



SECTION 7

Oil prices

Evolution of the Brent-WTI spread in recent years

Each year between 1983 and 2006, the American crude oil benchmark, WTI, remained more expensive than its European counterpart, Brent. This indicator, referred to as the Brent-WTI spread, averaged \$-1.35/b over that time period, with a standard deviation of \$0.61/b, and reached its minimum of \$-3.20/b in 2004. In 2007 it moved momentarily into positive territory and averaged \$0.26/b, before falling by \$2.89/b the next year to its second lowest value since the 1980s. In 2011 it sky-rocketed by \$16.19/b, over 666 times the average y-o-y change, and has stayed positive on a yearly basis ever since, marking a fundamental change in the global oil market.

The phenomenon of a low WTI price, in comparison with other global benchmarks, is often attributed to the oversupply in the United States (US) crude oil market. For the global market, oil oversupply can be defined as the difference between oil supply and demand, while on a country level trade plays the most crucial part. In the US, the situation is even more complicated with so many factors playing a role. The stocks levels at Cushing, Oklahoma, the delivery point for WTI — often described as the most significant trading hub connecting the Gulf Coast suppliers with northern consumers — is often used as the reference point for assessing over/undersupply in the US.

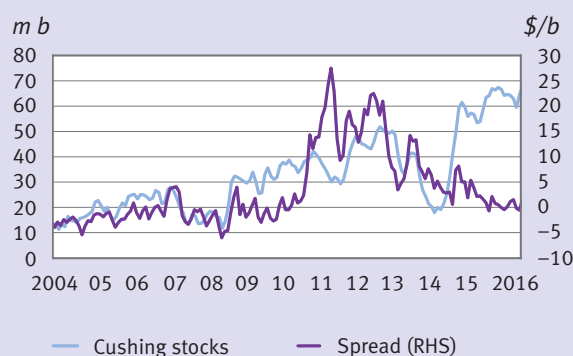
The global oil market situation in 2011, when the Brent-WTI spread saw a dramatic increase, was quite unique. Rising Canadian and US onshore production provided additional supply to the mid-continent, while US demand declined by over 200,000 b/d y-o-y. On the other side of the Atlantic, declines in North Sea production and outages in Libya provided support for Brent, which was appreciating not only towards WTI but also towards Dubai crudes. From December 2010 to February 2011, the Brent-WTI spread increased by a factor of six — from \$2.38/b to \$14.36/b — as the stocks at Cushing filled up and reached a local maximum of 86 per cent full at the end of March 2011. The quantities of crude available exceeded the sum of both: the capacity of local refineries and the capacity of infrastructure allowing its transport towards refining centres and ports in the Gulf Coast. In September 2011 the 12-month moving correlation between Cushing stock levels and the Brent-WTI spread turned negative for the first time since 2008, marking a temporary change in the relationship between the two variables. It stayed in negative territory for a year, during which the outflow of oil from Cushing doubled.

Average yearly 12 month moving correlation between Cushing stock levels and Brent-WTI spread

2007	2008	2009	2010	2011	2012	2013	2014	2015
0.58	0.44	0.71	0.58	0.29	-0.01	0.15	0.61	0.30

As the pipeline network linking Cushing to the Gulf Coast developed, the outflow of oil from PADD 2, where Cushing is located, towards the refining centre in the Gulf Coast (PADD 3) rose gradually, contributing to bringing the spread down to \$3.45/b in July 2013. This relationship can be described by the correlation between the Brent-WTI spread and crude oil outflow from PADD 2, which stands at -0.82 for June 2011 to December 2016.

Cushing stocks vs Brent-WTI spread



Crude oil outflow from PADD 2 vs Brent-WTI spread

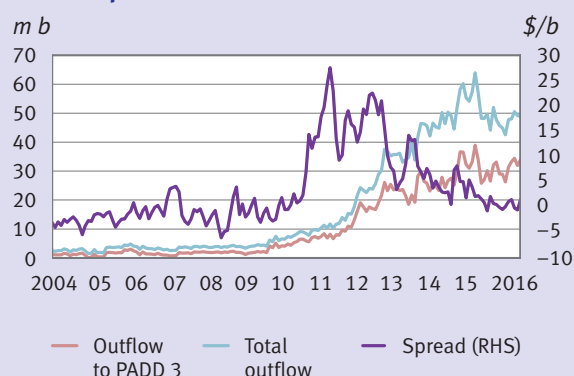


Table 7.1

OPEC Reference Basket (ORB) and corresponding components spot prices

(\$/b)

