World oil market

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Lecture outline

- Introduction: World oil market as a bathtub
- The commodity: What is it that is being traded?
- Market structure
- Actors

W. Nordhaus: The „Bathtub“ view of the World oil market

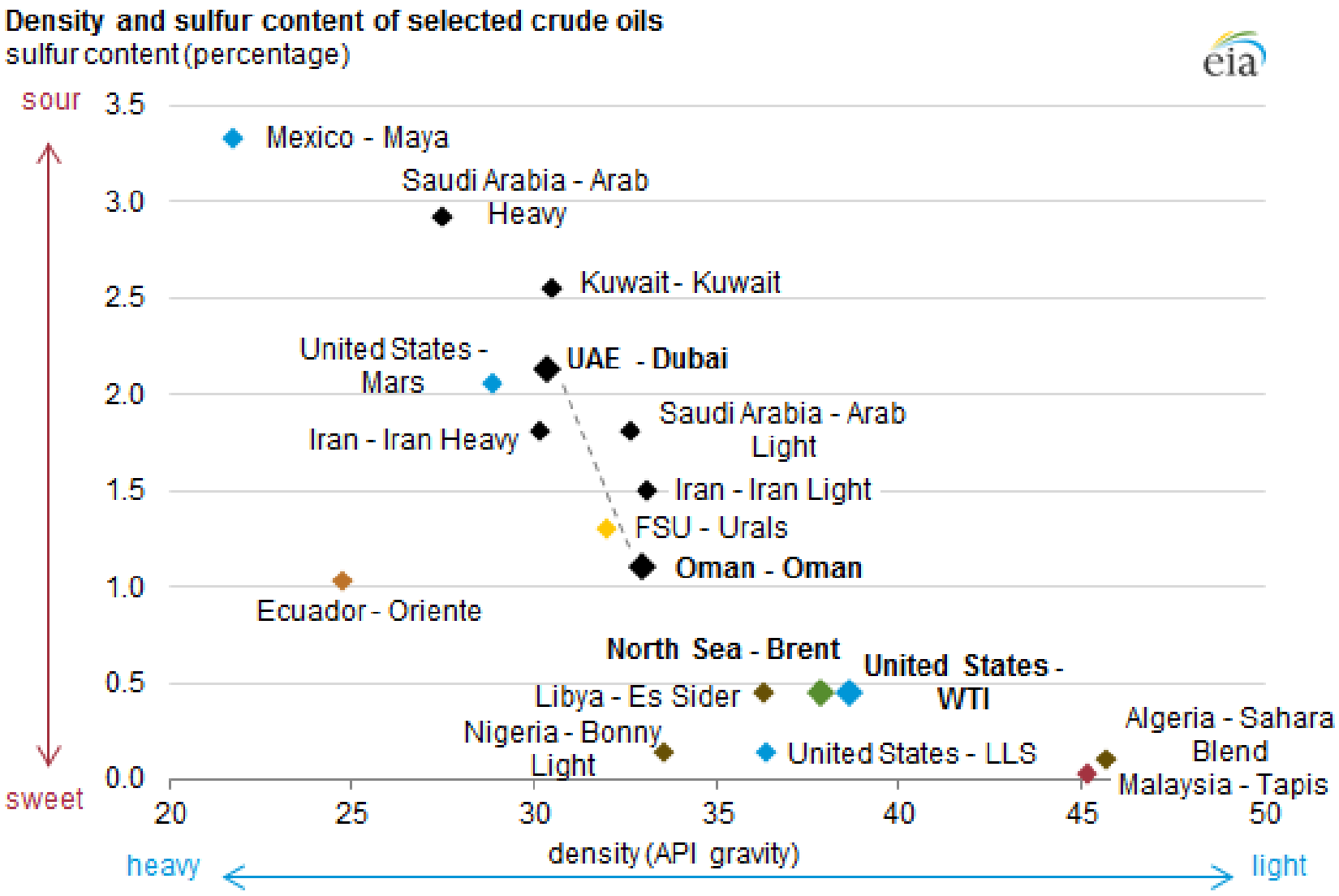
- Spigots: Saudi Arabia, Russia, and other producers that introduce oil into the inventory
- Drains: the United States, China, and other consumers drawing oil from the tub

- Oil is fungible
- Bilateral ties are irrelevant
- Single price regardless the source

The commodity

What is (traded) oil?

Oil crudes actually vary...



Oil benchmarks

Benchmark crude

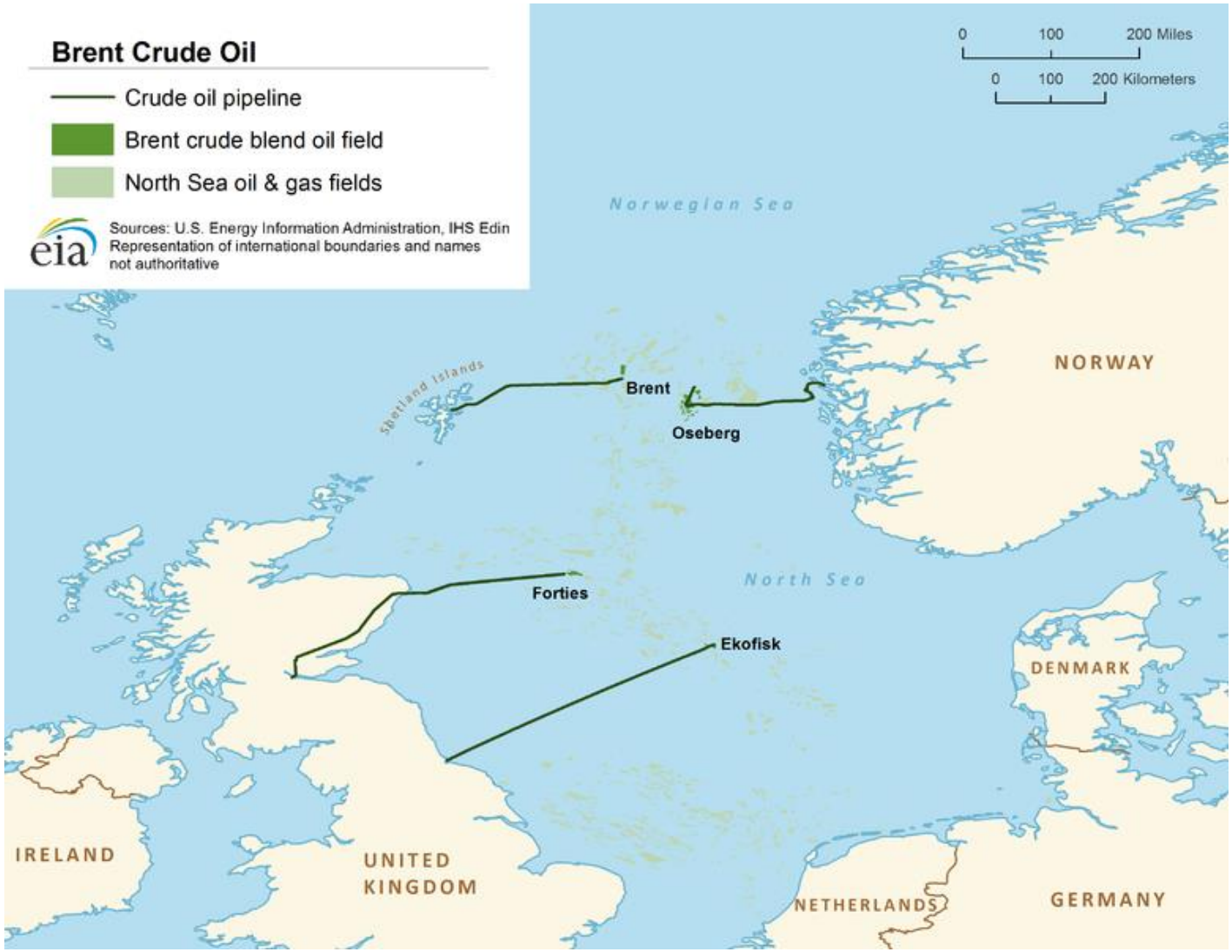
- Specific crude oil
- Widely and actively bought and sold
- To which other types of crude oil can be compared to determine a price by an agreed-upon differential

Oil benchmarks

Brent

- The most widely used global crude oil benchmark
- Include four North Sea streams:
  - Brent and Forties (offshore the United Kingdom)
  - Ekofisk and Oseberg (offshore Norway)
- 1 % of global production in 2013 (0.86 bpd)
- Benchmark for approx. 2/3 of global oil
- Light and sweet crude oil
  that is produced and traded in:
  - Europe
  - the Mediterranean and Africa
  - Australia
  - Asia (selectively)

Original source streams of Brent



West Texas Intermediate

- Light, sweet crude oil produced in the United States
- Priced at Cushing, Oklahoma
- Benchmark for other types of crude oil produced in the United States, such as:
  - Mars, a medium, sour crude produced in the Gulf of Mexico
  - Bakken, a light, sweet crude produced in North Dakota.
- WTI is also used as a benchmark for imported crude oil that is produced in:
  - Canada
  - Mexico
  - South America

Dubai/Oman

- Average price of Dubai and Oman crude, both of which are medium and sour
- Benchmark for crude oil produced in the Middle East (incl. Saudi Aramco) and exported to Asian markets.
- Dubai: steady decline in production down to 0.034 mbd (2013)
  => Omani oil (0.94 mbd in 2013) used to continue the benchmark

Table 1.1: OPEC Reference Basket and selected crudes, US$/b

	Oct 14	Nov 14	Change Nov/Oct	Year-to-date 2013	Year-to-date 2014
OPEC Reference Basket	**85.06**	**75.57**	**-9.49**	**105.72**	**99.57**
Arab Light	85.93	76.07	-9.86	106.40	100.47
Basrah Light	83.57	73.94	-9.63	103.47	97.70
Bonny Light	88.51	80.10	-8.41	111.21	104.15
Es Sider	86.31	78.90	-7.41	108.35	101.80
Girassol	86.78	78.68	-8.10	108.96	102.52
Iran Heavy	84.61	74.46	-10.15	105.46	99.49
Kuwait Export	83.99	74.04	-9.95	104.85	98.62
Marine	86.14	75.43	-10.71	105.11	99.67
Merey	76.17	68.42	-7.75	96.66	90.06
Murban	89.10	77.85	-11.25	107.95	102.76
Oriente	76.84	69.52	-7.32	97.84	90.29
Saharan Blend	87.61	79.60	-8.01	109.10	102.95
Other Crudes					
Brent	87.41	78.90	-8.51	108.44	102.33
Dubai	86.73	76.33	-10.40	105.25	99.96
Isthmus	85.40	79.04	-6.36	105.73	96.67
LLS	87.60	79.64	-7.96	107.73	100.13
Mars	83.57	75.76	-7.81	102.62	96.11
Minas	84.46	75.92	-8.54	107.50	102.13
Urals	86.63	78.92	-7.71	107.80	101.34
WTI	84.43	76.04	-8.39	97.98	96.26
Differentials					
Brent/WTI	2.98	2.86	-0.12	10.46	6.07
Brent/LLS	-0.19	-0.74	-0.55	0.71	2.20
Brent/Dubai	0.68	2.57	1.89	3.19	2.38

