

Values and Prices of Main Oil Derivatives on the West European Market During 2006 and 2007

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Analysis of mutual movements of prices for oil and main oil derivatives – premium gasoline, diesel and heavy fuel oil applicable on the market of Northwest Europe in the last two whole years, as well as determination of relationships between them – draws the attention to characteristic tendencies of changed relationships between these prices.

By monitoring the movement of relationships between prices for oil and oil derivatives through simple processing of statistical data according to the model which is the subject of this paper and based on its understanding, more reliable follow-up and even prediction of short-term – daily oscillations in prices of oil derivatives based on daily changes of oil prices, becomes possible. The method is based on practically constant average arithmetic and geometric relationships between the prices for oil derivatives and oil regardless of the intense oscillations of these prices in recent years. Possible deviations of above relationships (motor gasoline and diesel fuel) can be explained by the actual change in relationships of their market values based on very gradual and permanent change between supply and demand, which also proportionally follows all speculative financial and stock exchange impacts on the price of oil in the period under review.

Key words: price of oil, price of oil derivatives, relationships between prices, statistics

1. INTRODUCTION

In recent past the multitude of oil industry news was simply overwhelming, but most often by its »bombastic nature«. The more exceptional the case in comparison with recent news, the more space it received, even if unauthenticated or just marginal in importance and role.

Several examples, from quoting the price of one tankerload of oil, rather than the usual average price, from crises in supply to alleged crises due to decrease in reserves, were considered a *fait accompli* since basic correlation analysis, monitoring of events and their cause-effect relationships were missing.

In the price segment, or rather the value segment, there was almost no testing of real oil prices (with the exception of refinery complex in calculation of refinery margins through calculation of feedstock price) or analysis of the value of main oil derivatives and relationships of these values to the price of oil.

In our opinion, such correlation analysis and the simplest statistical methods can lead to observing of regularities in mutual relationship between prices and values of commodities in the oil industry, which is the purpose of the study presented in this paper.

2. TESTING OF INPUT DATA - MODEL

The selected model for comparison of data on prices of oil and main oil derivatives is very simple and boils down to verified data published in relevant publications. Possible objection to the model is that regression (and correlation) analysis could provide a more comprehensive picture of the relationship of prices.

In earlier research, as far back as in the 70s and onwards, difficulties for such comparison were seasonal oscillations in consumption, which ultimately implied seasonal oscillations in prices. According to the older data, at the time when oil prices were stable or characterized by slight oscillations, the price of heavy fuel oil oscillated by as much as 20% from the average. Seasonal oscillations have considerably decreased recently (with the exception of premium gasoline price), as can be seen from the data in Table 1 and from the derived data quoted (due to technical reasons) in the following Table, which is actually a continuation of Table 1, and in later text. But, during processing of data on relationships between the prices of oil derivatives and oil, we came to the conclusion that the price of oil also has to be verified. Namely, from earlier periods it is well known that the term »oil price« is a complex one. In addition to the more or less known difference in prices caused by CIF parity, i.e. FOB parity, it has almost been forgotten that the presented prices are as a rule »spot« prices, and consequently were negotiated for one-off supply in a specific period, without any other consequences or variable conditions. The two definitions on spot market and spot prices are worth to be noted are quoted as given in the Energy Terminology¹ :

»Spot market - Market on which the sales of short-term products are negotiated, i.e. the marginal quantities which are not covered by contracts."

»Spot price - Price at which products are negotiated on the spot market. This is highly fluctuating price which is indicative of the general trends on this market."

