spread}\right) \times \text{Imported oil share} \\
&\quad + \left(\text{WTI} - \text{Brent spread} + \text{Domestic oil} - \text{WTI spread}\right) \times \Delta \text{Domestic oil share} \\
&\quad + \left(\text{Imported oil} - \text{Brent spread}\right) \times \Delta \text{Imported oil share} \qquad \text{...Oil in U.S. factor} \\
&\quad + \Delta \text{Refining margin} + \Delta \text{Distributing margin and taxes}
\end{aligned}
$$

The increase in gasoline retail price of $0.84/gallon observed between 2010 and 2012 is decomposed as shown in Figure 4.

Figure 4: Decomposition analysis of changes in gasoline retail price (2010-2012)



Note: Regular gasoline

Source: Compiled from U.S. Energy Information Administration "Petroleum Marketing Monthly," etc.

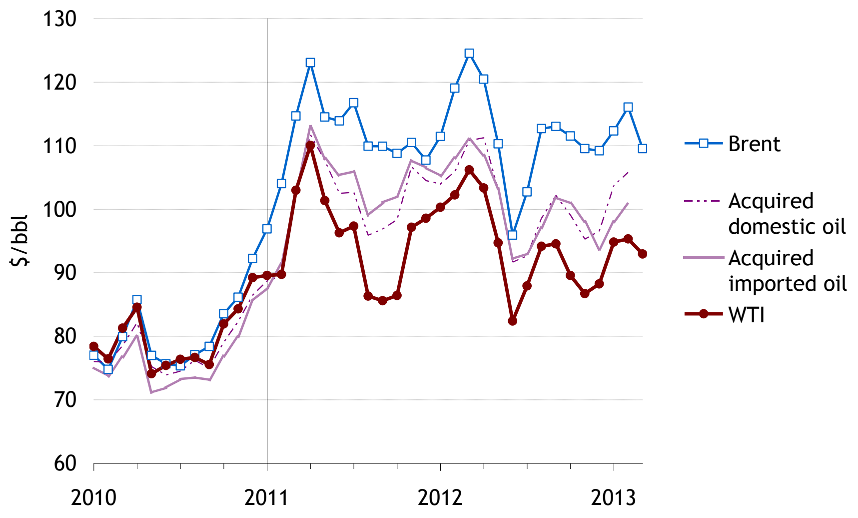
[1] 1 gallon = 1/42 barrel = 3.785 litres

It is the surge in Brent, an international marker oil price, that mostly contributed to the rise in gasoline retail price for the last two years. The contribution reaches $0.75/gallon.

The phenomenon that WTI is discounted from Brent (WTI–Brent spread factor) has contributed to fall of gasoline price by $0.15/gallon. It is sometimes stated naively that consumers in the United States reap benefit as much as the contribution by the WTI–Brent spread factor. The real life, however, is not so simple.

Domestic crude oils such as Louisiana Light Sweet that refineries actually acquire have cost more than WTI[2] (Figure 5). Therefore, domestic crude oil–WTI spread factor has contributed to rise in gasoline price by $0.08/gallon, offsetting half of the effect from discounted WTI. On the other hand, imported crude oil that refineries acquire has cost less than Brent due to cheaper oil price in the country, contributing to the fall of gasoline price by $0.09/gallon.

