

# Values and prices of basic oil derivatives in Western European markets during 2008

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**This article provides an analysis of movements in prices of crude oil and main derivatives in 2008 by using the same methodology that was used in analysing the prices and relationships between crude oil and main derivatives prices in 2006 and 2007.<sup>2</sup>**

**The analysis identifies changes in values that were signalled even in the previous study, in the environment of volatile prices which prevailed in the markets. Indeed, volatility was one of key features of oil industry throughout 2008. We also give a brief overview of unusual fluctuation in refinery margins (gross and net).**

*Key words:* oil prices, oil derivatives prices, relationships between prices, statistics, refining margin

## 1. Introduction – impact of previous trends in oil industry

Steady increase of oil prices during 2007, after fluctuations in 2006, did not attract particular attention even when prices went further up in the second half of 2007 and then continued to rise sharply in the first half of 2008. This period of rising prices will be analyzed separately.

During 2007 prices of all commodities recorded significant growth, particularly on the NYMEX, accompanied by stock markets booming, which was then attributed to intensive economic activity of the North American industry, with rare warnings about «overheated demand».

Crude oil futures transactions augmented and gradually moved from the NYMEX to the London exchange already in 2007. The growing number of transactions and their value, particularly by the end of the year, raised concerns among some analysts who posed the question: «why are prices going up all the time in the situation of sufficient supply and strategic stocks filled up?»

In addition to crude oil prices, the prices of other commodities went up, primarily other energy sources (except natural gas on the North American market), including food and wheat, which pushed other prices up, with the support of so called “hot money” overwhelmingly present on the NYMEX.

Uncertainties about future development of gas business, particularly in Western Europe, including challenges related to security of supply that were present already in 2007, did not have a direct impact on oil price movements.

An analysis of trends in movement of prices for oil and main oil derivatives (premium gasoline, diesel fuel and heavy fuel oil) and their comparison with previous years (2006 and 2007) was published in the *Nafta Journal*<sup>2</sup> and the same model is being used here for analysing price movements in 2008 and their relationships.

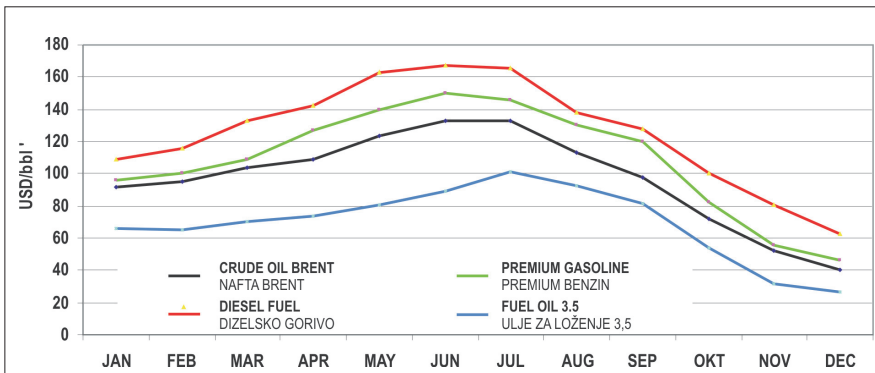
## 2. Value relations between crude oil and key derivatives

An overview of movements of crude oil prices and prices of basic derivatives is presented in Table 1 and Figure 1<sup>5</sup> together with statistical data. The figure clearly reflects the direction of price movements.

The data based on monthly averages, and not on extreme values that appeared on certain dates, reveal the trends that are not visible at the first sight:

“After continuous, almost steady growth of both crude oil and derivatives prices until August 2008, the prices plummeted to the lowest level since 2004 (Brent spot yearly average 35.27 \$/bbl)<sup>1</sup>, while differences between prices contracted to the minimum. It is to be pointed out that diesel fuel prices were constantly higher than premium gasoline (50 ppm) while gasoline prices were close to crude oil prices.”

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OKT	NOV	DEC
Crude oil Brent	92.00	94.98	103.58	108.97	123.05	132.44	133.19	113.03	98.13	71.87	52.51	40.35
Premium gasoline	95.82	100.30	108.91	127.26	140.04	150.09	145.48	129.93	120.10	82.48	55.77	46.33
Diesel fuel	108.70	115.98	133.01	142.66	163.07	166.80	165.10	138.28	127.29	100.15	80.38	62.38
Fuel oil 3.5	65.73	64.89	70.28	73.57	80.30	89.47	100.80	92.38	81.22	54.12	31.54	26.78



**Fig. 1. Price of "Brent" and oil derivatives on the north-western European market during 2008 (USD/bbl)**

Sl. 1. Cijene nafte "Brent" i naftnih derivata na sjeverozapadnom europskom tržištu tijekom 2008. godine (USD/bbl)

Careful analysis of prices and relationships between them presented in Table 2, which also quotes 2007 data for comparison, (more detailed data are presented in Attachment 1) confirms this trend of decreasing value of gasoline both in relation to crude oil and diesel fuel, and slight increase of fuel oil value.