	Representative crude stream	2012	2013	2014	2015	2016
Algeria	Saharan Blend	111.49	109.38	99.68	52.79	44.28
Angola	Girassol	112.21	109.14	99.19	52.96	43.61
Ecuador	Oriente	102.76	97.74	87.31	44.94	38.44
Gabon	Rabi Light	na	na	na	52.83	42.62
IR Iran	Iran Heavy	109.06	105.73	96.18	48.80	39.57
Iraq	Basrah Light	107.96	103.60	94.45	47.87	39.53
Kuwait	Kuwait Export	108.93	105.04	95.32	48.13	39.30
Libya	Ess Sider	111.86	108.51	98.51	51.38	42.69
Nigeria	Bonny Light	113.66	111.36	100.85	52.95	44.02
Qatar	Marine	109.26	105.32	96.39	50.71	41.43
Saudi Arabia	Arab Light	110.22	106.53	97.18	49.85	40.96
United Arab Emirates	Murban	111.76	108.21	99.45	53.87	44.83
Venezuela	Merey	100.06	96.66	86.88	41.11	34.02
OPEC	ORB	109.45	105.87	96.29	49.49	40.76
ORB	Volatility ¹	7.96	3.93	14.56	8.50	7.28
ORB	Coefficient of variation ² , %	7.27	3.71	15.12	17.18	17.85

Notes:

1. Standard deviation of daily prices.
2. Ratio of volatility to annual average price.

Graph 7.1
OPEC Reference Basket

(\$/b)