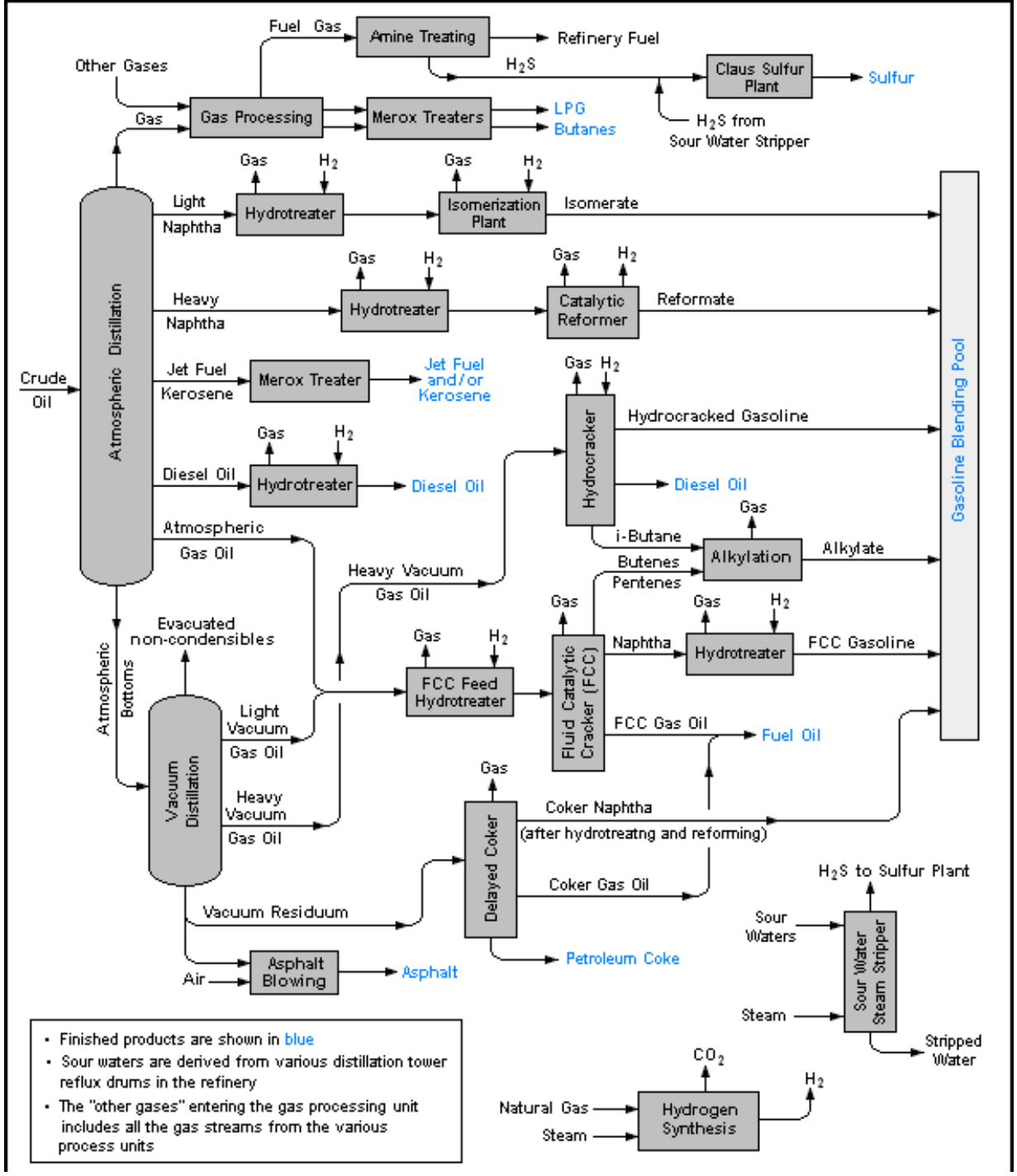
Differentials

... A benchmark is a type of crude oil to which other types of crude oil can be compared to determine a price by an agreed-upon differential...

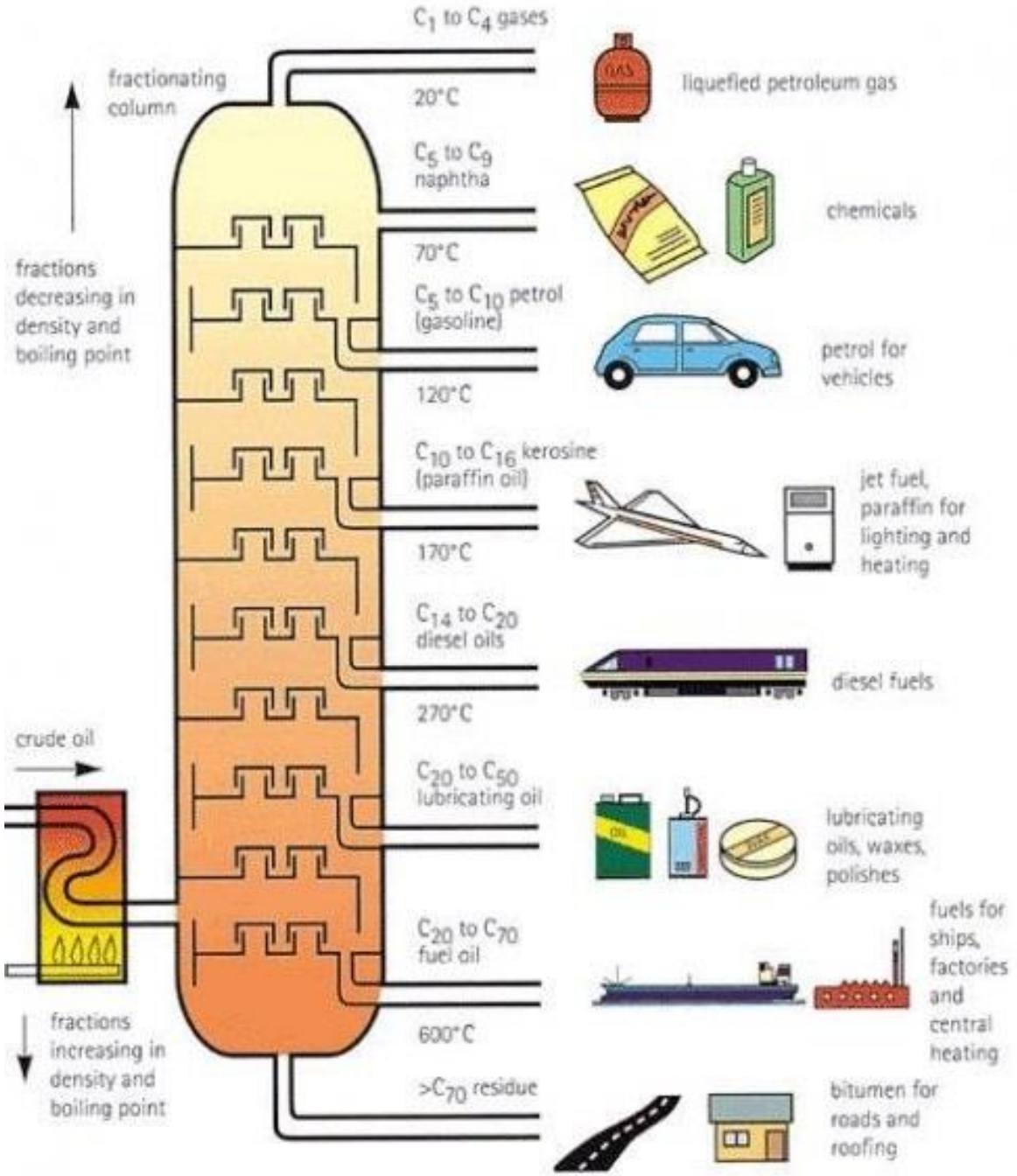
Differentials are determined by:

- Quality characteristics (API gravity or sulfur content).
- Transportation costs from production areas to refineries.
- Regional and global supply and demand conditions.

Oil quality


Fuel Gas
Amine Treating
Refinery Fuel
Other Gases
H_2S
Claus Sulfur Plant
Sulfur
Gas
Gas Processing
Merox Treaters
LPG
Butanes
H_2S from Sour Water Stripper
Gas
H_2
Light Naphtha
Hydrotreater
Isomerization Plant
Isomerate
Heavy Naphtha
Catalytic Reformer
Reformate
Crude Oil
Atmospheric Distillation
Jet Fuel Kerosene
Merox Treater
Jet Fuel and/or Kerosene
Diesel Oil
Hydrocracker
Hydrocracked Gasoline
Atmospheric Gas Oil
Heavy Vacuum Gas Oil
i-Butane
Butenes
Pentenes
Alkylation
Alkylate
Gasoline Blending Pool
Evacuated non-condensibles
Atmospheric Bottoms
FCC Feed Hydrotreater
Fluid Catalytic Cracker (FCC)
Naphtha
FCC Gasoline
Light Vacuum Gas Oil
Heavy Vacuum Gas Oil
Vacuum Distillation
FCC Gas Oil
Fuel Oil
Coker Naphtha (after hydrotreatng and reforming)
Delayed Coker
Coker Gas Oil
Vacuum Residuum
Petroleum Coke
Asphalt Blowing
Air
Asphalt
H_2S to Sulfur Plant
Sour Waters
Sour Water Steam Stripper
Steam
Stripped Water
CO_2
Natural Gas
Steam
Hydrogen Synthesis
H_2
• Finished products are shown in blue
• Sour waters are derived from various distillation tower reflux drums in the refinery
• The "other gases" entering the gas processing unit includes all the gas streams from the various process units