We would not enter into a detailed analysis of causes of such dramatic change in prices or values, but part of explanation for such relationships between fuels lies in the changed structure of demand: in 2008 European demand for light distillates declined by 3.5% in comparison with previous year, while demand for

medium distillates increased by 2.2%, and in the entire OECD zone the consumption of light distillates (including motor gasoline) dropped by 3.5%, and medium distillates (including diesel fuel) by 2.1%.

All these data, apart from 2008 figures, have been presented and interpreted in previous analysis by application of correlation analysis, but the picture is not complete. What we miss is the analysis of consequences – how this situation impacted refinery economics – i.e. refinery margins.

In determination of real refining margins we are faced with methodological problems. Even if we overcome the difficulty in determination of type of refinery according to its

processing complexity (hydroskimming, cracking or coking type) and if for the purpose of analysis we reduce all refineries to medium complexity type, i.e. cracking type, we still have uncertainties about (average) refining operations in individual area. Difference in feedstock can also pose a problem, because it is not only crude oil but it can include various additions in form of bio-components, natural gasoline ( $C_{5+}$ ) fraction, or even virgin naphtha or residues or products from the stocks.

Therefore we shall take into account possible differences in calculation of feedstock costs (crude oil), and the manner of calculation of refining margins, with

**Table 2. Statistical data**

	PRICES				RELATIONSHIPS BETWEEN PRICES		
	CRUDE OIL	VIRGIN NAPHTHA	DIESEL FUEL	FUEL OIL	VIRGIN NAPHTHA	DIESEL FUEL	FUEL OIL
<b>2007</b>							
PRICE RANGE	53.78 - 92.62	65.11 - 109.03	67.79 - 118.34	33.81 - 70.61			
ARITHMETIC MEAN	73.20	87.07	93.07	52.21	1 : 1.189	1 : 1.271	1 : 0.713
MEAN VALUE	72.50	92.03	88.62	51.30	1 : 1.268	1 : 1.221	1 : 0.707
<b>2008</b>							
PRICE RANGE	40.35 - 133.19	46.33 - 150.09	62.38 - 166.80	26.78 - 100.80			
ARITHMETIC MEAN	86.77	98.21	114.59	63.79	1 : 1.132	1 : 1.321	1 : 0.735
MEAN VALUE	97.01	108.54	125.32	69.26	1 : 1.119	1 : 1.292	1 : 0.714

**Table 3. Refining margins on the north-western European market during 2008 (USD/bbl)**

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
SALES REVENUES	100.3	104.9	116.3	124.9	140.5	147.8	148.5	127.9	115.9	85.4	63.5	49.9
FEEDSTOCK COST	92.6	94.2	103.9	110.4	124.7	133.6	135.8	115.3	100.3	73.7	52.9	41.4
GROSS MARGIN	7.8	10.7	12.4	14.5	15.9	14.1	12.7	12.6	15.7	11.7	10.6	8.5
FIXED COSTS	2.35	2.34	2.34	2.35	2.35	2.35	2.36	2.36	2.37	2.37	2.37	2.38
VARIABLE COSTS	3.35	3.31	3.60	3.78	4.11	4.56	5.12	4.71	4.13	2.79	1.69	1.46
CASH OPERATING MARGIN	2.09	5.08	6.42	8.34	9.39	7.16	5.24	5.52	9.16	6.57	6.55	4.62

the remark that part of the data is difficult to verify, so the analysis is based more on logical than exact conclusions.

### 3. Verification of data – refining margins in North-Western Europe

Basic presentation of calculated and realized refining margins as regularly presented in OGJ<sup>4</sup> under column “Statistics – Muse, Stancil & Co. statistical data” is advantageous primarily because of comparison with other areas in the world (in this case north-western Europe), however, for formerly applied accounting system it also had some disadvantages. Namely the calculation system takes into account categories like cash flow and cash operating margins. Currently, depreciation is not consid-

ered a cost (justly) but a calculation item which enables (gradual) deduction of CAPEX from profit tax.