Figure 5: WTI, Brent and refineries acquiring oil prices



Source: U.S. Energy Information Administration, IntercontinentalExchange

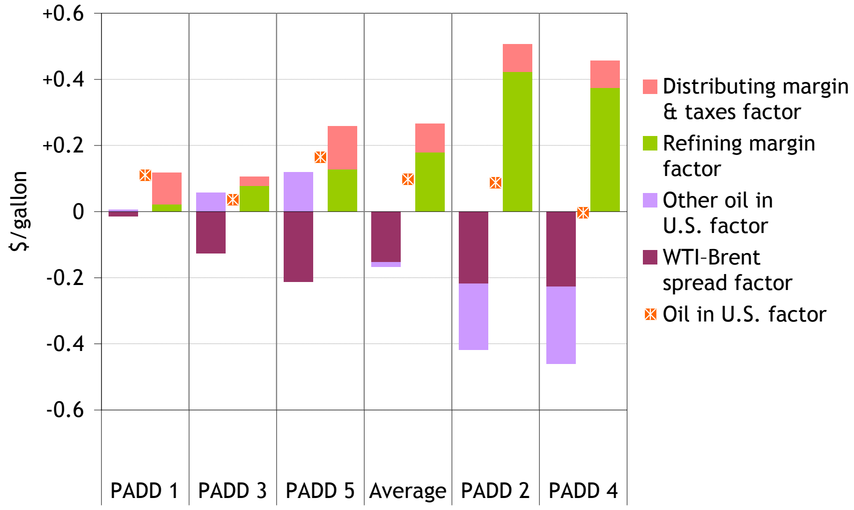
The acquired oil–marker oil spread factor has resulted in almost neutral (-$0.01/gallon) for gasoline price when domestic and imported crude oils are combined. Consequently, oil in the United States factor—price deferential between acquired oil and Brent—consisting of the three spread factors and the factor of domestic/imported oil shares, has contributed to the fall by $0.17/gallon. Then consumers in the country had the possibility to offset more than 20% of the rise in gasoline retail price caused by the surge in Brent price.

On the other hand, contribution to the rise by margin factors (refining margin factor and distributing margin and taxes factor) has reached $0.27/gallon. That is why people saw the rise in gasoline retail price by $0.84/gallon exceeding the surge in Brent price. The situation that the margin factor has completely offset the contribution to the fall by the oil in the United States factor and caused the rise in gasoline price is observed not only in national

[2] Rather isolated fall of WTI is reality.

average but also in the five Petroleum Administration for Defense Districts, or PADDs (Figure 6). Additionally, the more oil in the United States factor[3] has contributed to the fall of gasoline price, the more expanding margins contributed to the rise of the price.

Figure 6: Contribution by domestic factors to changes in gasoline retail prices in the United States (2010-2012)



Note: Regular gasoline
Source: Compiled from U.S. Energy Information Administration "Petroleum Marketing Monthly," etc.

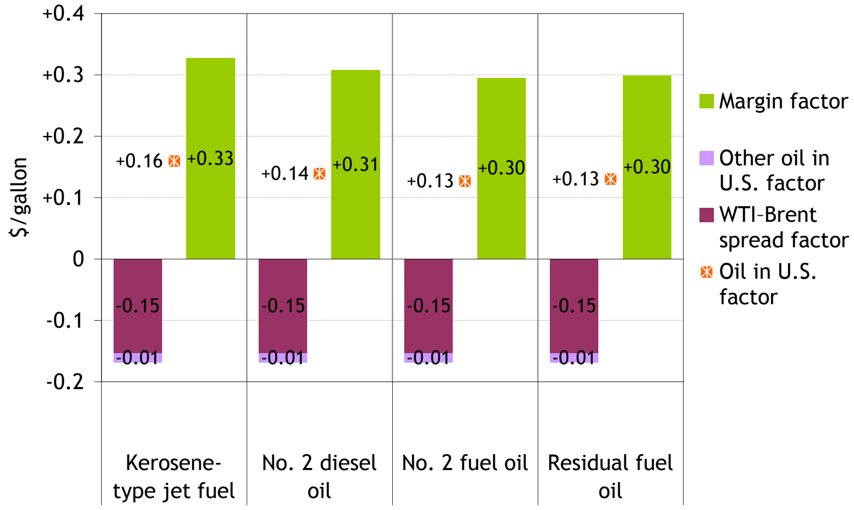
Decomposition analysis of changes in other petroleum product prices

Have the expanding refining and distributing margins offset consumers' benefit from discounted WTI by chance?: e.g. tightened supply and demand balance made the gasoline market bullish in this period. It is hard to examine the question strictly and quantitatively but it is possible to check whether the phenomenon is specific to gasoline or not by decomposing end user prices of other petroleum products. Results of decomposition analyses of kerosene–type jet fuel, No. 2 diesel oil, No. 2 fuel oil and residual fuel oil are shown in Figure 7.