ROTTERDAM VPC, USD/bbl						ROTTERDAM VPC RELATIONSHIP WITH OIL PRICE, index		
DATE	OIL PRICE	INDEX	PREMIUM GASOLINE 0.15 g/l	DIESEL 0.2 %	FUEL OIL 3.5%	PREMIUM GASOLINE 0.15 g/l	DIESEL 0.2 %	FUEL OIL 3.5%
Jan-06	63.05	100.0	76.37	73.79	42.21	121.1	117.0	66.9
Feb-06	60.12	95.4	70.12	72.76	44.03	116.6	121.0	73.2
Mar-06	62.08	98.5	76.53	77.42	44.02	123.3	124.7	70.9
Apr-06	70.35	111.6	90.97	84.69	47.67	129.3	120.4	67.8
May-06	69.83	110.8	93.84	86.03	48.13	134.4	123.2	68.9
Jun-06	68.69	108.9	95.72	86.13	44.06	139.4	125.4	64.1
Jul-06	73.66	116.8	102.17	87.80	46.79	138.7	119.2	63.5
Aug-06	73.11	116.0	93.21	89.75	46.41	127.5	122.8	63.5
Sep-06	61.71	97.8	72.69	77.31	40.67	117.8	125.3	65.9
Oct-06	57.80	91.7	67.12	74.92	39.25	116.1	129.6	68.0
Nov-06	58.92	93.4	69.11	74.53	38.70	117.3	126.5	65.7
Dec-06	62.33	98.9	72.94	75.60	37.82	117.0	121.3	60.7
Jan-07	53.78	100.0	65.11	67.79	33.81	121.1	126.1	62.9
Feb-07	57.43	106.8	71.76	72.51	37.99	125.0	126.3	66.2
Mar-07	62.15	115.6	82.57	76.23	40.35	132.9	122.7	65.0
Apr-07	67.51	125.5	93.90	81.65	46.46	139.1	121.0	68.8
May-07	67.38	125.3	100.00	81.72	47.33	148.4	121.3	70.2
Jun-07	71.55	133.0	97.59	85.50	48.83	136.4	119.5	68.2
Jul-07	77.01	143.2	96.78	89.12	54.01	125.7	115.7	70.1
Aug-07	70.74	131.5	90.16	86.40	52.23	127.5	122.1	73.8
Sep-07	76.87	142.9	94.47	94.83	55.65	122.9	123.4	72.4
Oct-07	82.50	153.4	97.25	99.44	62.26	117.9	120.5	75.5
Nov-07	92.62	172.2	109.03	118.34	70.61	117.7	127.8	76.2
Dec-07	91.25	169.7	105.68	109.94	66.06	115.8	120.5	72.4

Regardless of the fact that the formulations are somewhat obsolete, primarily due to «futures sales» which were almost nonexistent at the time of publication, «contract» prices also need to be mentioned.

When analyzing the mentioned area, based on earlier conclusions we used the data on refinery margins as quoted in OGJ² using the data on »feedstock costs» - costs of feedstocks for refineries in Northwest Europe. Theoretically, costs of feedstocks in this case can also refer to condensate (occasionally called «natural gasoline», i.e. a mixture of hydrocarbons of C₃ to C₅ order or «natural gasoline», but in any case that quantity cannot be significant for considerable impact on costs of feedstock-oil.

The resulting conclusions were not additionally elaborated or compared to the data for other markets, as we were not sure that the necessary data for such analysis would have been available, and furthermore, they are beyond the scope of the study specified in the title.

This analysis determines the relationships between average and current prices of oil and oil derivatives. The

investigation is based on the data on oil and oil derivatives market for «Northwest Europe», rather than the Mediterranean, since the data for the first area are more reliable and more complex.

3. RELATIONSHIPS BETWEEN THE VALUE OF OIL AND OIL DERIVATIVES

The data on prices of oil and derivatives were taken from the OPEC Bulletin.³ As those who use these data know, they are calculated from daily averages and although they do not represent the geometric average, they closely approach it. Therefore, the data are credible, but it must be mentioned that they refer to «spot» - current prices (excluding contract prices for which the data are unavailable).

The acquired and processed data are shown in Tables 1 and 1b, and in relevant Figures 1 and 2.

In our opinion the presented data does not need special explanation, since Table 1b contains a (numerical) comment. Namely, besides notable increase in the range

Table 1b. Statistical values of data from table 1

	PRICES, USD/bbl				RELATIONSHIP WITH PRICES, index		
	OIL	PREMIUM GASOLINE	DIESEL	FUEL OIL	PREMIUM GASOLINE	DIESEL	FUEL OIL
2006							
RANGE OF PRICES	57.80 – 73.66	70.12 – 102.17	72.76 – 89.75	37.82 – 48.13			
ARITHMETIC AVERAGE	65.73	86.15	81.26	42.98	1 : 1.311	1 : 1.236	1 : 0.654
GEOMETRIC AVERAGE	65.13	81.73	80.06	43.31	1 : 1.255	1 : 1.229	1 : 0.665
2007							
RANGE OF PRICES	53.78 – 92.62	65.11 – 109.03	67.79 – 118.34	33.81 – 70.61			
ARITHMETIC AVERAGE	73.20	87.07	93.07	52.21	1 : 1.189	1 : 1.271	1 : 0.713
GEOMETRIC AVERAGE	72.50	92.03	88.62	51.30	1 : 1.268	1 : 1.221	1 : 0.707