Oil quality

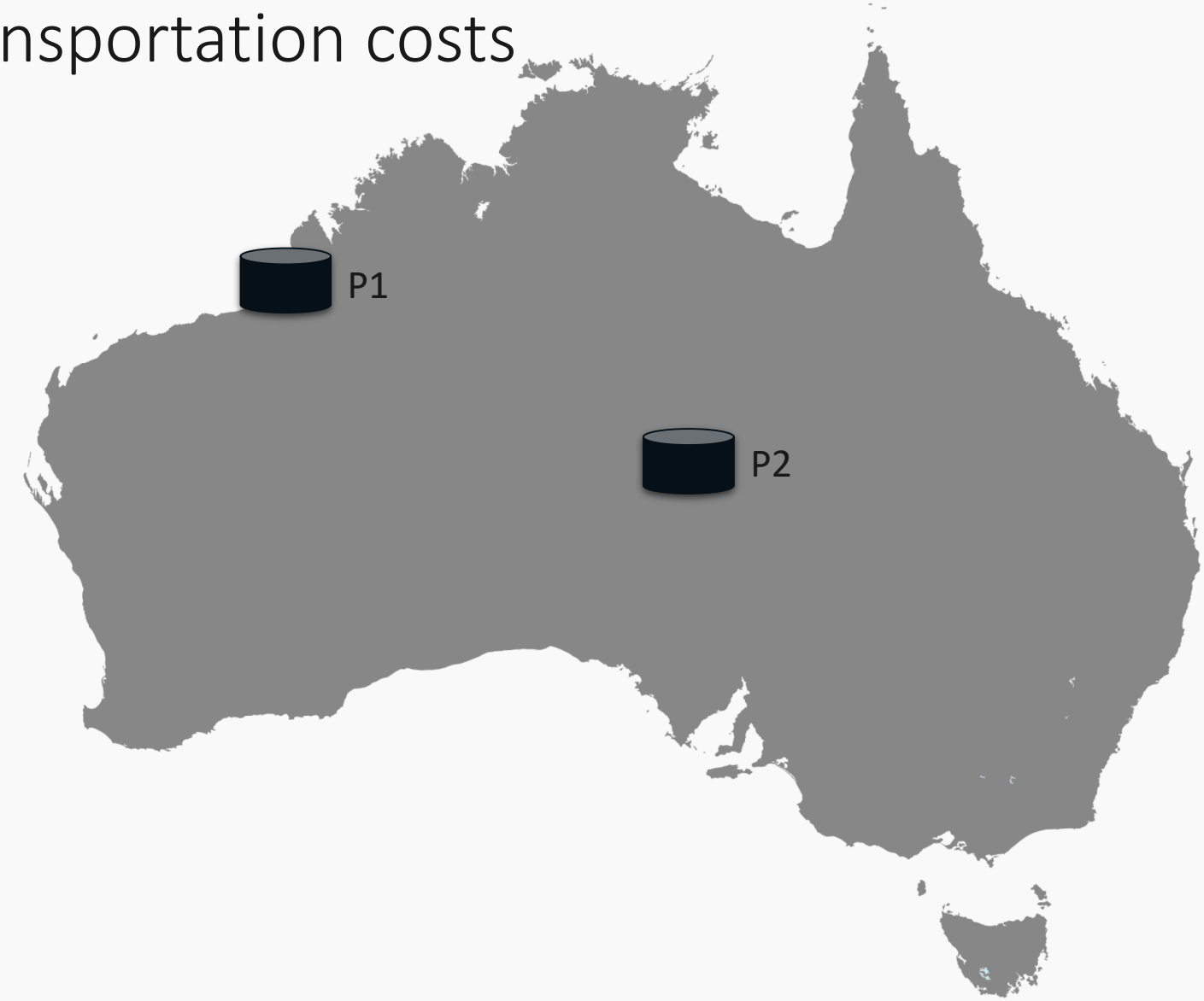

C_1 to C_4 gases
fractionating column
20°C
liquefied petroleum gas
C_5 to C_9 naphtha
chemicals
70°C
fractions decreasing in density and boiling point
C_5 to C_{10} petrol (gasoline)
petrol for vehicles
120°C
C_{10} to C_{16} kerosine (paraffin oil)
jet fuel, paraffin for lighting and heating
170°C
C_{14} to C_{20} diesel oils
diesel fuels
270°C
crude oil
C_{20} to C_{50} lubricating oil
lubricating oils, waxes, polishes
C_{20} to C_{70} fuel oil
fuels for ships, factories and central heating
600°C
fractions increasing in density and boiling point
>C_{70} residue
bitumen for roads and roofing

Oil quality

Refineries

- Calibrated to process a particular type of oil (sweet/sour, light/heavy)
- Processing different oil possible but at reduced efficiency => noncompetitiveness
- Re-calibration possible but at significant costs

Transportation costs



Transportation costs

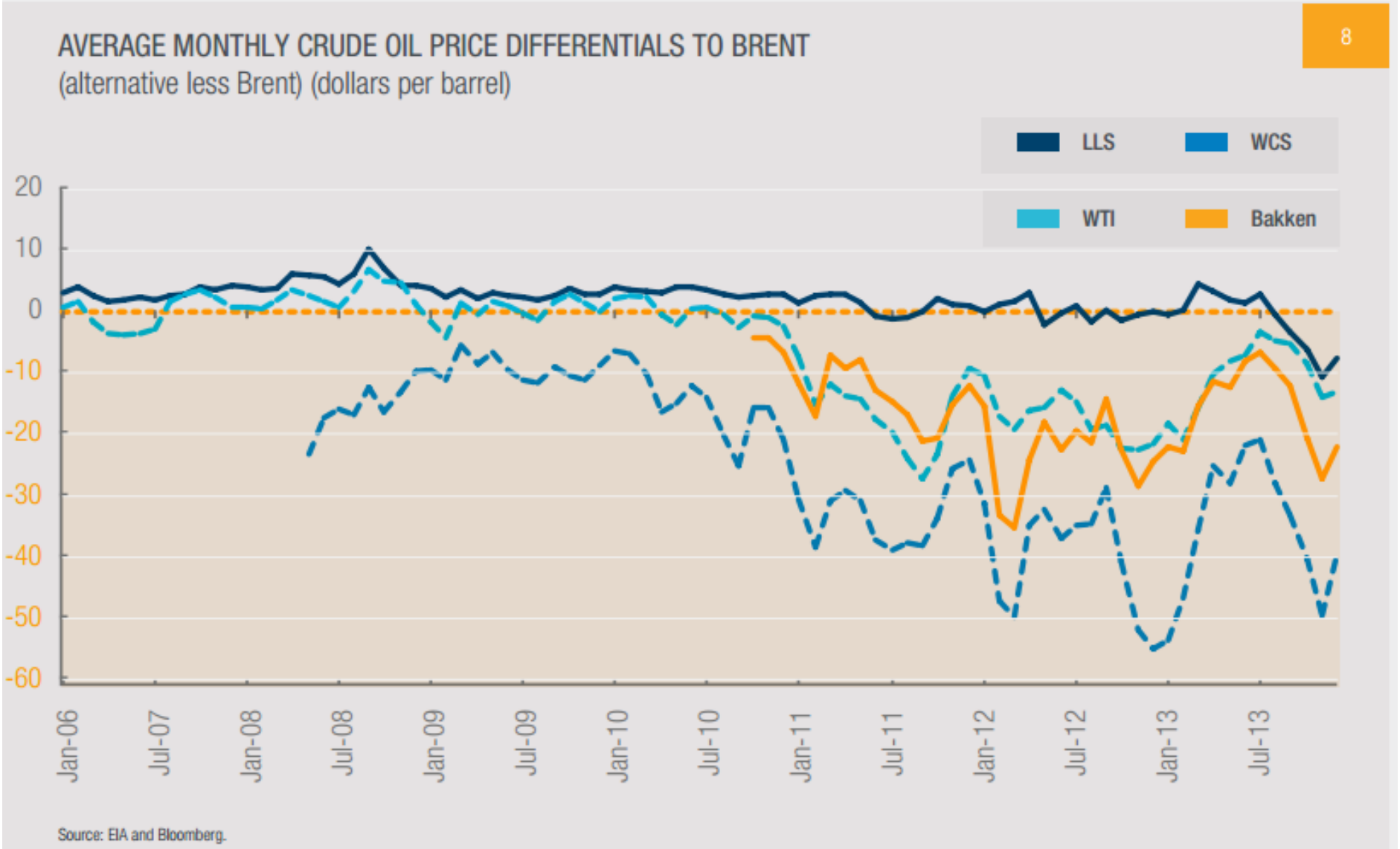
- Onshore-produced and otherwise poorly accessible crudes tend to be cheaper than offshore and easy accessible onshore crudes

Transportation costs

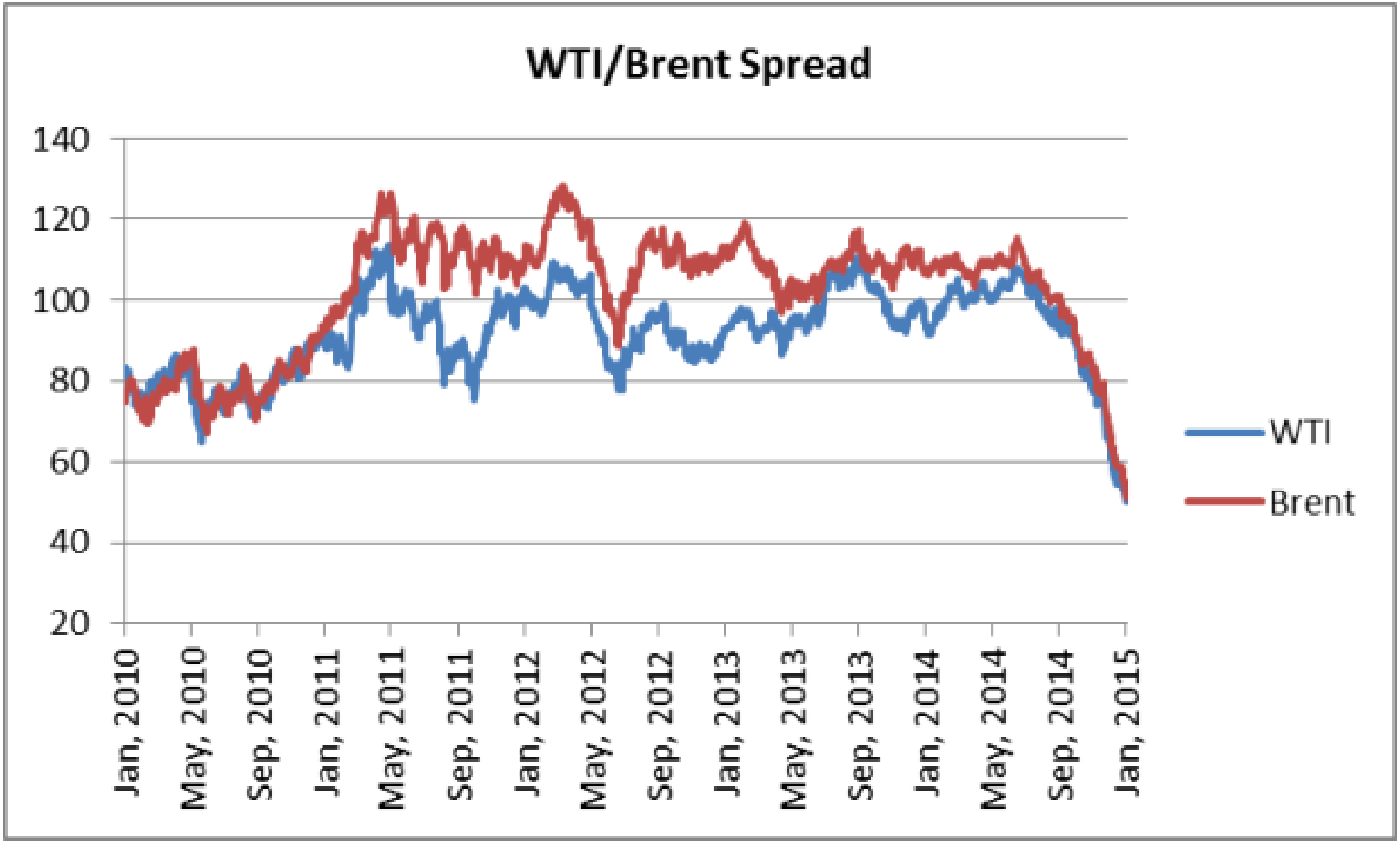
Onshore-produced and otherwise poorly accessible crudes tend to be cheaper than offshore and easily accessible onshore crudes

- To compensate for additional costs of transportation
- Transportation bottleneck foster „micro“ oil-to-oil competition

