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ICE (LS) Gasoil Markets Forum

Oil futures forward curves:

economics explained

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- **PJK International:**

‘Market research company specialized in NWE oil markets’

- **ARA / Rhine barge freight rates**
- **ARA oil product stocks**
- **Market analysis reports**
- **Consultancy & Quant research**
- **Freight Control App**

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- 1. Forward curves in focus**
- 2. Economics of forward curves**
- 3. Relevance of ARA gasoil stocks for ICE gasoil forward curve**
- 4. ICE gasoil & Brent forward curves: analysis of recent developments**



Oil futures forward curves??

Futures prices on Nov. 11th 2012 at 14:14 CET:

NEWOIL OIL
GBP 1.5977/82 EUR 1.2795/98

ICE Brent	<O#LCO:>	Bid
DEC2 ↓ 108.40	+0.67	108.89/
JAN3 ↓ 107.48		
FEB3 ↑ 106.76		
MAR3 ↑ 106.16	+0.39	106.15/
APR3 ↑ 105.72	+0.36	105.71/

ICE WTI	<O#WTCL:>	Bid
DEC2 ↑ 86.00	+0.35	85.98/
JAN3 ↓ 86.39	+0.25	86.45/
FEB3 ↓ 86.94	+0.21	87.02/
MAR3 ↑ 87.62	+0.28	87.61/
APR3 ↓ 88.32	+0.41	88.17/

ICE LGO	<O#LGO:>	Bid
NOV2 ↑ 936.25	+13.75	936.00/
DEC2 ↓ 934.50	+14.50	934.25/
JAN3 ↑ 933.00		
FEB3 ↑ 929.75	+15.75	929.00/
MAR3 ↑ 926.00	+15.75	925.25/

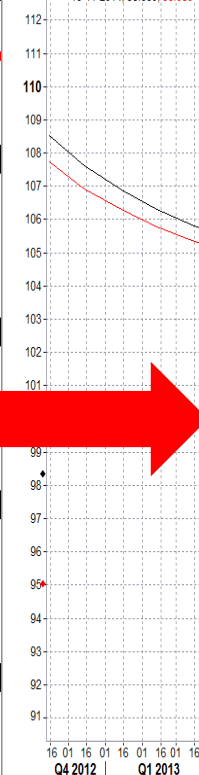
ICE LS Gasoil	<O#ULS:>	Bid
NOV2	/	/
DEC2	/	/
JAN3	/	/
FEB3	/	/
MAR3	/	/

ICE Nat Bal PT	<O#NGLNM:>	Bid
DEC2 ↓ 65.400	+0.660	65.400/
JAN3 ↓ 66.650	+0.640	66.560/
FEB3 ↑ 66.760	+0.680	66.650/
MAR3 ↓ 65.200	+0.650	65.150/
APR3 ↑ 62.750	+0.450	62.800/63.100