The margin (refining and distributing) factor reflects the circumstances surrounding the prices of each petroleum product while contribution by oil in the United States factor is identical among the products by definition. The margin factors of the four petroleum products, however, have contributed to rise in their prices by $0.30/gallon–$0.33/gallon showing remarkable resemblance among the products. Consequently, contribution by discounted WTI to the fall in their prices had been offset completely and increases in the end user prices for all of the petroleum products have exceeded the surge in Brent by $0.13/gallon–$0.16/gallon.

[3] Higher domestic crude oil share leads to larger contribution by the WTI–Brent spread factor.

Figure 7: Contribution by domestic factors to changes in petroleum product end user prices in the United States (2010-2012)

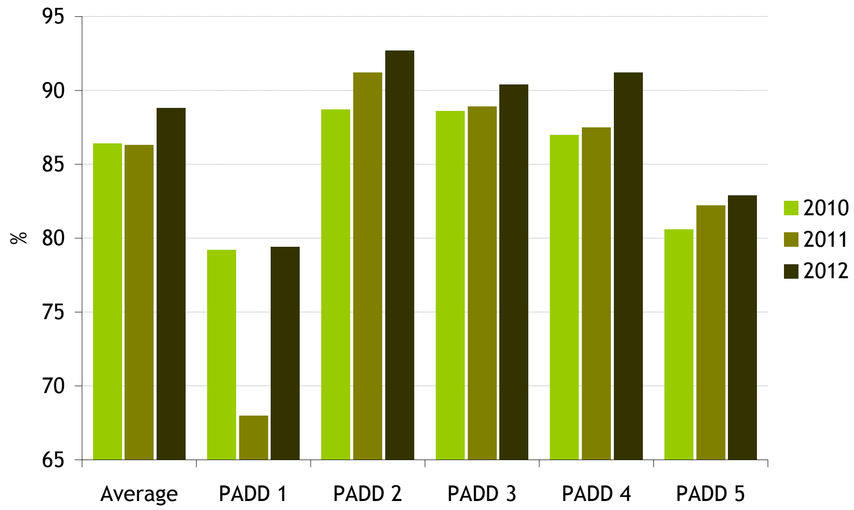


Note: Excluding taxes

Source: Compiled from U.S. Energy Information Administration "Petroleum Marketing Monthly," etc.

There is reason that similarity to some extent can happen since these petroleum products are joint products: e.g. effects caused by the status of utilisation of refineries. Operable utilisation rates of atmospheric crude oil distillation units in 2012 jumped up due to drop of 429 kb in the capacity including 402 kb/d in PADD 1 and 73 kb/d in PADD 5, the largest since 1986 when the statistics became available, making the market tightened (Figure 8). In general, these situations are regarded to work for expanding margins.

Figure 8: Operable utilisation rates of atmospheric crude oil distillation units in the United States (2010-2012)