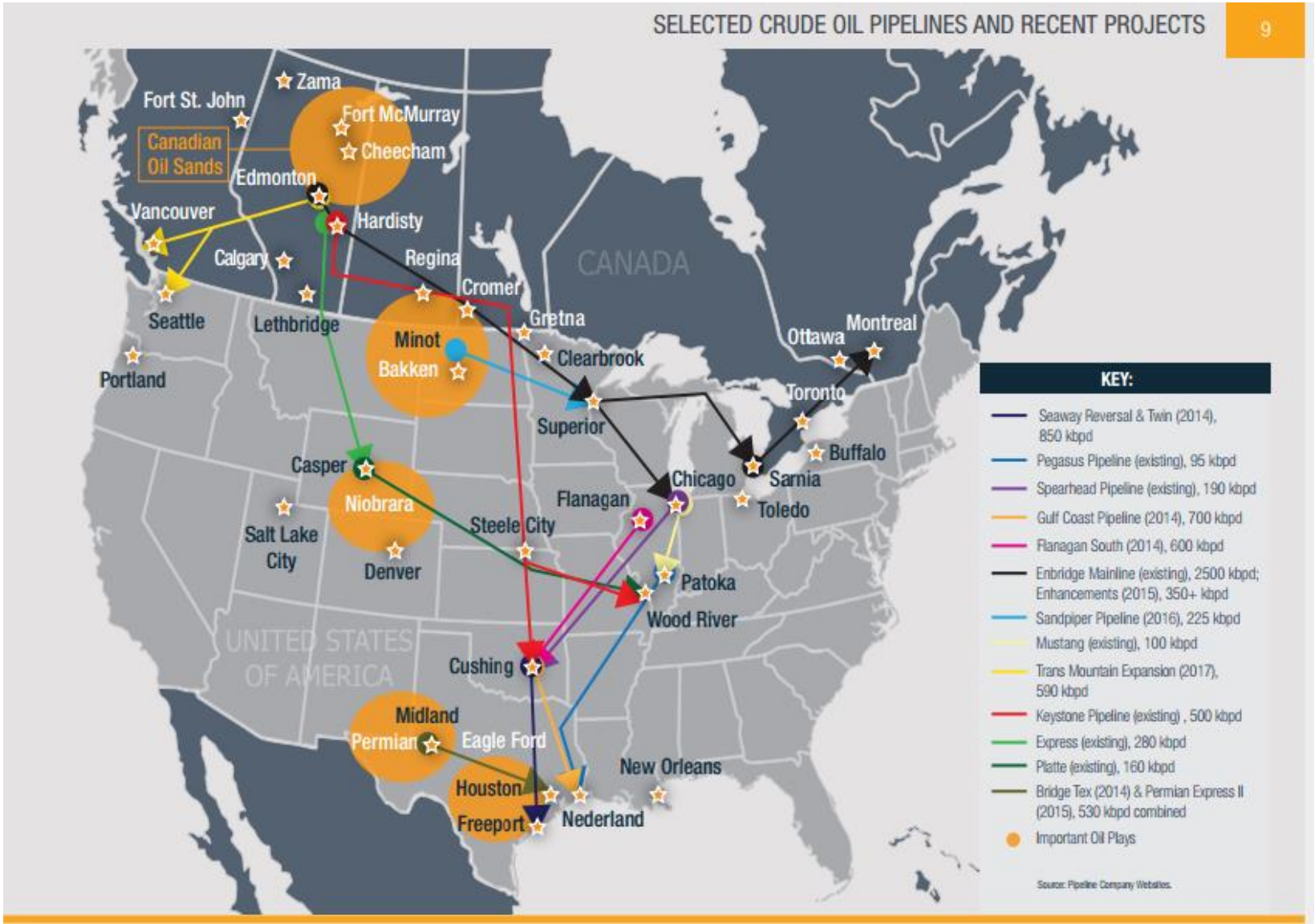
Regional supply/demand



Regional supply/demand



Regional supply/demand



How a specific crude becomes benchmark?

- Stable and ample production.
- Transparent, liquid market located in a geopolitically and financially stable region to encourage price discovery.
- Adequate storage to encourage market development.
- Delivery points at locations that allow arbitrage opportunities in world markets so that prices reflect global supply and demand.

An oil bathtub?

- Individual crudes are interchangeable only at significant costs/loss of competitiveness
- Individual crudes are feedstock for production of the same products
- World oil market = set of very closely correlated benchmark/regional markets

Market structure

Market characteristics: elasticity

Limited elasticity of both supply and demand

- Supply (non-OPEC)
  - Production requires huge up front investment
  - Variable costs are a small component of total costs
  - As long as variable costs are paid, producers are best off maximizing production
- Supply (OPEC)
  - Quotas
- Demand
  - Oil satisfies essential needs
  - Higher per capita income
  - Concentration in transportation
  - Taxes isolate consumers from the impact of price changes.

  => Demand is influenced primarily by macro trends (income effect) and the weather.

Marginal production cost by country

(USD/bbl)

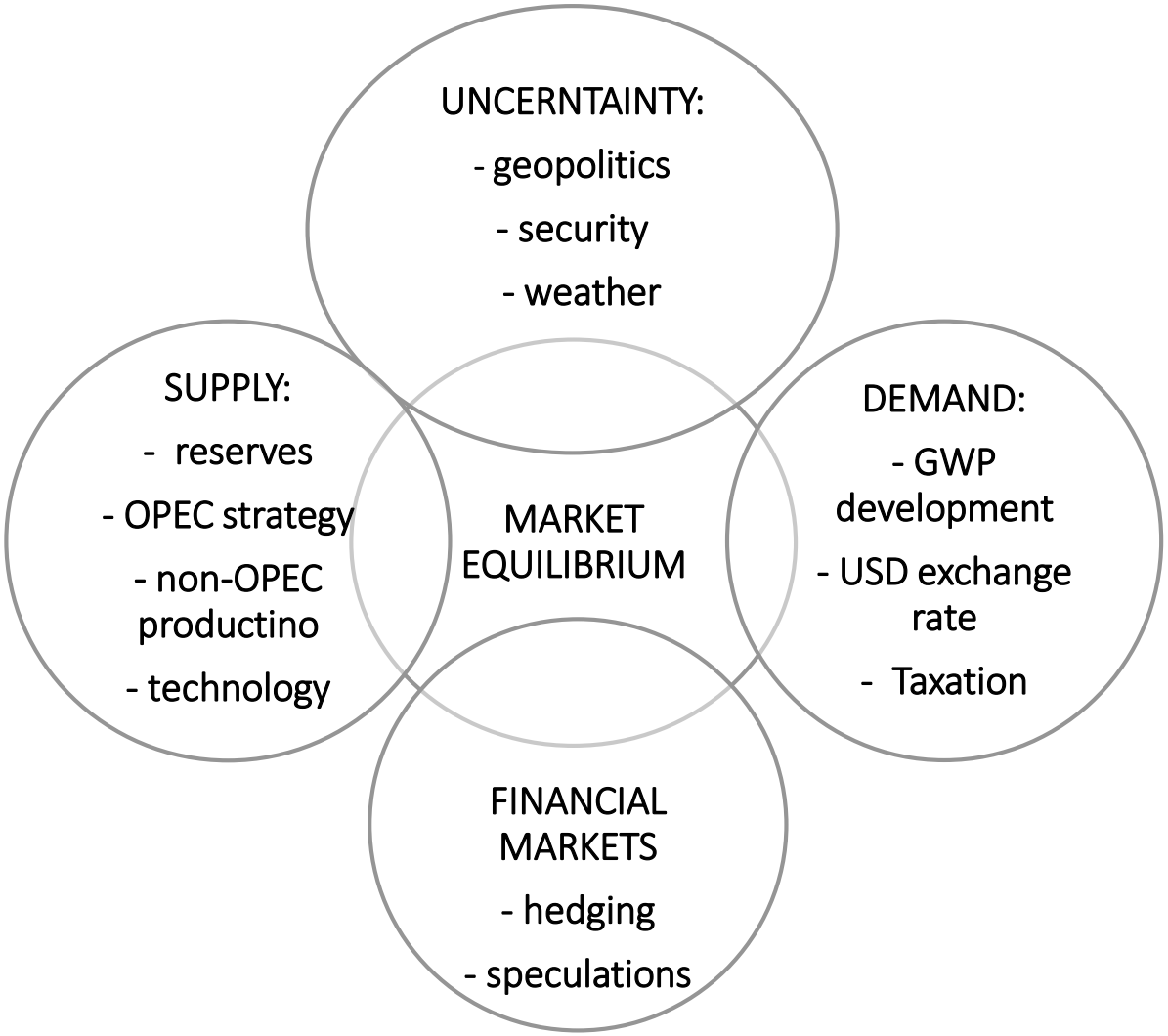
		Marginal Production Cost
		2014
Russia	Arctic	120.00
	Onshore	18.00
Europe	Biodiesel	110.00
	Ethanol	103.00
Canada	Sand	90.00
Brazil	Ethanol	66.00
	Offshore	80.00
United States	Deep-water	57.00
	Shale	73.00
Angola	Offshore	40.00
Ecuador	Total	20.00
Venezuela	Total	20.00
Kazakhstan	Total	16.00
Nigeria	Deep-water	30.00
	Onshore	15.00
Oman	Total	15.00
Qatar	Total	15.00
Iran	Total	15.00
Algeria	Total	15.00

Source: Oil Statistics (Production Costs, Breakeven Price)

Long term: boom and bust

- Demand and (less so) supply are price elastic.
- Consumers will make the investment required to reduce fuel consumption or switch to a different fuel.
- On the supply side, companies' cash flow improves, investment increases, new fields are developed.
- However, higher prices may also encourage resource nationalism and slow down investment/production

Market structure: the big picture



Actors

- International oil companies(IOCs).
- National oil companies (NOCs).
- International energy organizations: OPEC, IEA (IOs).
- Investors, traders.

Rank	*Company*	*Country*	*State ownership (%)*	*Production (thousand barrels/day)*	*Proved reserves (million barrels)*
1	**Saudi Aramco**	**Saudi Arabia**	100	10,413	264,200
2	**NIOC**	**Iran**	100	4,401	138,400
3	Pemex	Mexico	100	3,474	12,187
4	CNPC	China	100	2,764	22,447
5	Exxon Mobil	US		2,616	11,074
6	**KPC**	**Kuwait**	100	2,600	101,500
7	**PDV**	**Venezuela**	100	2,570	99,377
8	BP	UK		2,414	10,073
9	**INOC**	**Iraq**	100	2,145	115,000
10	Rosneft	Russia	75.16	2,027	17,513
11	Petrobras	Brazil	32.2	1,918	9,581
12	Shell	UK/Netherlands		1,899	4,887
13	**Sonatrach**	**Algeria**	100	1,860	11,400
14	Chevron	US		1,783	7,523
15	ConocoPhillips	US		1,644	6,541
16	**Adnoc**	**UAE**	100	1,574	52,800
17	Lukoil	Russia		1,552	12,572
18	Total	France		1,509	5,778
19	**NNPC**	**Nigeria**	100	1,414	21,700
20	**Libya NOC**	**Libya**	100	1,368	30,700

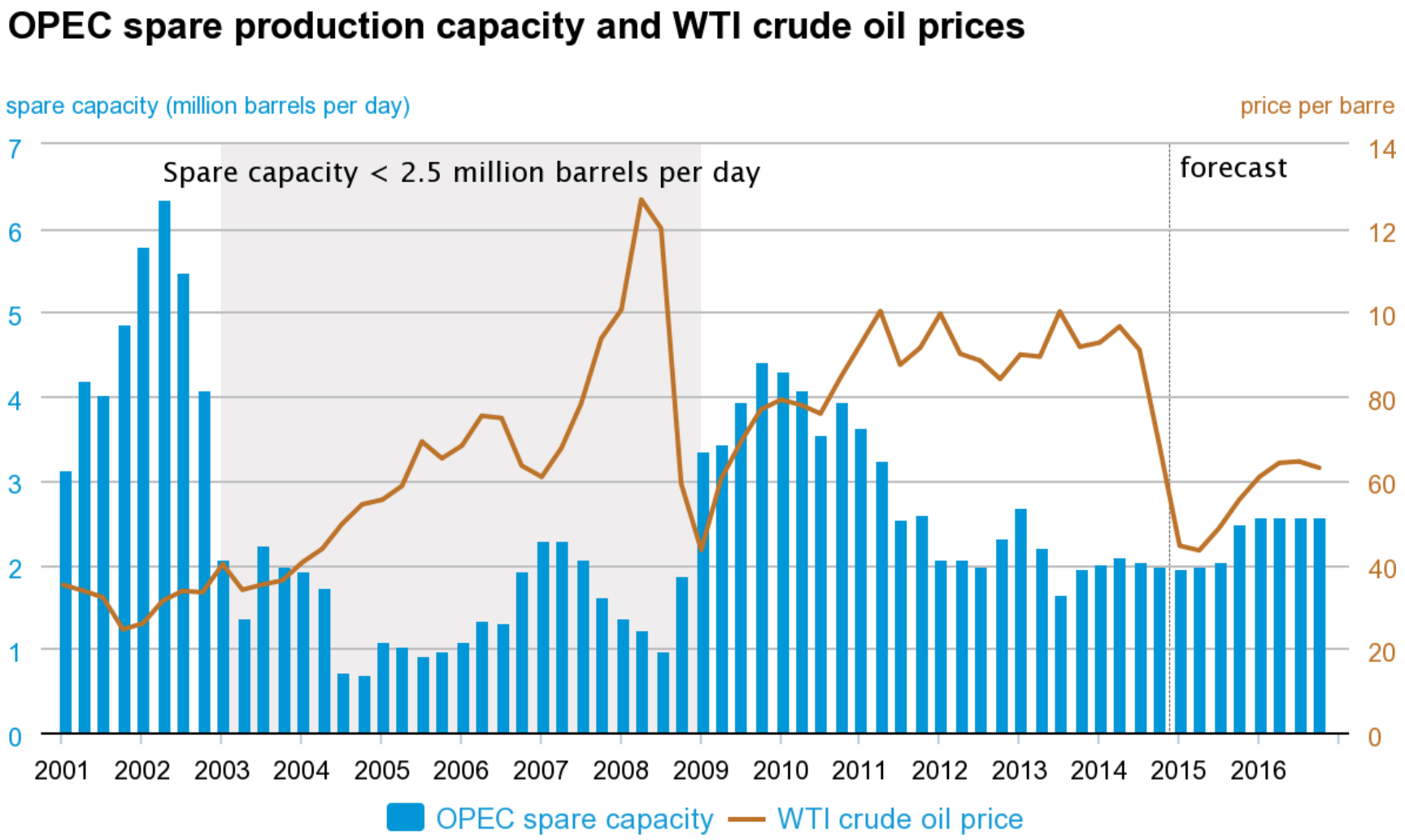
Source: Petroleum Intelligence Weekly, December 4, 2008.