Without deeper analysis, which is only partly possible due to lack of analytical data, we would like to draw attention to the fact that variable costs are almost even, slightly above 3% of sales revenues (of course with minor exceptions), so in addition to fixed costs which are constant, operating revenues grow almost evenly with some minor time lag. The question is can refiners ensure sufficient level of liquidity of operations in terms of increasing feedstock prices (crude oil) and respective sales revenue increase.

The IEA publication<sup>3</sup> gives slightly different presentation of refining margins in this part of the world (both in north-western and south-east Europe). The reports pro-

**Table 4. Refining margins on north-western European market during 2008 – processing of Brent type crude in „cracking type“ refinery – differences in comparison with the data presented in the table above (USD/bbl)**

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
CASH OPERATING MARGIN (OGJ)	2.09	5.08	6.42	8.34	9.39	7.16	5.24	5.52	9.16	6.57	6.55	4.62
CASH OPERATING MARGIN (CRACKING, IEA)	1.90	3.55	4.33	6.59	6.55	4.47	3.11	4.66	8.94	6.17	4.49	3.57
DIFFERENCE	0.19	1.53	2.09	1.75	2.84	2.69	2.13	0.86	0.22	0.40	2.06	1.05

#### Attachment 1.

PRICE OF BRENT 2007 - 2008 AND OIL DERIVATIVES ON NORTH-WESTERN EUROPEAN MARKET								
DATE	BRENT PRICE USD/bbl	INDEX	ROTTERDAM WP			ROTTERDAM WP RELATIONSHIP WITH CRUDE OIL PRICE		
			PREM. GASOLINE 0.15 g/l	DIESEL FUEL 0.2 %	FUEL OIL 3.5%	PREM. GASOLINE 0.15 g/l	DIESEL FUEL 0.2%	FUEL OIL 3.5
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
JUNE-07	71.55	133.0	97.59	85.50	48.83	136.4	119.5	68.2
JULY-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
SEPT-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
JAN-08	92.00	100.0	95.82	108.70	65.73	104.2	118.2	71.4
FEB-08	94.98	103.2	100.30	115.98	64.89	105.6	122.1	68.3
MAR-08	103.58	112.6	108.91	133.01	70.28	105.1	128.4	67.9
APR-08	108.97	118.4	127.26	142.66	73.57	116.8	131.0	67.5
MAY-08	123.05	133.8	140.04	163.07	80.30	113.8	132.5	65.3
JUNE-08	132.44	144.0	150.09	166.80	89.47	113.3	125.9	67.6
JULY-08	133.19	144.8	145.48	165.10	100.80	109.2	124.0	75.7
AUG-08	113.03	122.9	129.93	138.28	92.38	115.0	122.3	81.7
SEPT-08	98.13	106.7	120.10	127.29	81.22	122.4	129.7	82.8
OCT-08	71.87	78.1	82.48	100.15	54.12	114.8	139.3	75.3
NOV-08	52.51	57.1	55.77	80.38	31.54	106.2	153.1	60.1
DEC-08	40.35	43.9	46.33	62.38	26.78	114.8	154.6	66.4

vide monthly statistics on actual refining margins in cracking type refineries, but without any additional analytical data.

The table indicates significant differences in margins quoted by the two different sources, probably as a result of different methodology used for calculation. Namely, in OGJ<sup>4</sup> presentation of cash operating margins, the cash flow includes depreciation, which is not the case in IEA's calculation. Besides, it is very likely that OGJ observed refineries in the so called ARA triangle (Amsterdam, Rotterdam, Antwerpen) where most of refineries have coking units, so they have improved yield of products. Also, they count on cheaper feedstock and higher yields since Brent crude is more favourable for processing according to API and sulphur content, compared to average crude processed in north-western parts of European market (coming from Russia or Middle East).

#### 4. Conclusion

The trend in changes of values (and prices!) between motor gasolines (light distillates) and diesel fuel (middle distillates) was recorded for the first time in September 2006 as a more radical change, but then it continued in 2008. The disparity (misbalance) is mainly caused by higher demand for diesel fuels in comparison with gasoline.

In addition to disturbed relationship between gasoline and diesel, significant decrease of heavy fuel oil value by the end of 2008 deserves specific survey (possible causes: decline in industrial activity – beginning of economic instability and possible imbalance of gas market – additional offer of LNG, negotiations with new gas suppliers and pipelines from the Caspian region to western Europe).

Also, obvious disparity in increase of refining margins and values (prices) of crude oil and vice versa – decline of refining margins when crude oil prices decline. This fact tells us that in the period from 2006 – 2008 global accumulation of capital expanded from upstream business partly into downstream business.

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