Help: <ENERGY> Key: <OILLOOK><NYMOIL><IPEOIL>

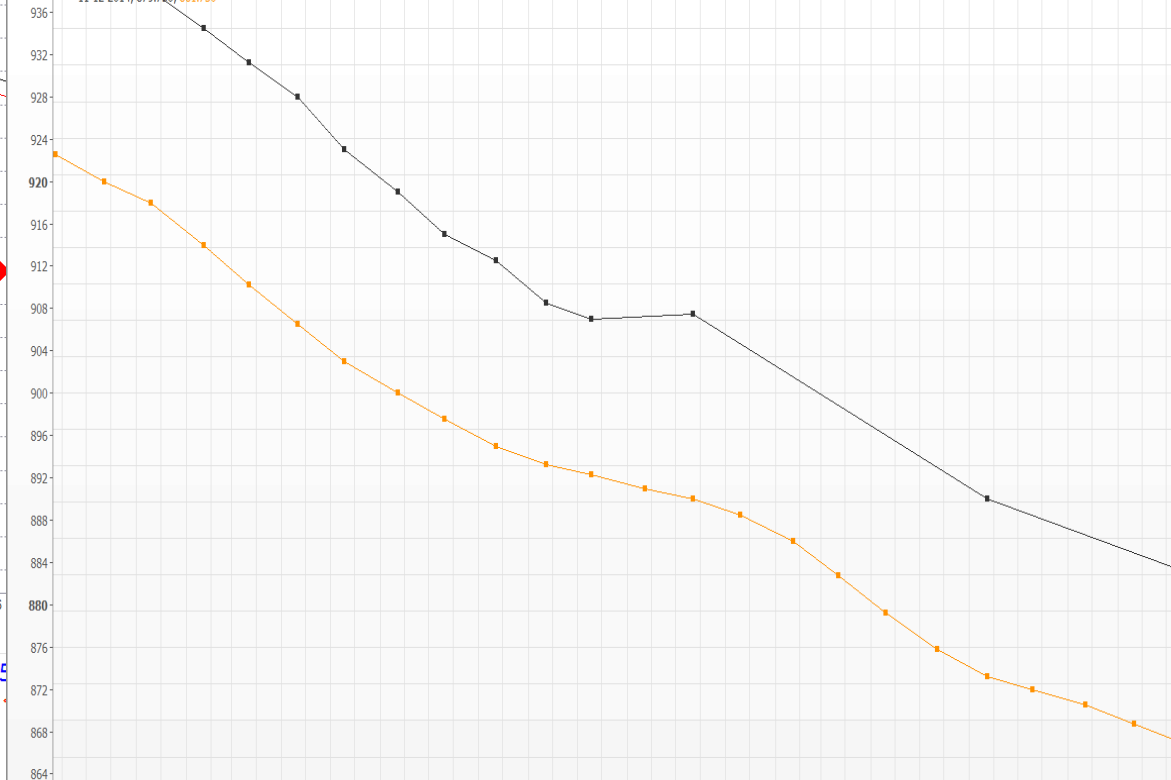
QLCO:

Price
TS: QLCO; Default: 36
13-11-2014; 98.360; 95.050



QLGO:

Price
TS: QLGO; Default: 36
11-12-2014; 875.750; 861.750





What do we know about forward curves....

..... and why is this important?

- Relevance for various market players
- Stylized facts of oil forward curves



Relevance for various market players:

1. Physical traders:

- Physical differentials (Gasoil 0.1% barges fob ARA)
- Basis risk of hedge using derivatives (futures / swaps)
- Inventory management: max. inventory or JIT
- Availability of product / storage capacity

2. Tank storage companies:

- Demand for tank capacity is linked to shape
 - Contango: much demand
 - Backwardation: little demand