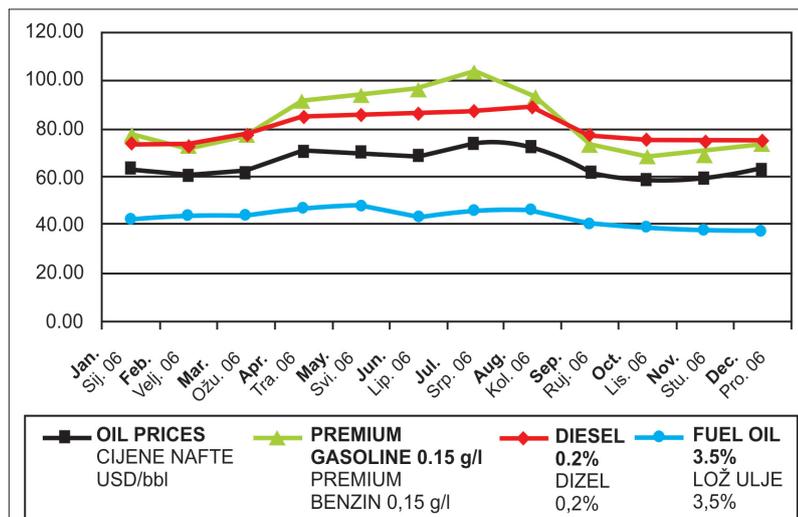


Fig. 1 Diagram of Brent crude oil prices and main products on the market of Northwest Europe in 2006

Sl. 1. Dijagram cijena nafte Brent i glavnih proizvoda na sjeverozapadnom tržištu Europe tijekom 2006.

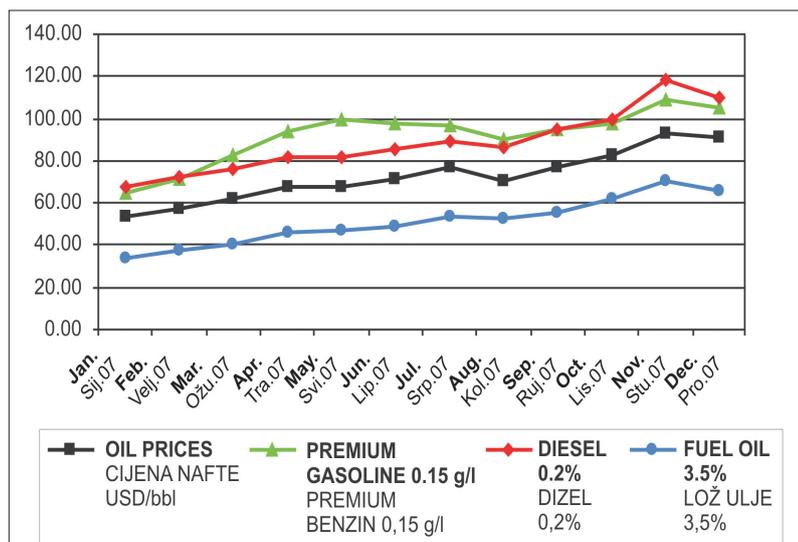


Fig. 2 Diagram of Brent crude oil prices and main products on the market of Northwest Europe in 2007

Sl. 2. Dijagram cijena nafte Brent i glavnih proizvoda na sjeverozapadnom tržištu Europe tijekom 2007.

of premium gasoline prices, accompanied by the increase of values in comparison with previous year (1 : 1.268 towards 1 : 1.255), and (average) decrease of values for diesel, although in the last three months of 2007 by price it exceeded the value of premium gasoline (1 : 1.221 in 2007 in comparison with 1 : 1.229 in 2006). The increased price for heavy fuel oil (and value in comparison with oil) must also be noted, although the range of prices (and values) did not indicate such development at the first glance. Our conclusion is supported by the increase of both arithmetic and geometric average price on the one hand, and even more the increase of relationship between arithmetic and geometric average to such averages for oil.