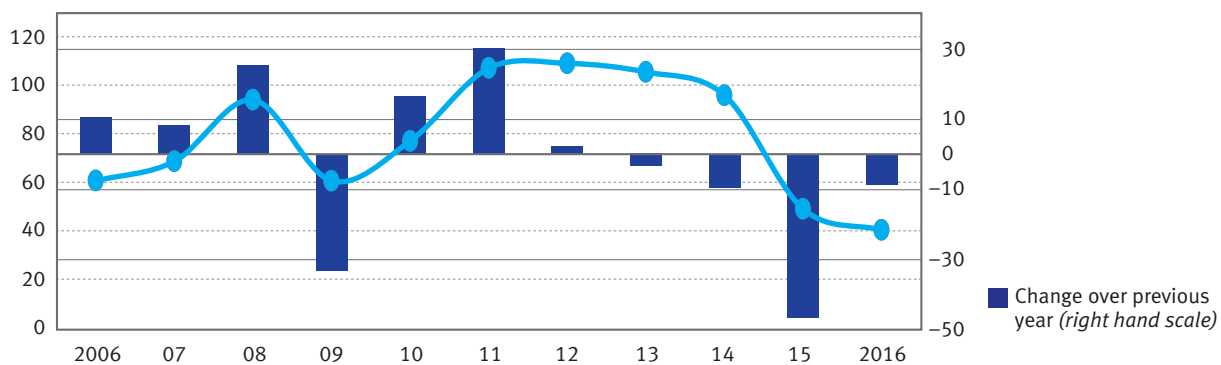


Table 7.2

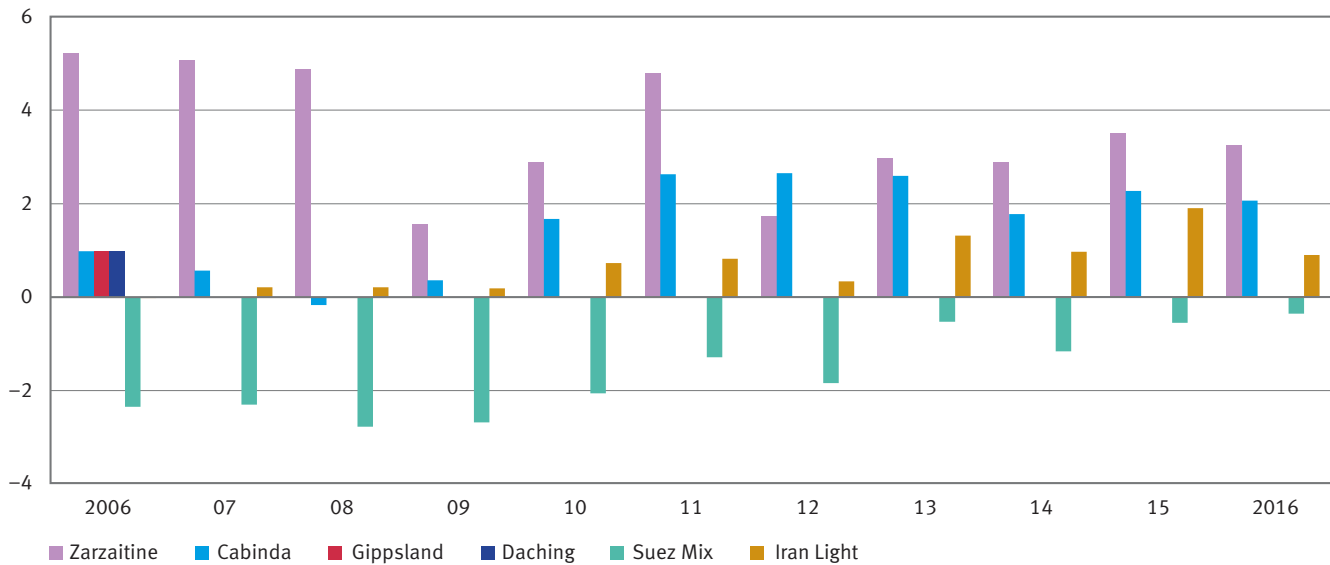
Selected spot crude oil prices

(\$/b)

	Crude stream	2012	2013	2014	2015	2016
Algeria	Zarzaitine	111.18	108.85	99.19	53.00	44.02
Angola	Cabinda	112.10	108.47	98.07	51.77	42.83
Egypt	Suez Mix	107.62	105.35	95.13	48.94	40.41
IR Iran	Iran Light	109.79	107.19	97.26	51.40	41.66
Indonesia	Minas	116.60	107.41	98.68	49.17	41.11
Libya	Brega	111.45	108.88	98.79	52.08	43.73
Malaysia	Miri	118.25	115.51	105.10	57.93	46.39
Malaysia	Tapis	116.98	114.39	103.15	55.75	45.69
Mexico	Isthmus	106.55	105.16	93.65	51.14	42.37
Mexico	Maya	99.65	97.31	85.80	44.11	36.52
Nigeria	Forcados	114.21	111.95	101.35	54.41	43.70
Norway	Ekosfisk	112.76	109.88	99.72	53.12	44.01
Norway	Oseberg	112.98	110.04	99.99	53.61	44.52
Oman	Oman	109.35	105.51	97.04	51.21	41.96
Qatar	Dukhan	110.34	107.05	98.44	52.87	43.69
Russia	Urals	110.49	108.00	98.08	51.90	42.16
Saudi Arabia	Arab Heavy	108.32	103.89	93.68	47.01	38.45
United Kingdom	Brent Dated	111.62	108.62	99.08	52.41	43.76
United Kingdom	Forties	111.62	108.65	99.14	52.50	43.42
United States	WTI	94.10	97.96	93.26	48.73	43.27
United Arab Emirates	Dubai	109.07	105.45	96.71	50.94	41.39
Spread	WTI – Brent	-17.52	-10.66	-5.82	-3.68	-0.49
	WTI – Dubai	-14.97	-7.49	-3.45	-2.21	1.88
	Brent – Dubai	2.55	3.17	2.37	1.47	2.37

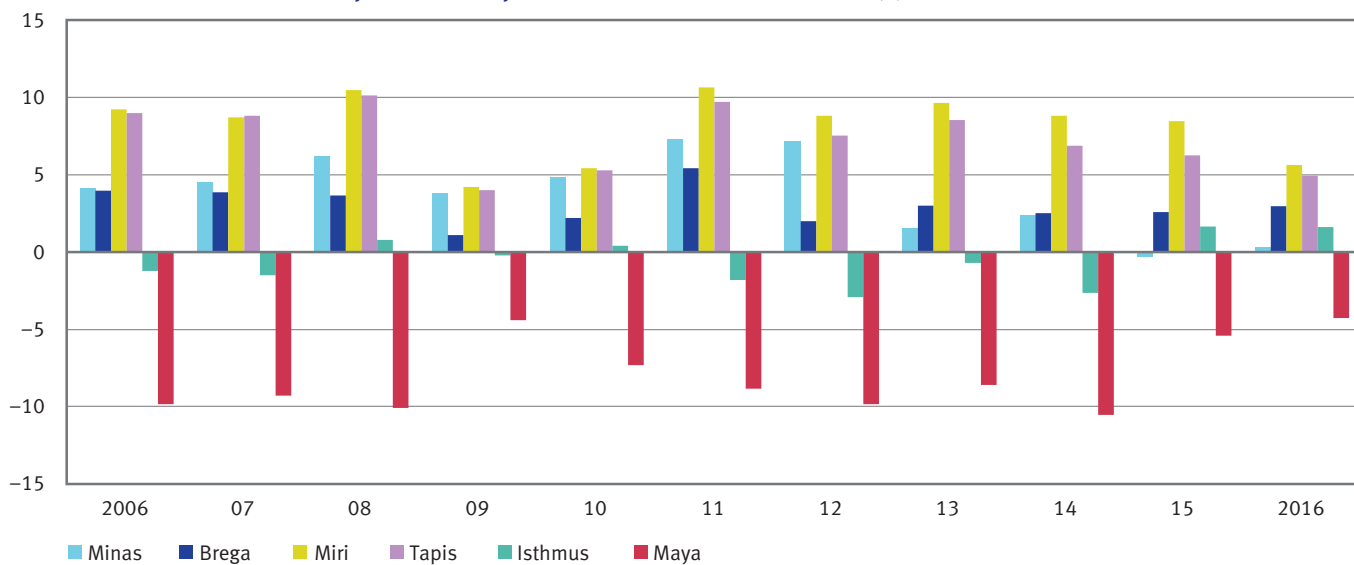
Graph 7.2
Differentials of selected spot crude oil prices to OPEC Reference Basket (1)