3. Futures traders:

- Speculative spread trading



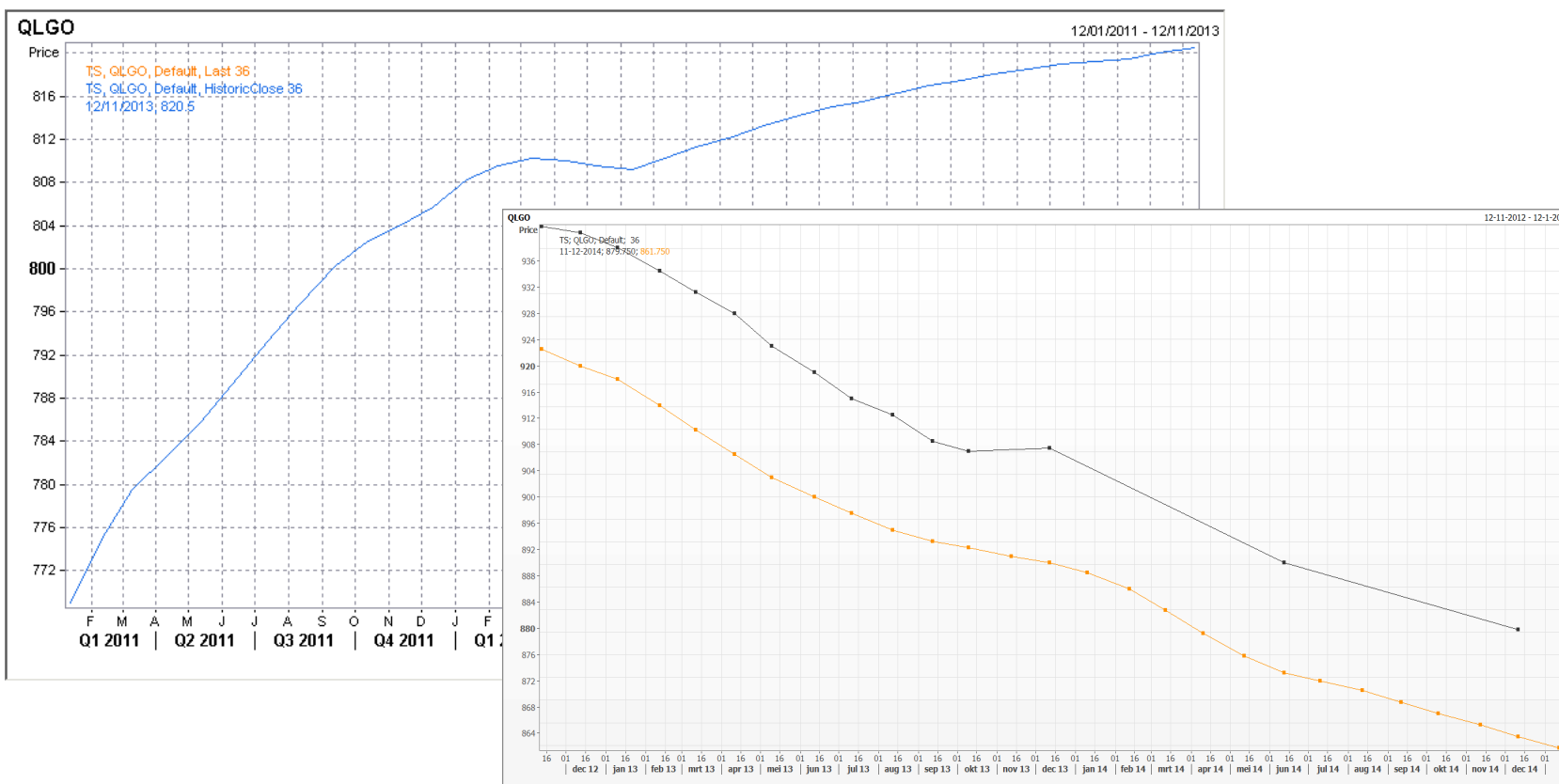
Stylized facts of oil forward curves:

Most important:

1. Shape of curve:
 - Upwards sloping (contango) or
 - Downwards sloping (backwardation)
2. Shape is persistent and fairly independent of daily swings in futures prices
3. Crude and oil products forward curves are linked

Stylized facts of oil forward curves:

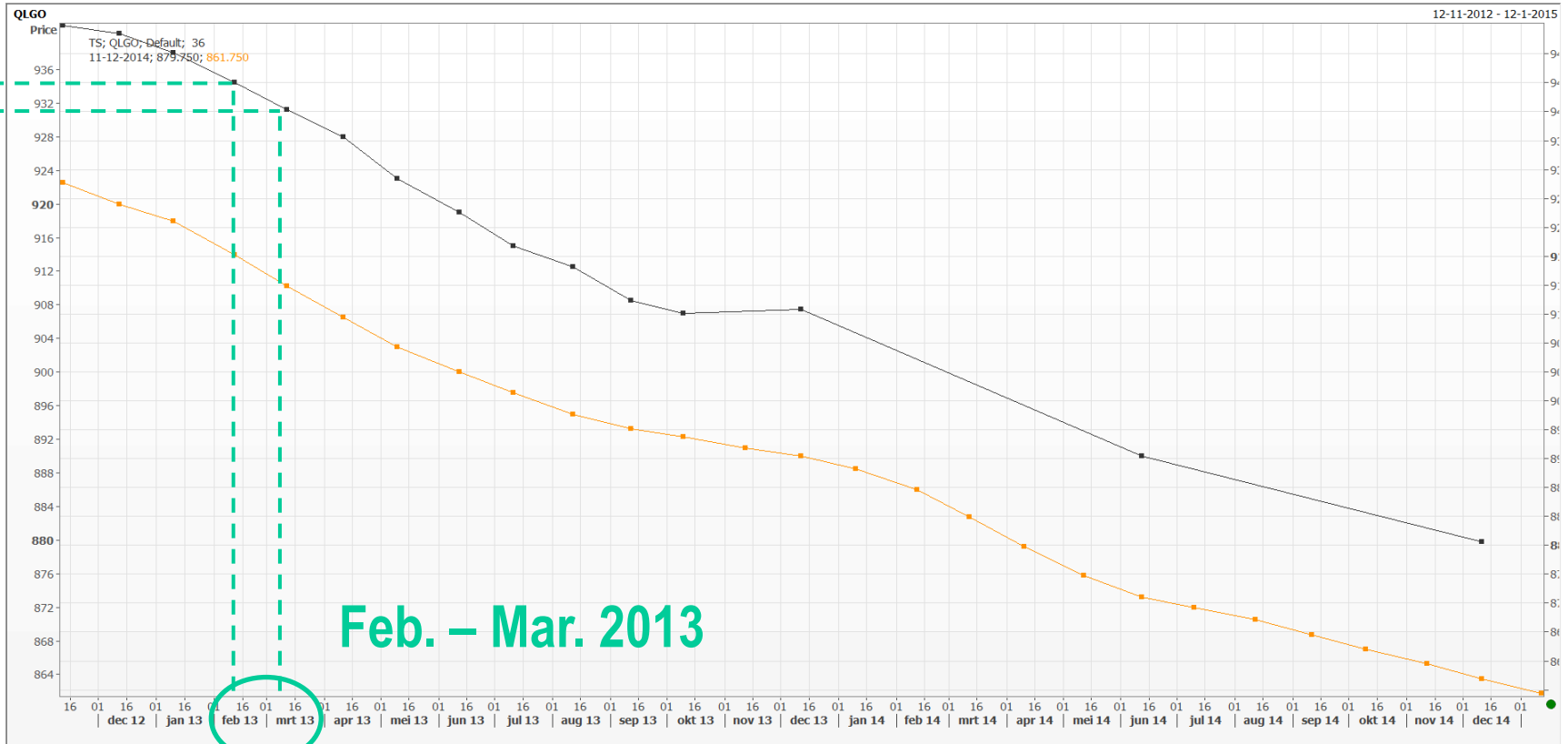
1. Slope of curve: contango / backwardation



Stylized facts of oil forward curves:

- Shape is persistent and fairly independent of daily swings in oil prices
 - look at time spreads to see dynamics
 - Time spread = price differential between two consecutive futures contracts