4. VERIFICATION OF OIL PRICE TERMINOLOGY

It was previously mentioned that the price of oil refers to the price of Brent crude oil, well represented on the market of Northwest Europe, which has a relatively high API^o (38.3) and low sulphur content (0.4%)⁴, and due to that it is one of more expensive oils. At the same time, the price of Brent crude oil (alongside with Ural in Northwest Europe) is the basis for calculation of refinery margin, particularly for refineries of «Cracking» and «Hydro-skimming» type. Within the scope of this paper that claim serves only to prove the special role of that oil in global oil industry economy.

We believe that these remarks already indicate a high probability for use of less valuable oils in refining. And another necessary note about oil prices. The price of oil on the market in principle refers to FOB price, while the price of oil at entry to the refinery is a CIF price, encumbered by all accompanying costs, not only for the difference in parity (CIF minus FOB), but by other costs as well (either pipeline transportation costs, or other port, transporta-

tion and customs fees). Consequently, the price of oil at entry to the refinery must necessarily be higher than the price of (such) oil at FOB parity.

The average price of oil for each refinery, and even for the same refinery at different times, simply cannot be the same, not even if the same oil or the same mixture of oils is purchased (refined). In other words, a change in oil price will change other dependent costs, and some of them will probably behave as fixed (as certain taxes – which can also be proportional – ad valorem, but transportation costs to the refinery can be different, particularly if the structure of processed oil differs). Due to such considerations these external impacts can be analysed only by individual refineries, but due to the lack of data possibility for detailed analysis of these impacts on overall refinery economics does not exist, and the same refers to construction of a totally precise model for relationship between the value of oil and individual derivatives.

Because of that, without further analyses for which sufficient reliable data is unavailable, we gave only a rough presentation of differences in such prices in 2007 between Brent crude oil, which is mainly used in refineries of Northwest Europe, as stated in the OPEC Bulletin, and «Feedstock costs» for «Northwest Europe» column «Muse, Stancil & Co. Refining Margins from the Oil and Gas Journal».

After such comparisons we come to the conclusion that differences, at least in 2007, are not significant. The average price of Brent crude oil (geometric average) is only by 0.7% higher in comparison with the same price of «feedstock costs» as stated by the above mentioned source.

5. CONCLUSION

In spite of almost constant rise in oil prices during 2007 (with the exception of August), mutual relationships between the prices of main oil derivatives have not changed significantly at annual level, excluding the increase in relationship between prices for heavy fuel oil, which have more or less stabilized at 70% of oil value.

During analysis of price movements for diesel fuel during the year, a basic characteristic - increase of value of that relationship - has been observed in the last three months, even above the level for premium gasoline.

The presented data, or more precisely their statistical processing, based on several statistical data on arithmetic and geometric average of relationships between the prices of relevant derivative towards the price of oil over a certain earlier period of time, makes it possible to „guess“ or more precisely „determine“ with high degree of certainty the price of these derivatives tomorrow or in several days, on the basis of oil price recorded today. The phenomenon of time lag in market „adjustment“ of prices

Table 3.

MONTH	(1) BRENT (USD/bbl)	(2) FEEDSTOCK COST (USD/bbl)	(1-2) DIFFERENCE
Jan	53.78	51.92	1.86
Feb	57.43	55.69	1.74
Mar	62.15	61.23	0.92
Apr	67.51	66.97	0.54
May	67.38	67.64	-0.26
Jun	71.55	70.79	0.76
Jul	77.01	76.64	0.37
Aug	70.74	71.69	-0.95
Sep	76.87	76.71	0.16
Oct	82.50	81.49	1.01
Nov	92.62	92.03	0.59
Dec	91.25	92.35	-1.10

for derivatives according to the trend in oil prices over several days, allows a leisurely preparation of the mentioned statistical „guessing“ or „determination“ of prices for derivatives.

Naturally, reliability will increase with the increase in number and freshness of data entered into the model.

6. REFERENCES

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