(\$/b)



Graph 7.3
Differentials of selected spot crude oil prices to OPEC Reference Basket (2)

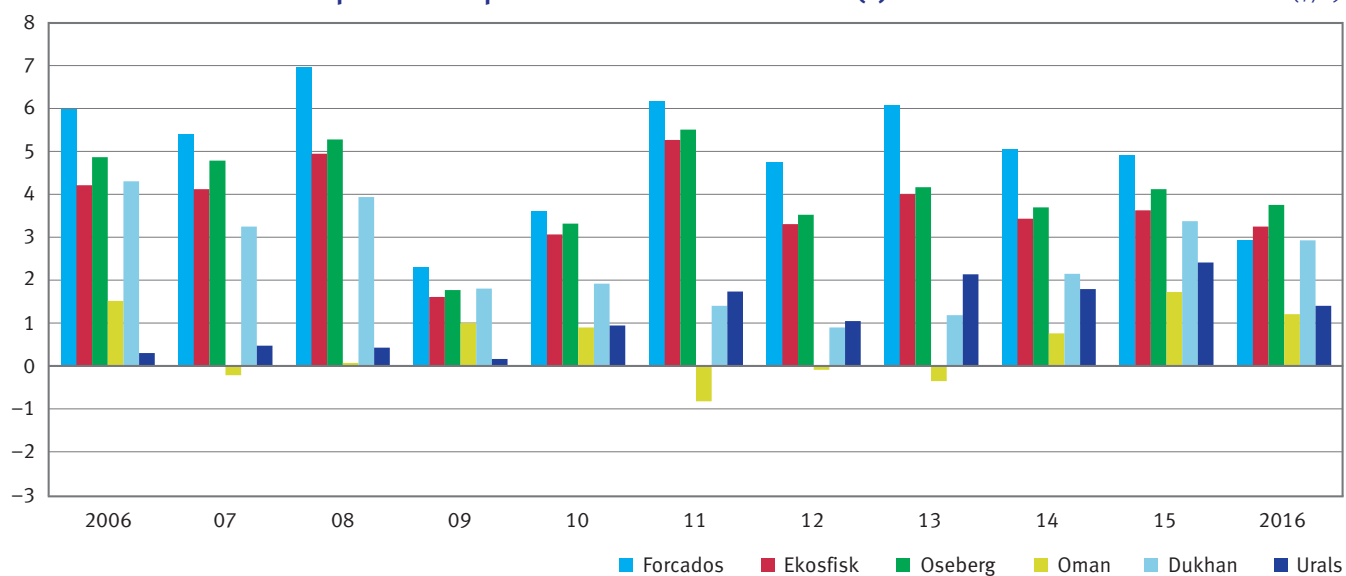
(\$/b)



Graph 7.4

Differentials of selected spot crude oil prices to OPEC Reference Basket (3)

(\$/b)



Graph 7.5

Differentials of selected spot crude oil prices to OPEC Reference Basket (4)

(\$/b)