OPEC

Founded in 1960 in Baghdad, founding members Venezuela, Saudi Arabia, Iraq, Iran, Kuwait.

Holds 80% of proven reservers, 44% production, and practically all spare production capacity.

Spare capacity



Source: U.S. Energy Information Administration, Thomson Reuters.
Updated: Monthly | Last Updated: 03/10/2015

OPEC

Regulates the supply via two means:

- Production quotas.
- Investments into new production capacities.

How a cartel works? A coordination game

Imagine following situation:

- Overall demand for oil is 6-14 barrels per day
- The price varies according to scarcity of oil:
  - At 6 bpd the price is high (20 USD/b)
  - At 14 bpd the price is low (4 USD/b)
- There are (only) two producers (P1 and P2)
  - Similar production and delivery costs
  - Wishing to maximize profits

    => adjusting production according to the price

How a cartel works? A coordination game

Barrels	USD/b	P1‘s income	P2‘s income	Total income
6	20	3*20=60	3*20=60	120
7	18	4*18=72	3*18=54	126
8	16	4*16=64	4*16=64	128
9	14	5*14=70	4*14=56	126
10	12	5*12=60	5*12=60	120
11	10	6*10=60	5*10=50	110
12	8	6*8=48	6*8=48	96
13	6	7*6=42	6*6=36	78
14	4	7*4=28	7*4=28	56

How a cartel works? A coordination game

Barrels	USD/b	P1‘s income	P2‘s income	Total income
6	20	3*20=60	3*20=60	120
7	18	4*18=72	3*18=54	126
8	**16**	**4*16=64**	**4*16=64**	**128 (cartel equilibrium)**
9	14	5*14=70	4*14=56	126
10	**12**	**5*12=60**	**5*12=60**	**120 (Nash equilibrium)**
11	10	6*10=60	5*10=50	110
12	8	6*8=48	6*8=48	96
13	6	7*6=42	6*6=36	78
14	4	7*4=28	7*4=28	56

The freeriding issue: prisoners‘ dilema

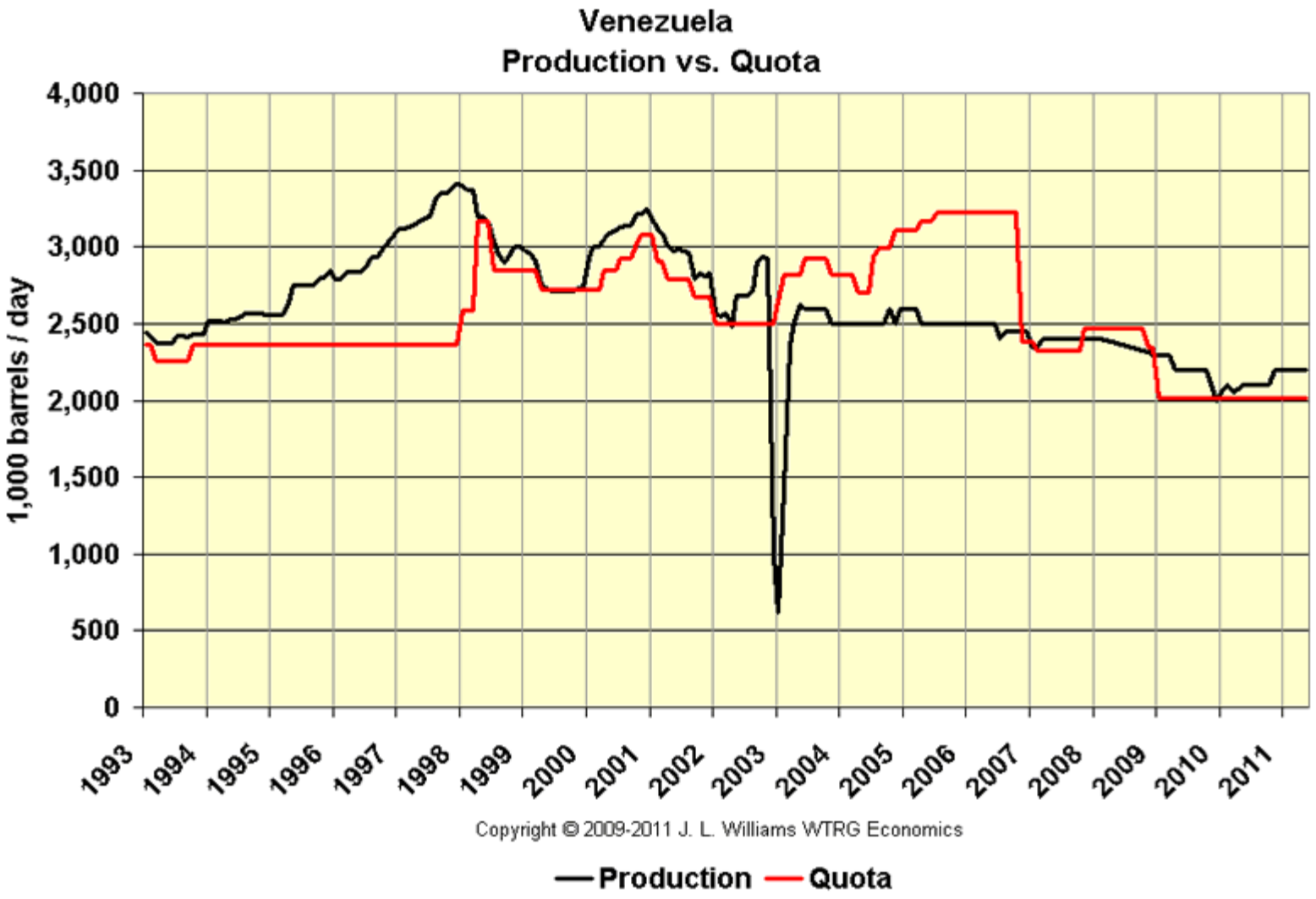
*"Mr. President, we are rapidly approaching a moment of truth both for ourselves as human beings and for the life of our nation. Now, truth is not always a pleasant thing. But it is necessary now to make a choice, to choose between two admittedly regrettable, but nevertheless *distinguishable*, postwar environments: one where you got twenty million people killed, and the other where you got a hundred and fifty million people killed.“*

General Buck Turgidson, (Dr. Strangelove)
http://www.youtube.com/watch?v=HgyjlqhiTV8

The freeriding issue: prisoners‘ dilema

		P2	
		Does not increase	Increases
P1	Does not increase	64/64	56/70
	Increases	70/56	60/60

Freeriding: the case of Venezuela



Buying oil

- Physical oil
- Financial derivatives (futures, options, ...)
  - Speculation
  - Hedging

What is the ratio between daily traded physical and financial (paper) barrels?

Physical deliveries

Over-the-counter (bilateral agreements)

- Term contracts of mostly one year
- Price set according to spot
- 90-95% physically traded volume

Spot market (hub trading, exchange trading)

- Balancing needs (surplus or missing barrels)
- Sets the price („marginal barrels“)
- 5-10% of volume

Financial deliveries

- Futures
- Options
- Swaps
- Forwards

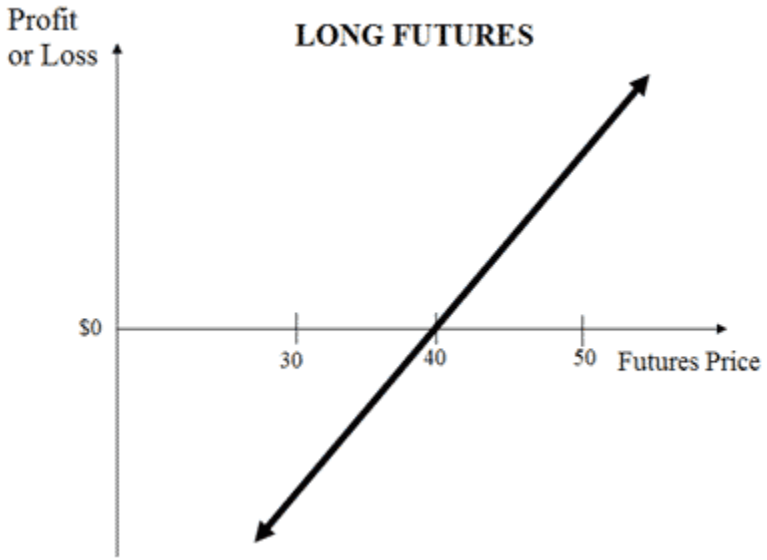
Futures

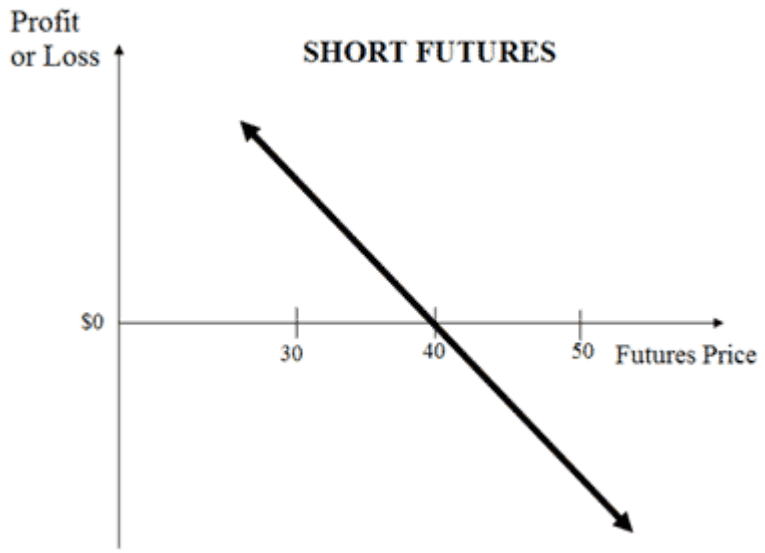
Futures

A financial contract obligating the buyer to purchase an asset (or the seller to sell an asset), such as a physical commodity or a financial instrument, at a predetermined future date and price.