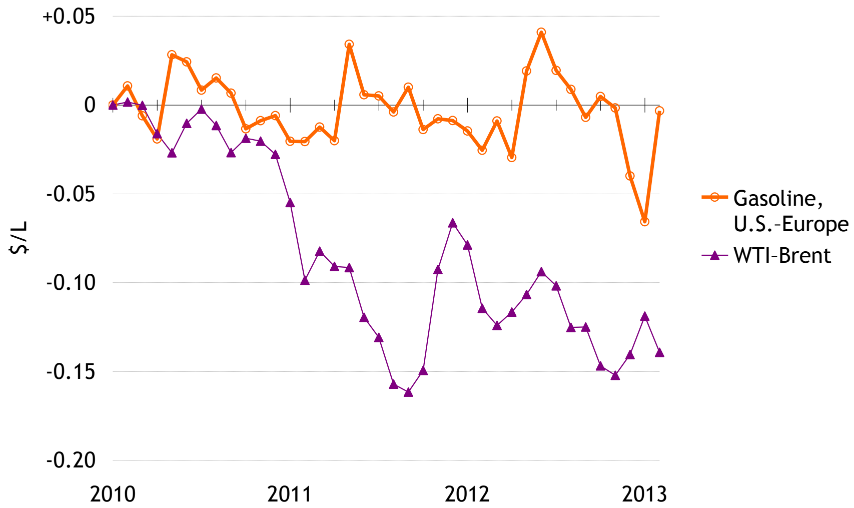
Source: U.S. Energy Information Administration

The expansion of margins in the petroleum products, however, was larger in 2011 rather than 2012 while rises in the utilisation rates were significant in 2012[4]. The rises in the end user prices may not be pure results of the tightened market but naturally could be regarded as reflection of intention of refiners and distributors to some extent.

Directly unreachable benefit by discounted WTI to consumers

Although WTI has been discounted from Brent, the benefit is not tangible in the form of drop in gasoline prices. In other words, consumers in the United States cannot feel the direct benefit of discounted WTI. Despite the fact that the WTI–Brent spread has expanded, gasoline price differential between the United States and Europe indeed remained unchanged except for short–term fluctuations (Figure 9).

Figure 9: WTI-Brent spread and gasoline price differential between the United States and Europe (compared with January 2010)



Note: Regular unleaded for the United States; average of unleaded premium (95 RON) of France, Germany, Italy, Spain and United Kingdom for Europe. Excluding taxes.
Source: Compiled from International Energy Agency "End–use petroleum product prices and average crude oil import costs," U.S. Energy Information Administration, IntercontinentalExchange, etc.

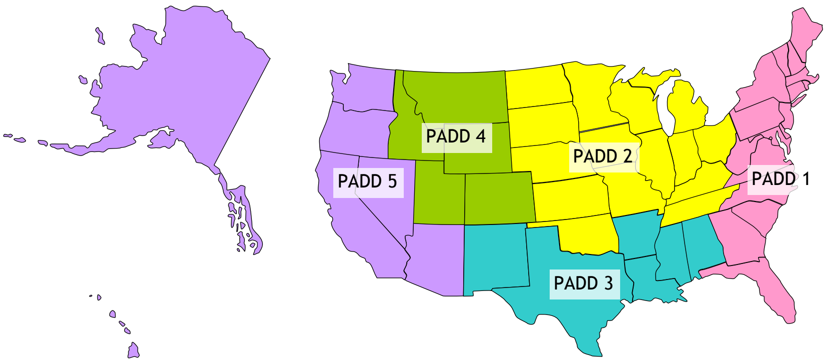
Cumulative benefit from discounted WTI and other oil prices in the United States during the last two years is estimated roughly to amount to as much as $110 billion—around $350 per capita—being premised on 15 Mb/d of crude oil consumption there[5]. Although petroleum product prices do not reflect it, the benefit itself does not evaporate. The huge benefit contributes to improve oil companies' business performance via expansion of their margins.

[4] The reason the utilisation rates in the PADD 1 fell to 68% in 2011 is that the district, in which refining depends on imported oil, lost its competitiveness with others, which use cheap domestic oil.
[5] 2011: oil consumption of 14.8 Mb/d × acquire oil–Brent spread of $9.14/bbl × 365 days = $49 billion, 2012: oil consumption of 15.0 Mb/d × acquire oil–Brent spread of $10.70/bbl × 366 days = $59 billion.

Indirect benefit induced by that is surmised to ripple to the U.S. citizens through expansion of production and employment and increases in income. The ripple, however, is probably neither universal nor equal.

Appendix: PADDs and the states

Figure 10: PADDs



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