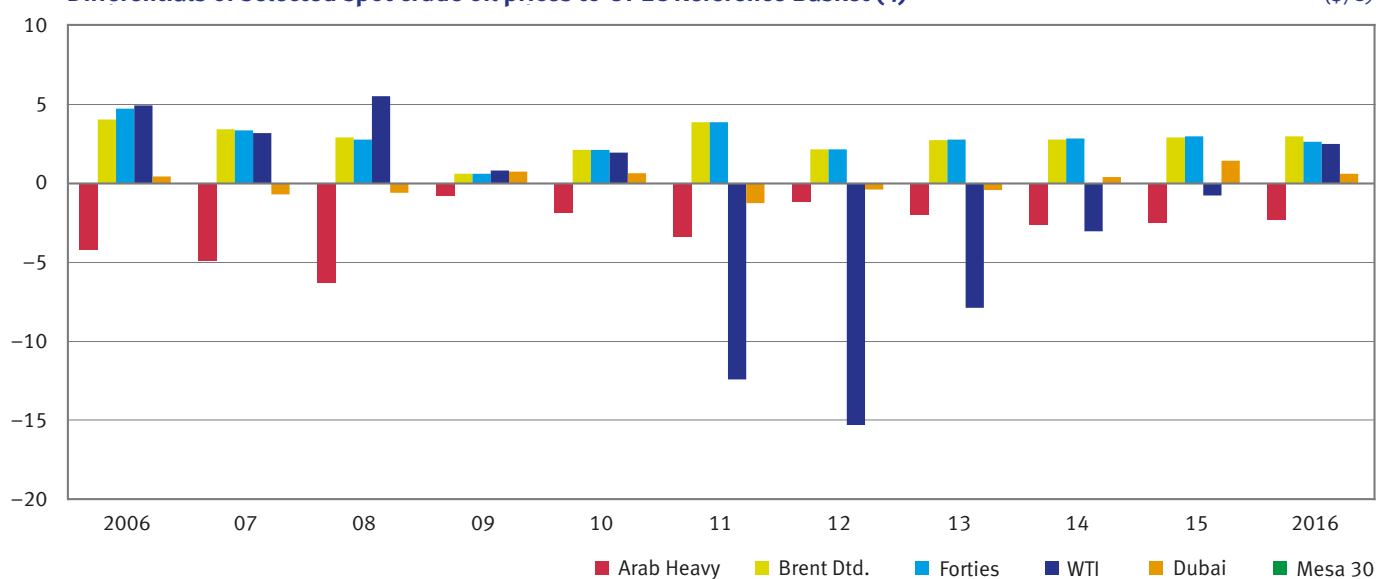


Table 7.3
ICE Brent, NYMEX WTI and DME Oman annual average of the 1st, 6th and 12th forward months (\$/b)

	2012	2013	2014	2015	2016
ICE Brent					
1 st forward month	111.69	108.69	99.45	53.60	45.13
6 th forward month	109.24	105.91	99.29	57.21	47.65
12 th forward month	106.68	103.02	98.30	60.18	49.49
NYMEX WTI					
1 st forward month	94.17	98.04	92.91	48.73	43.47
6 th forward month	95.99	96.33	90.23	52.56	46.88
12 th forward month	96.02	92.99	87.57	55.08	48.45
DME Oman					
1 st forward month	109.30	105.55	96.86	51.25	41.99
6 th forward month	106.97	103.07	96.61	54.36	43.89
12 th forward month	104.60	100.76	95.55	57.31	45.81

Table 7.4
OPEC Reference Basket in nominal and real terms (\$/b)

	2012	2013	2014	2015	2016
Nominal oil price	109.45	105.87	96.29	49.49	40.76
Nominal price adjusted for:					
Exchange rates ¹	84.90	82.67	75.36	43.35	35.92
Inflation ²	89.42	85.32	76.77	39.40	32.29
Combined ³	69.36	66.62	60.09	34.52	28.46

Notes:

Base: 2001 = 100.

1. Based on weighted average index of currency exchange rates in the modified Geneva I Agreement (see Geneva I Agreement definition under 'General Notes').
2. Based on weighted average consumer price indices of modified Geneva I countries and the US.
3. Based on combined indices of exchange rates and inflation.