- Underlying asset (oil)
- Type: long (buying) x short (selling)
- Date of settlement

Long and short position





Long futures: buying futures with expectation of price increase
Short futures: selling futures with expectation of price decline

Speculation with futures

Example

- Time T0 (now), oil price P0 = $50
  - 1,000 barrels financial futures bought at $60 with settlement next June (T1)
- Time T1 (next June), oil price P1 = $55
  - Bought for $60 what is being now traded at $55 => lost $5 per barrel => lost 5,000 USD
- Time T1 (next June), oil price P1 = $65
  - Bought for $60 what is being now traded at $65 => gained $5 per barrel => gained 5,000 USD

Hedging with futures

Imagine a following oil buyer:

- Has invested in business whose profitability depends on price of oil (i.e. an airline)
- Needs a stable oil price to plan the development of the business.
- => Wishes to hedge against price fluctations, i.e. wishes the current (time T0) prices (P0) to last.

- Will need 1,000 barrels of oil about this time next year (time T1, oil price P1)

Hedging with futures

Today (time T0, price P0 = 50 USD/b):

- The buyer enters a contract in which agrees to buy 1,000 **physical** barrels at $50 (P0) with delivery in time T1.

- At the same time sells 1,000 **financial** barrels at $50 (P0) with delivery in time T1

- In time T1, therefore, the buyer:
  - Will pay for the physical delivery amount equal to 1,000 x P0.
  - Will get paid for financial delivery amount equal to 1,000 x P1.

Hedging with futures

About this time next year (T1): The price went up to P1 = 70 USD/b

Settles the physical contract:

- Bought $70 worth barrels for $50 ... Balance: +20 x 1,000 = +20,000 USD

Settles the financial contract:

- Sold $70 worth barrels for $50 ... Balance: -20 x 1,000 = -20,000 USD

Total balance: 0 USD

=> The buyer got 1,000 barrels at $50 as desired.

Hedging with futures

About this time next year (T1): The price went down to P1 = 30 USD/b

Settles the physical contract:

- Bought $30 worth barrels for $50 ... Balance: -20 x 1,000 = -20,000 USD

Settles the financial contract:

- Sold $30 worth barrels for $50 ... Balance: +20 x 1,000 = +20,000 USD

Total balance: 0 USD

=> The buyer got 1,000 barrels at $50 as desired.

Hedging with futures

If buyer was a seller:

T0: P0 = 50 USD/b
Agrees to deliver 1,000 physical barrels at 50 USD/b in T1
At 50 USD/b buys 1,000 financial barrels to receive what they are worth in T1 (P1)

T1: P1 = 70 USD/b
- Physical: Delivered $70 worth barrels at $50 ... Balance -20,000 USD
- Financial: Received $70 for what was bought for $50 ... Balance +20,000 USD

T1: P1 = 30 USD/b
- Physical: Delivered $30 worth barrels at $50 ... Balance +20,000 USD
- Financial: Received $30 for what was bought for $50 ... Balance -20,000 USD

Total balance: 0 USD

=> The seller sold 1,000 barrels at $50 as desired.

Options

Options

A financial derivative that represents a contract sold by one party (option writer) to another party (option holder). The contract offers the buyer the right, but not the obligation, to buy (call) or sell (put) a security or other financial asset at an agreed-upon price (the strike price) during a certain period of time or on a specific date (exercise date).

Option types

	Call option	Put option
Buyers	Right to buy stock if exercised	Right to sell stock if exercised
Sellers	Obligation to sell stock if assigned	Obligation to buy stock if assigned

- Underlying asset: oil
- Type: call (right to buy) x put (right to sell)
- Price: price of contract
- Strike price: oil price at which the right can be exercised
- Exercise date: when the contract expires

Hedging with options

	Call option	Put option
Buyers	Right to buy stock if exercised	Right to sell stock if exercised
Sellers	Obligation to sell stock if assigned	Obligation to buy stock if assigned

Example: oil purchasing hedging (oil purchaser = option buyer)

T0: oil price P0 = $50

- Buyer: bought call option for 1,000 barrels at $60 from Seller for 3 USD/b due to T1

T1: oil price P1 = $70

- Buyer: exercises his right and gets $70 worth barrels for $60 ... Balance: + 10,000 – 3,000 = + 7,000 USD
- Seller: sells $70 worth barrels for $60

  ... Balance: - 10,000 + 3,000 = - 7,000 USD

=> Hedging successful, major loss due to price spike prevented

	Call option	Put option
Buyers	Right to buy stock if exercised	Right to sell stock if exercised
Sellers	Obligation to sell stock if assigned	Obligation to buy stock if assigned

Example: oil purchasing hedging (oil purchaser = option buyer)

T0: oil price P0 = $50

- Buyer: bought call option for 1,000 barrels at strike price of $60 from Seller for 3 USD/b due to T1

T1: oil price P1 = $58

- Buyer: does not exercise his right (would get $58 worth barrels for $60) ... Balance: - 3,000 USD
- Seller: gains $3 per each barrel for selling unexercised option at $3 ... Balance: + 3,000 USD

=> Hedging successful, major loss due to price spike prevented

	Call option	Put option
Buyers	Right to buy stock if exercised	Right to sell stock if exercised
Sellers	Obligation to sell stock if assigned	Obligation to buy stock if assigned

Example: oil selling hedging (oil seller = option buyer)

T0: oil price P0 = $50

- Buyer: bought put option for 1,000 barrels at strike price of $40 from Seller for 3 USD/b due to T1

T1: oil price P1 = $30

- Buyer: exercises his right and sells $30 for $40
  ... Balance: + 10,000 – 3,000 = + 7,000 USD
- Seller: buys $30 worth barrels for $40
  ... Balance: - 10,000 + 3,000 = - 7,000 USD

=> Hedging successful, major loss due to price decline prevented

	Call option	Put option
Buyers	Right to buy stock if exercised	Right to sell stock if exercised
Sellers	Obligation to sell stock if assigned	Obligation to buy stock if assigned

Example: oil selling hedging (oil seller = option buyer)

T0: oil price P0 = $50

- Buyer: bought put option for 1,000 barrels at strike price of $40 from Seller for 3 USD/b due to T1

T1: oil price P1 = $45

- Buyer: does not exercise his right (would sell $45 worth barrels for $40) ... Balance: - 3,000 USD
- Seller: gains $3 per each barrel for selling unexercised option at $3 ... Balance: + 3,000 USD

=> Hedging successful, major loss due to price spike prevented

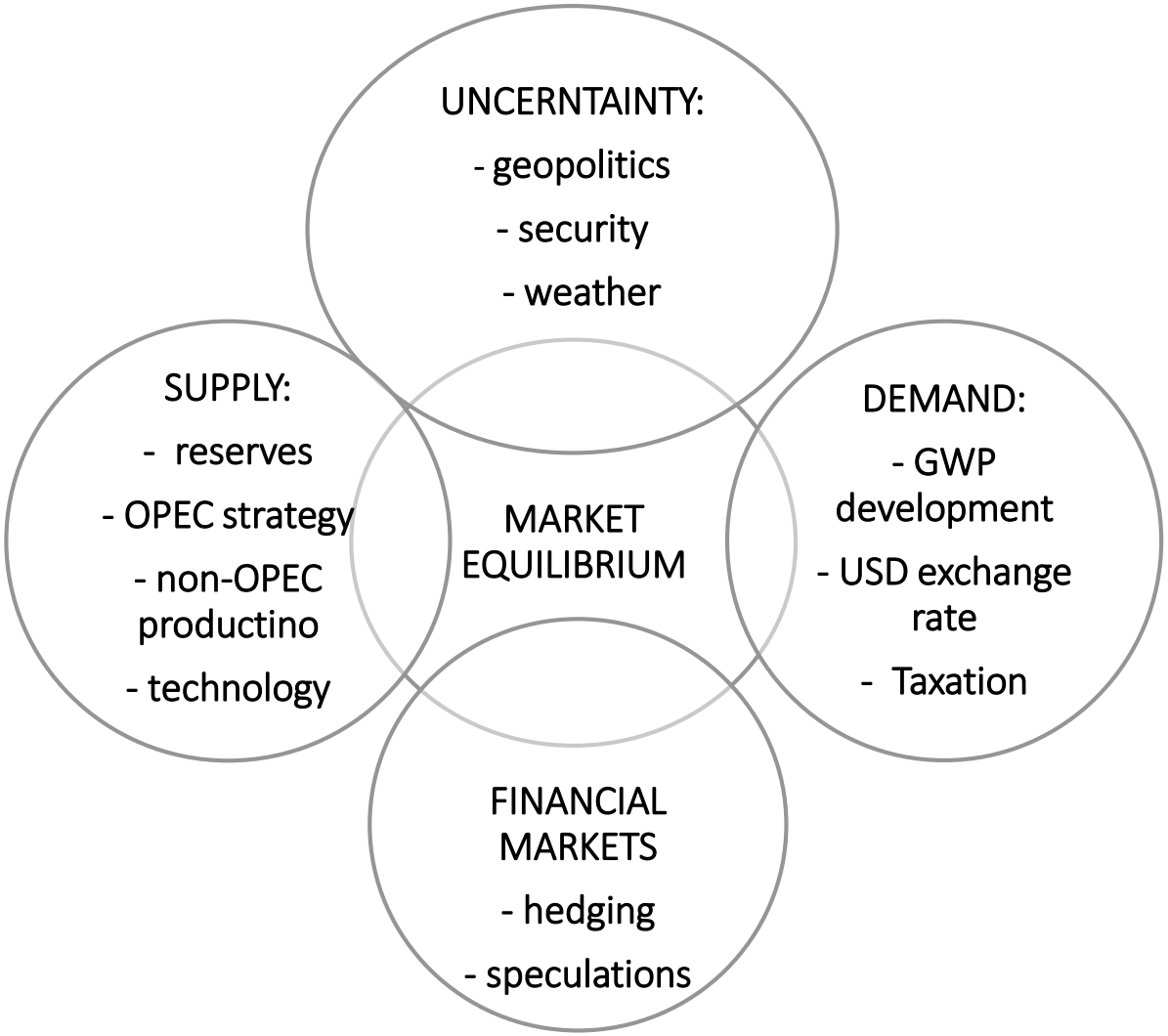
What is the ratio between daily traded physical and financial (paper) barrels?

Physical to financial trading

- Physical barrels: approx. 92 mbd (2014, EIA)
- Financial barrels: more than 1,000 mbd
  (2009, Congressional testimony by the commodities specialist Michael W. Masters)

=> At least 1:10

Market structure: the big picture



The development of the World oil market

1910s - 1960s

- Establishment and dominance of vertically integrated IOCs – „Seven sisters“ (1949: 88% of world oil trade)
- High barriers to entry (essentially building a whole new company)
- Support from Western governments

1960s

- New wave of globalization
- Economic prosperity
- Independence movements in colonies
- Nationalization of resources:
  Russia (1918), Bolivia (1937), Mexico (1938), Argentina (1958), Indonesia (1963), Algeria (1971), Libya (1971), Iraq (1972), Saudi Arabia (1972), Kuwait (1972), Abu Dhabi, (1972), Iran (1973), and Venezuela (1976).

=> Demand growth (115% between 1960 and 1970)

=> Emergence of an independent supply (up to 300 private and 50 state-owned companies)

1970s

- Independents leave trading oil through 7S and search for their own low-cost reservers, offering better terms to local governments.
- 7S react by building non-OPEC reserves: North Sea oil discovered 1968 (on stream 1975), Alaska 1969 (1977).
- Less fortunate of the 7S start selling their down stream units (expectations of decreased supply)

=> Origins of non-OPEC supply.