Graph 7.6
OPEC Reference Basket in nominal and real terms (base 2001, \$/b)

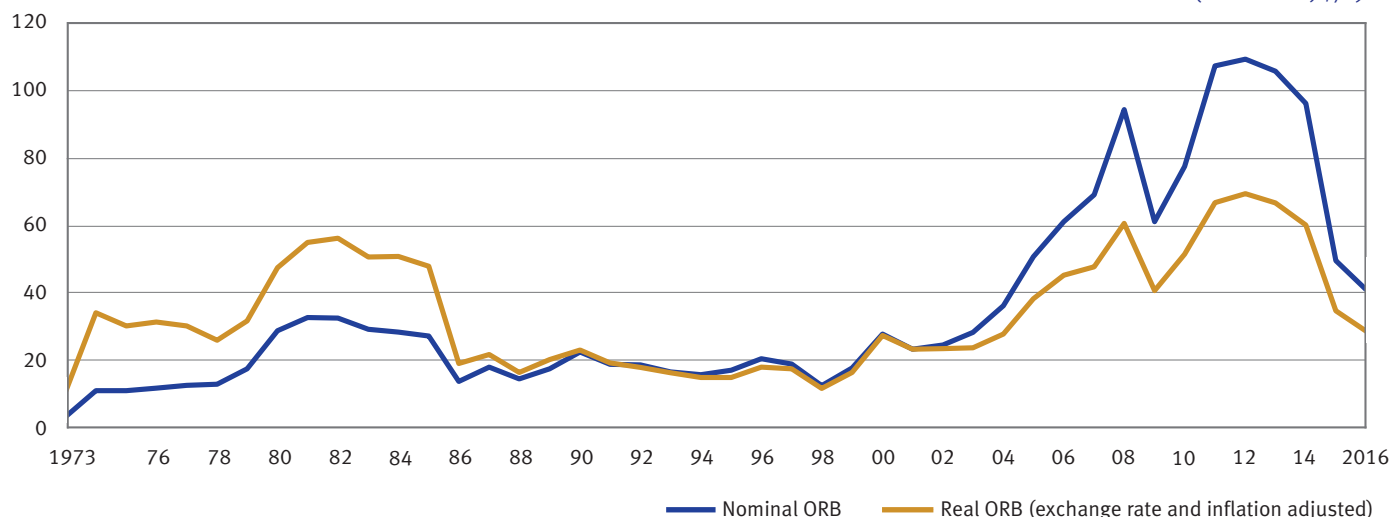


Table 7.5

Annual average of premium factors for selected OPEC Reference Basket components

(\$/b)

		2012	2013	2014	2015	2016
Europe						
Algeria	Saharan Blend	-0.11	0.75	0.61	0.38	0.52
IR Iran	Iran Heavy	-3.68	-3.70	-4.60	-5.09	-6.38
Iraq	Basrah Light	-3.88	-4.20	-4.74	-4.83	-4.74
Libya	Es Sider	0.25	-0.11	-0.56	-1.04	-1.08
Nigeria	Bonny Light	2.05	2.73	1.77	0.54	0.26
Saudi Arabia	Arab Light	-1.52	-1.52	-2.78	-3.53	-4.64
Asia						
IR Iran	Iran Heavy	0.50	0.48	-0.58	-2.24	-2.01
Iraq	Basrah Light	0.72	-0.14	-1.02	-2.81	-1.94
Kuwait	Kuwait Export	0.34	0.33	-0.96	-2.73	-2.31
Saudi Arabia	Arab Light	2.20	2.51	1.48	-0.85	-0.42
US						
Iraq	Basrah Light	-1.82	-1.87	0.06	-0.43	-0.59
Saudi Arabia	Arab Light	0.42	0.64	2.43	1.06	0.29
	Arab Medium	-1.85	-1.78	0.05	-0.53	-1.17
	Arab Heavy	-3.54	-3.45	-1.55	-1.13	-1.74

Notes:

Premium factors are related to corresponding benchmark crudes.

Table 7.6
Spot prices of petroleum products in major markets

(\$/b)

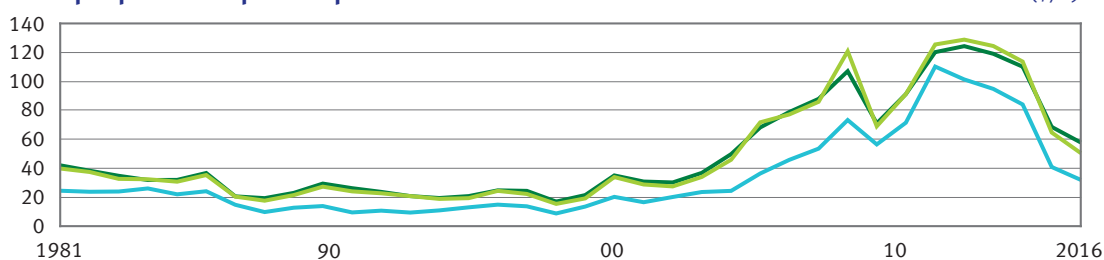
	Specifications	2012	2013	2014	2015	2016
US Gulf						
Gasoline	Regular unleaded 87	121.73	116.55	107.90	67.58	57.15
Gasoil	0.2% sulphur	126.02	121.75	111.39	63.80	50.10
Fuel oil	3.0% sulphur	99.36	93.05	82.67	40.78	32.13
Singapore						
Gasoline	Premium unleaded 97	126.41	121.51	111.96	71.41	57.81
Gasoil	0.05% sulphur	128.15	123.38	112.67	64.57	52.05
Fuel oil	380 centistokes	103.17	95.67	86.58	44.27	34.92
Rotterdam						
Gasoline	Premium unleaded 98	127.29	122.57	115.10	75.53	63.58
Gasoil	10ppm sulphur	129.18	123.87	112.91	66.03	53.28
Fuel oil	3.5% sulphur	100.10	93.89	83.68	40.75	29.64

Notes:

US Gulf and Singapore prices apply to cargo. Rotterdam prices apply to barge size lots.

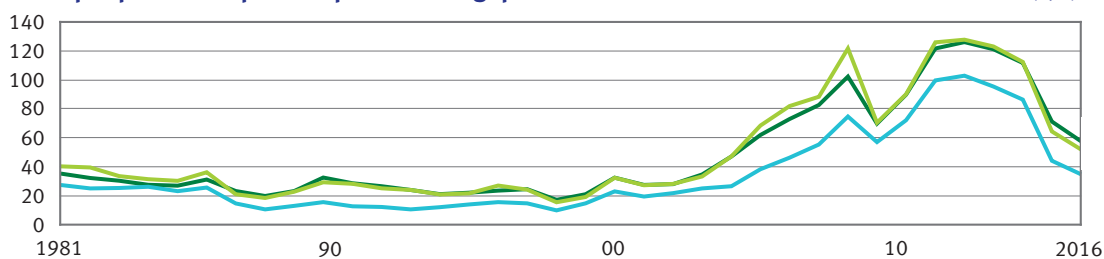
Graph 7.7
Spot petroleum product prices – US Gulf

(\$/b)



Graph 7.8
Spot petroleum product prices – Singapore

(\$/b)



Graph 7.9
Spot petroleum product prices – Rotterdam

(\$/b)

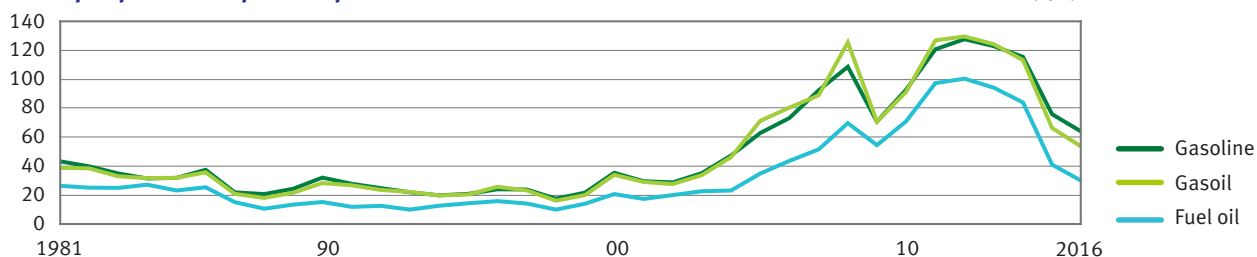


Table 7.7
Retail prices of petroleum products in OPEC Members *(units of national currency/b)*