1970s oil shocks

Shocks facilitated the rise of independents

Before 70s:

- Buyers‘ market, where the IOCs, as the primary buyers of crude, had the power to set prices they were willing to offer sellers (oil producing nations).
- Long term contracts (2 years)

After 70s:

- NOCs become more and more important (IOCs share 73-83: 90 => 50%)
- Increased complexity (independent actors in upstream, downstream and midstream).
- Price spikes motivate emerging traders (midstream)
- Basis of spot trading laid (independets + 7S compensating for upstream outages incurring due to nationalization)
- Oil futures traded since 1983.

1980s

- Oil stocks at records high
- Conservation policies of developer states
- Inability of OPEC to limit production (cuts 20-65%)
- Freeriding incentive (increasing production above quotas)
- 1985: SA announces it would no longer play the role of a swing producer
- Abandonment of production and pricing agreements, increase in OPEC production by 25%
- Oil price down below 10 USD/b (in real terms lower than before 1973)
- OPEC unable to recover quotas until 1998.

1990s

- 1991: Gulf crisis (dispute over production levels mostly between Iraq and Kuwait).
- Democratization, globalization
- 1998-2002 consolidation of supermajors

2000s+

macrotrends.net

2014 price decline

<= Supply/demand expectations

<= Receding geopolitical concerns

<= US dollar appreciation

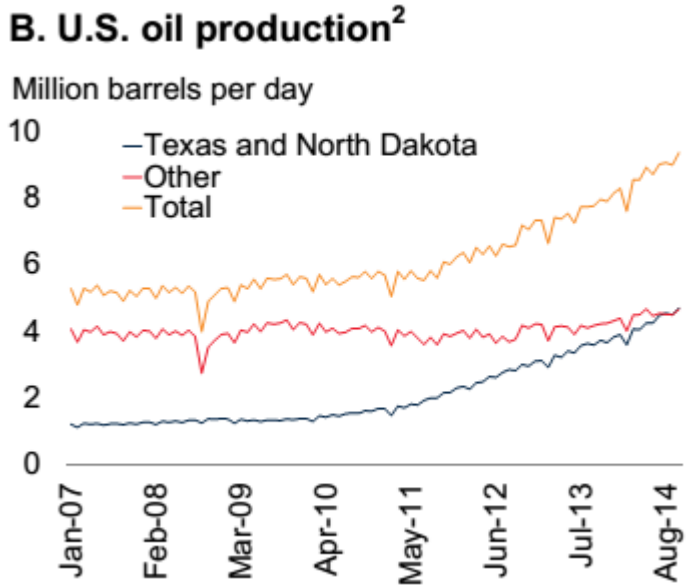
<= Change in OPEC strategy

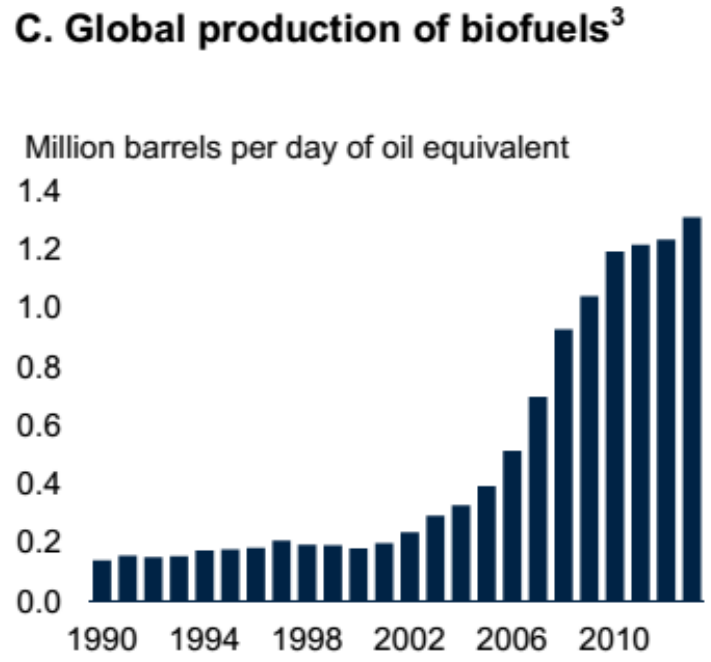
The 2014 price decline

Supply/demand

+ US shale oil
+ Biofuels

- Sluggish economic growth
- Demand corrections (between 7-12/14 alone the demand forecast for 2015 has revised downwards by 0.8 mbd)
- Oil intensity of global GDP almost halved since 1970s.





Geopolitics

- Production recovery by 0.5 mbd in Libya
- Iraq maintains output as ISIS expansion stalls
- Russian production unaffected by sanctions

US dollar

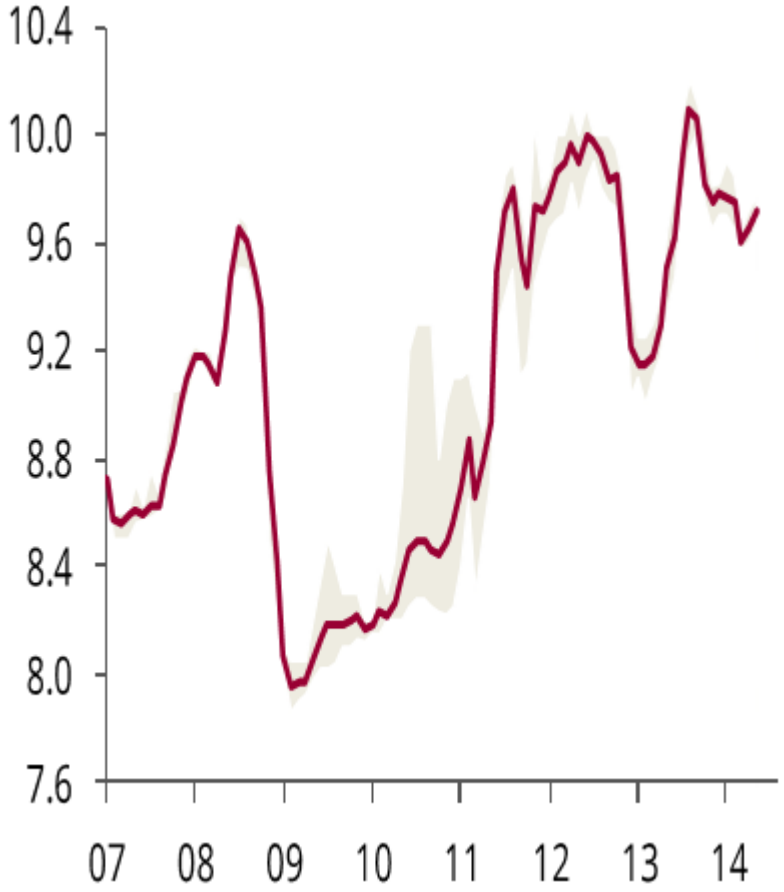
- Long term: negative correlation (terms of trade).
  - Consumers (weak dollar → greater purchasing power → greater consumption → oil price increase).
  - Producers (weak dollar → lower purchasing power → lower production → oil price increase).
- Long term: positive correlation (interest rates).
  - Consumers (high oil prices → inflation/balance of payment issues → increased interest rates/intervention → strong dollar).
  - Producers (high oil prices→ accumulation of petrodollars → strong dollar).

OPEC

- November 2014: OPEC fails to agree on production cuts.
- Revenue targeting displaced by maintaining market share.
- What was the motivation of Saudi Arabia, the cartel‘s swing producer?

Saudi reaction

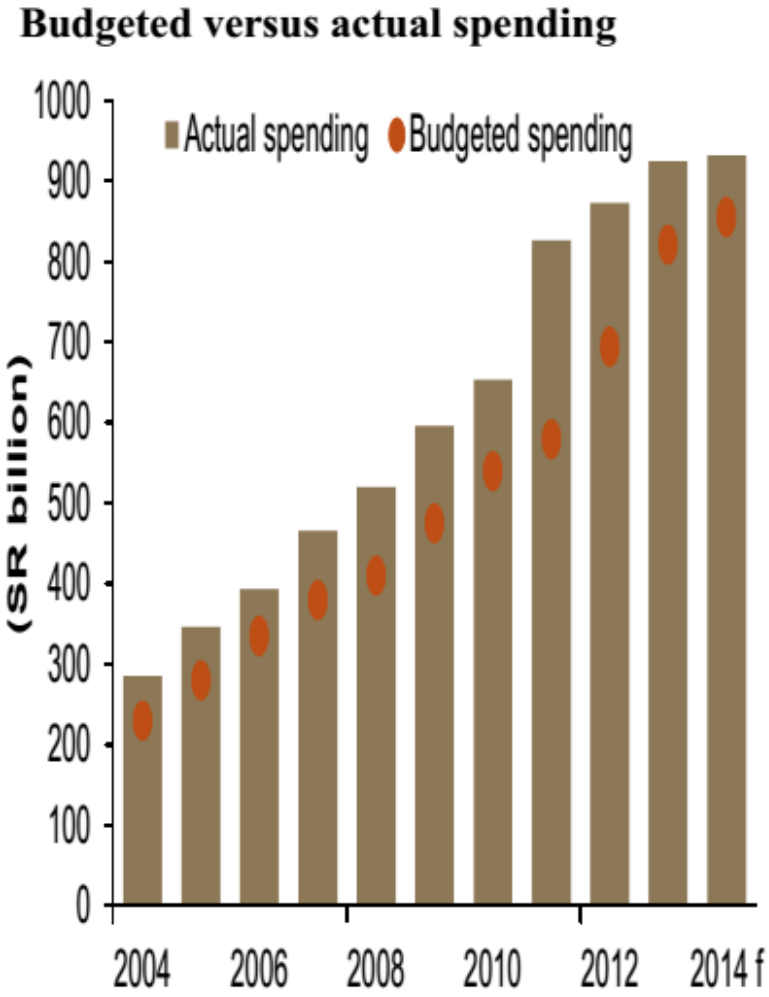
Why Saudi Arabia has not reacted to the sharp fall in oil price in the expected manner?



Does SA desire a lower price?

- Budget spending suggests otherwise
- Oil minister Ali Naimi:

  '*One-hundred dollars is a fair price for everybody - consumers, producers, oil companies… it is a fair price. It is a good price*' (Reuters, May 12, 2014).



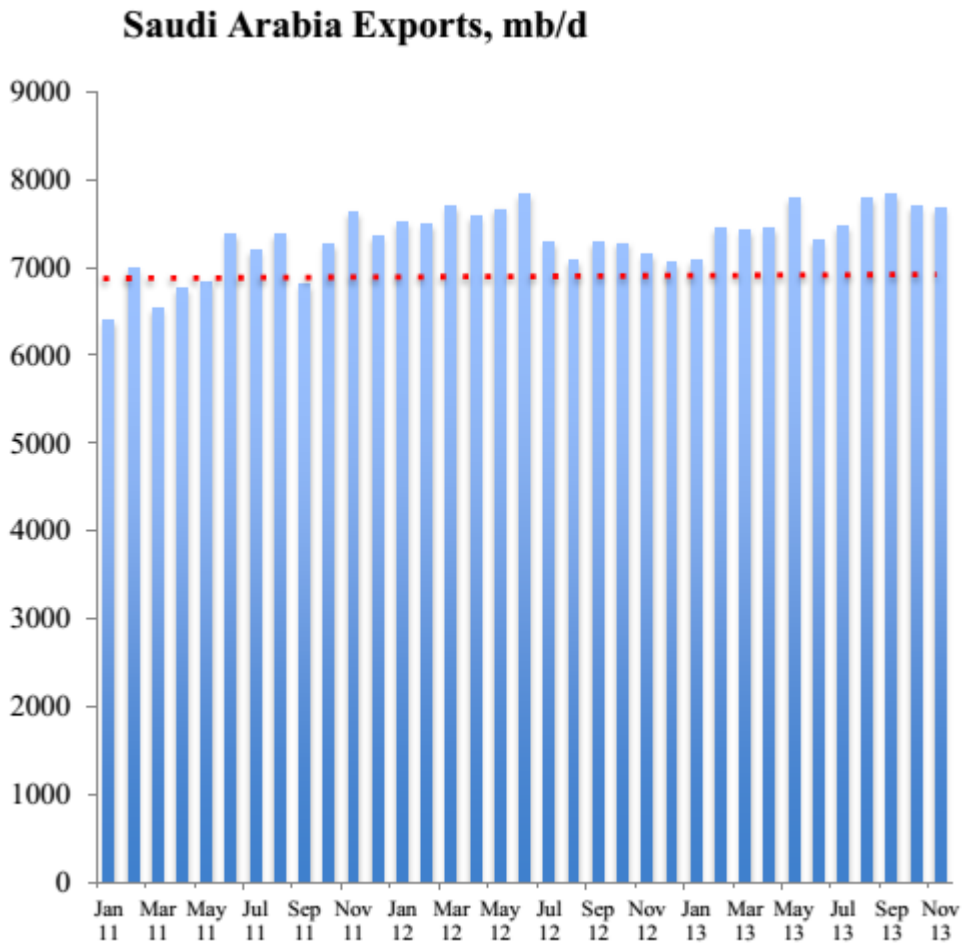
SA able to cope with lower prices

- Large government assests
- Small debt relative to GDP
- Access to cheap loans
- Ability to adjust expenditures

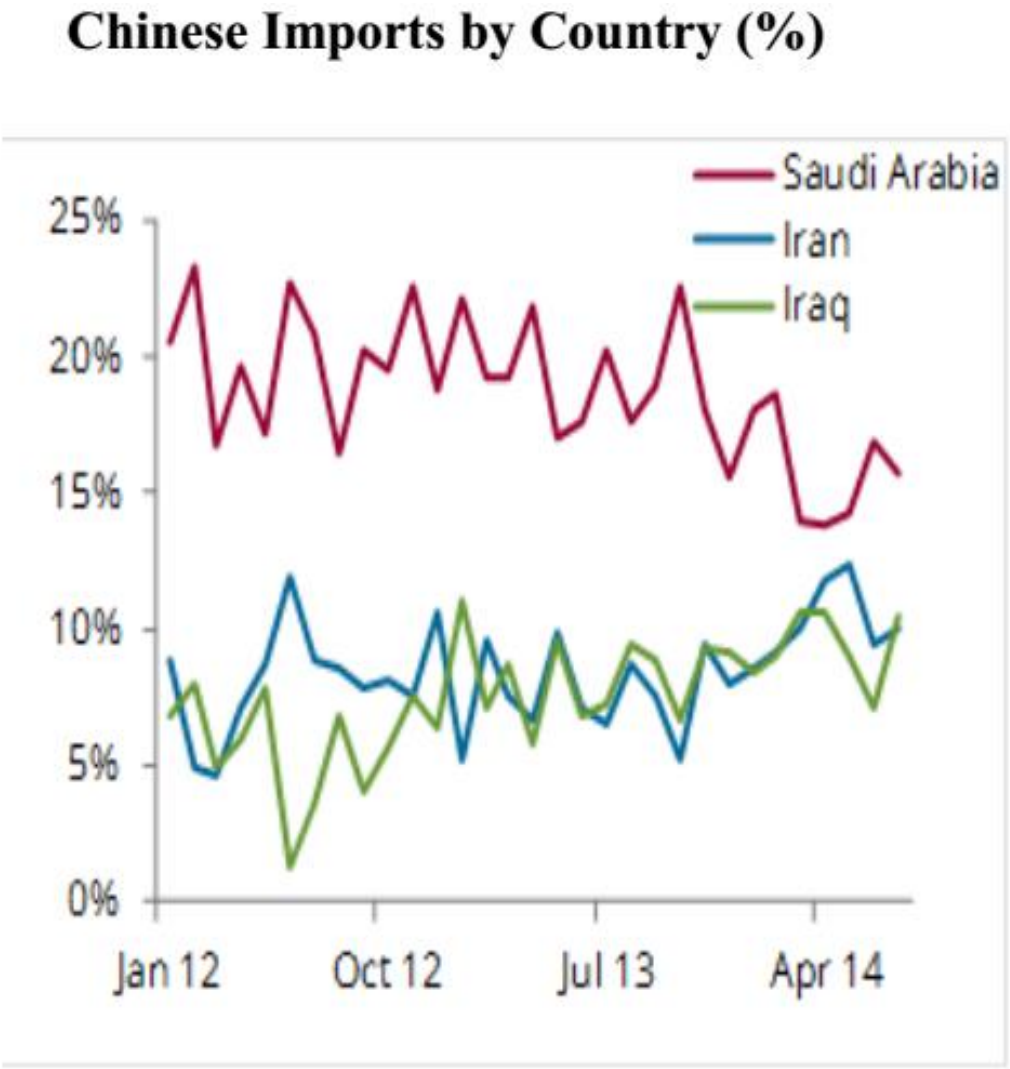
Government assets		
	Billion USD	% GDP
Nigeria	4.1	2.4
Russia	173.0	8.5
Saudi Arabia	446.9	58.1

Maintaining market share

- Stability of exports at around 7 mb/d
- Presence in key markets
- Building position for OPEC negotiation

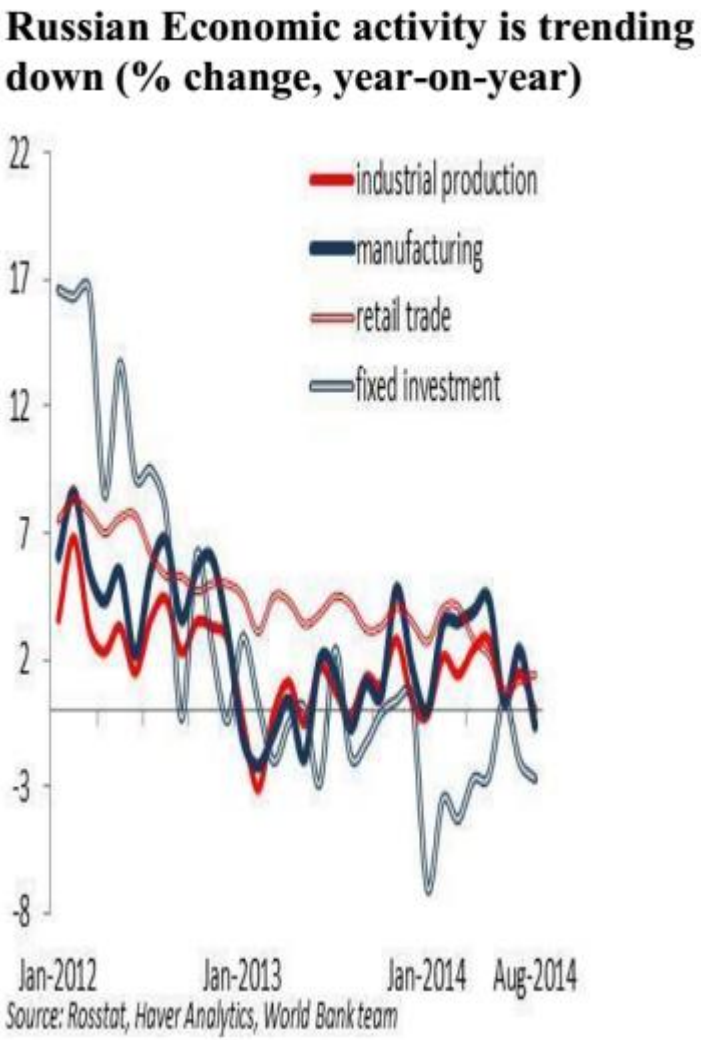


Competition in Asia?



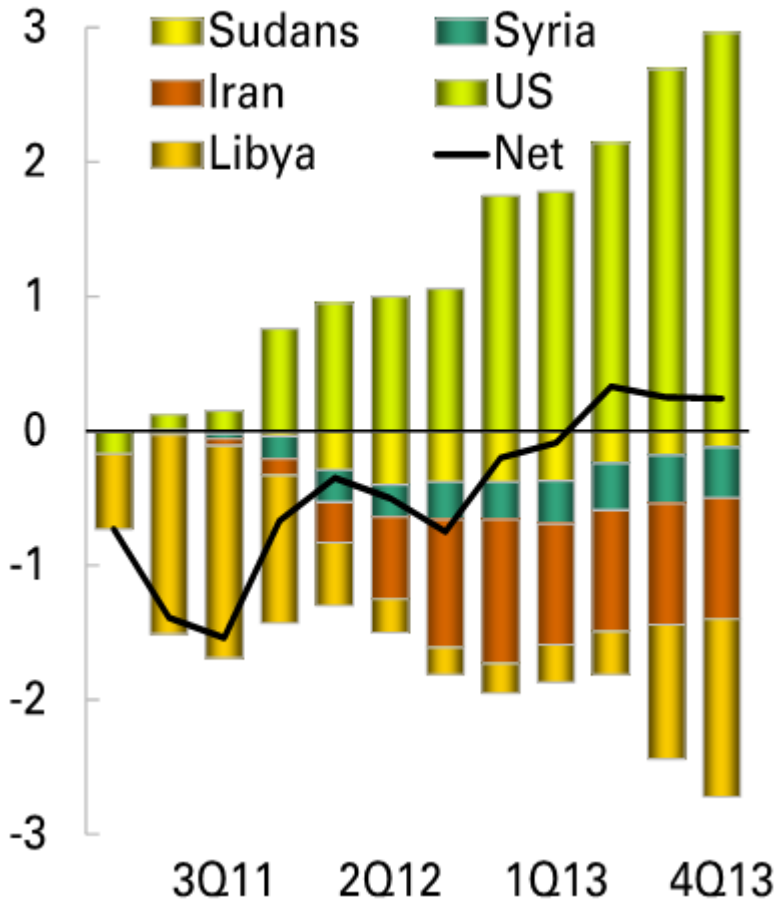
Political goals

Russia and Iran among main losers of low prices.



Reduce US production?

- In the past, SA has not reacted on any new high-cost producer.
- US supply helps balancing outages and provides price response feedback on the upside



Reduce US production?

- Would low prices work in breakeven price – diverse environment?
- How fast would the US producers react?

North Dakota Break-Even Oil Prices		
	Price ($/bbl)	**Rigs**
McKenzie	$28	66
Dunn	$29	28
Stark	$36	2
Williams	$37	43
Mountrail	$42	31
Bottineau-Renville	$51	4
Billings	$53	4
McClean	$73	1
Bowman-Slope	$75	0
Golden Valley	$77	0
Burke	$81	3
Divide	$85	8
Average/Total	**$56**	**190**

Source: North Dakota Department of Mineral Resources

Enforcing discipline in OPEC?

- Lowering price to bring production closer to quotas.
- Unilateral supply cuts unlikely: '*We (Saudis) have learned our lesson. Every time we go to quotas, who bears the brunt? Us. We are no longer the swing producer. Who needs quotas?*'

(MEES, Dec 6, 2013)

SA position: policy or pasivity?

- Could SA expect such price slide?
- Unilateral supply cuts are not adopted overnight.
- Lack of information on future demand => „wait and see“ strategy?
- Expectations that demand will pick up in Q4?

Consequences

Passivity or change in policy, either way:

=> Absence of feedback mechanism

=> Price left to market signals (marginal costs)

=> Deeper and more frequent price swings