	2012	2013	2014	2015	2016
Algeria					
Gasoline	2,226.67	2,227.00	2,227.00	2,227.00	3,029.67
Diesel oil	1,370.00	1,370.00	1,370.00	1,370.00	1,828.42
Kerosene	nap	nap	nap	nap	nap
Fuel oil	nap	nap	nap	nap	nap
Angola					
Gasoline	9,540.00	9,540.00	14,310.00	18,285.00	25,440.00
Diesel oil	6,360.00	6,360.00	9,540.00	11,925.00	21,465.00
Kerosene	3,339.00	3,339.00	5,565.00	7,155.00	11,130.00
Fuel oil	8,830.86	8,830.86	7,950.00	12,561.00	13,395.75
Ecuador					
Gasoline	62.79	63.42	62.79	62.79	62.79
Diesel oil	37.80	39.53	37.80	37.80	43.26
Kerosene	37.88	39.53	37.80	37.80	37.80
Fuel oil	23.65	19.99	19.99	9.10	9.10
Gabon					
Gasoline	85,065.00	85,065.00	85,065.00	85,065.00	90,630.00
Diesel oil	74,730.00	74,730.00	74,730.00	74,730.00	80,454.00
Kerosene	na	na	na	na	na
Fuel oil	nap	nap	nap	nap	nap
IR Iran					
Gasoline	1,192,500.00	1,192,500.00	1,192,500.00	1,749,000.00	1,749,000.00
Diesel oil	159,000.00	159,000.00	159,000.00	477,000.00	795,000.00
Kerosene	159,000.00	159,000.00	159,000.00	238,500.00	2,146,500.00
Fuel oil	318,000.00	318,000.00	318,000.00	477,000.00	1,590,000.00
Iraq					
Gasoline	71,550.00	71,550.00	71,550.00	82,150.00	92,750.00
Diesel oil	63,600.00	63,600.00	63,600.00	55,650.00	47,700.00
Kerosene	23,850.00	23,850.00	23,850.00	31,800.00	39,750.00
Fuel oil	nap	nap	nap	nap	nap
Kuwait					
Gasoline	11.40	11.40	11.40	11.40	13.87
Diesel oil	8.75	8.75	8.75	24.05	14.11
Kerosene	8.75	8.75	8.75	24.05	14.11
Fuel oil	nap	nap	nap	nap	nap
Libya					
Gasoline	23.85	23.85	23.85	na	na
Diesel oil	27.03	27.03	27.03	na	na
Kerosene	12.72	12.72	12.72	na	na
Fuel oil	nap	nap	nap	nap	nap
Nigeria					
Gasoline	15,423.00	15,423.00	15,423.00	14,628.00	18,505.48
Diesel oil	25,110.87	24,853.29	24,853.29	18,084.66	17,474.10
Kerosene	7,950.00	7,950.00	7,950.00	7,950.00	18,954.39
Fuel oil	18,585.51	18,394.87	18,394.87	10,654.63	10,294.91

Table 7.7
Retail prices of petroleum products in OPEC Members *(units of national currency/b)*

	2012	2013	2014	2015	2016
Qatar					
Gasoline	143.10	147.08	147.08	194.78	254.40
Diesel oil	111.30	159.00	238.50	238.50	238.50
Kerosene	nap	nap	nap	nap	nap
Fuel oil	nap	nap	nap	nap	nap
Saudi Arabia					
Gasoline	83.48	83.48	83.48	107.33	131.18
Diesel oil	39.75	39.75	39.75	55.65	71.63
Kerosene	69.17	69.17	69.17	82.78	96.39
Fuel oil	nap	nap	nap	nap	nap
United Arab Emirates					
Gasoline	218.56	262.52	262.52	278.25	259.04
Diesel oil	300.74	361.27	361.27	354.57	266.59
Kerosene	nap	nap	nap	nap	nap
Fuel oil	nap	nap	nap	nap	nap
Venezuela					
Gasoline	13.28	13.28	13.28	13.28	556.50
Diesel oil	7.63	7.63	7.63	7.63	7.63
Kerosene	468.88	671.27	648.93	333.87	196.89
Fuel oil	9.62	9.62	9.62	9.62	9.62

Table 7.8
Crack spread in major markets *(\$/b)*

Specifications		2012	2013	2014	2015	2016
US Gulf crack spread vs WTI						
Gasoline	Regular unleaded 87	33.13	21.26	20.56	18.99	14.10
Gasoil	0.2% sulphur	37.42	26.46	24.05	14.96	6.98
Fuel oil	3.0% sulphur	10.76	-2.24	-4.67	-8.01	-11.09
Singapore crack spread vs Dubai						
Gasoline	Premium unleaded 97	17.34	16.06	15.25	20.43	16.55
Gasoil	0.05% sulphur	19.08	17.93	15.96	13.05	10.50
Fuel oil	380 centistokes	-5.90	-9.78	-10.13	-6.10	5.78
Rotterdam crack spread vs Brent						
Gasoline	Premium unleaded 98	18.22	17.12	18.39	23.14	19.86
Gasoil	10ppm sulphur	20.11	18.42	16.20	13.51	9.57
Fuel oil	3.5% sulphur	-8.97	-11.56	-13.03	-10.75	-7.26

Notes:

US Gulf and Singapore prices apply to cargo. Rotterdam prices apply to barge size lots.