Time spread



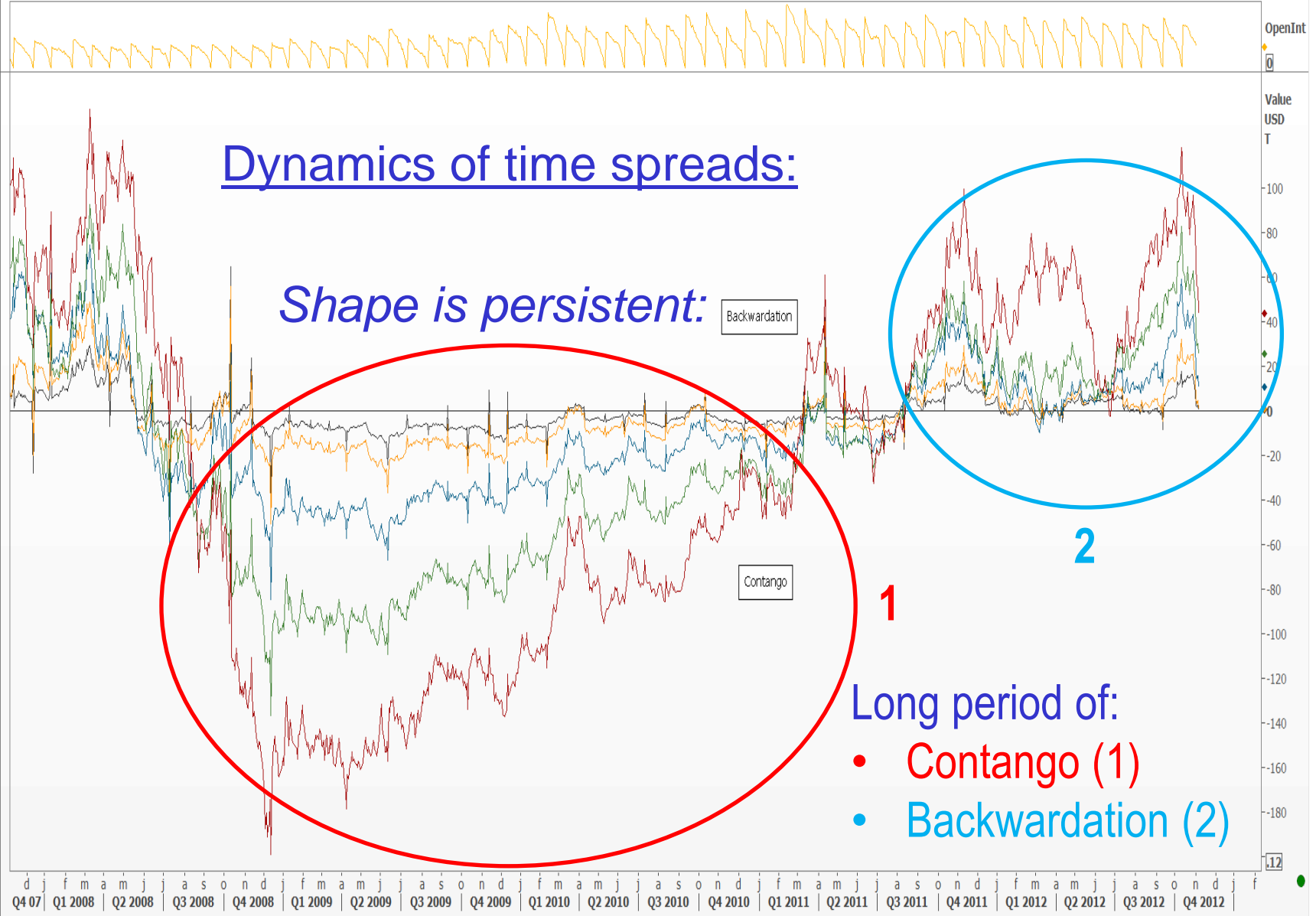


Forward curves in focus (7)



Daily QLGOc1; QLGOc2; QLGOc3; QLGOc6; QLGOc12; QLGOc24

7-11-2007 - 12-2-2013 (LON)



Dynamics of time spreads:

Shape is persistent:

Backwardation

Contango

1

2

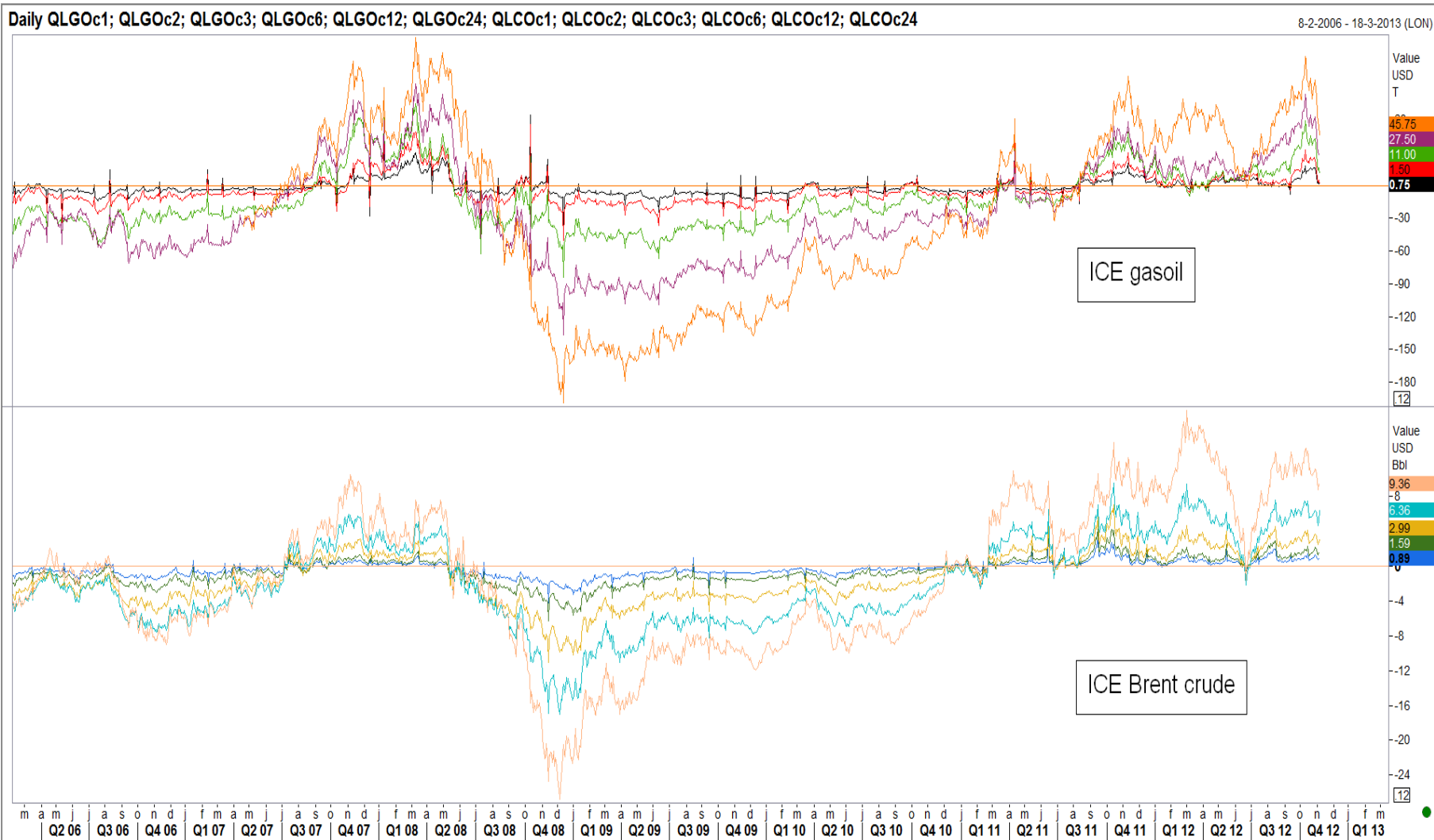
Long period of:

- Contango (1)
- Backwardation (2)

Forward curves in focus (8)

Stylized facts of oil forward curves:

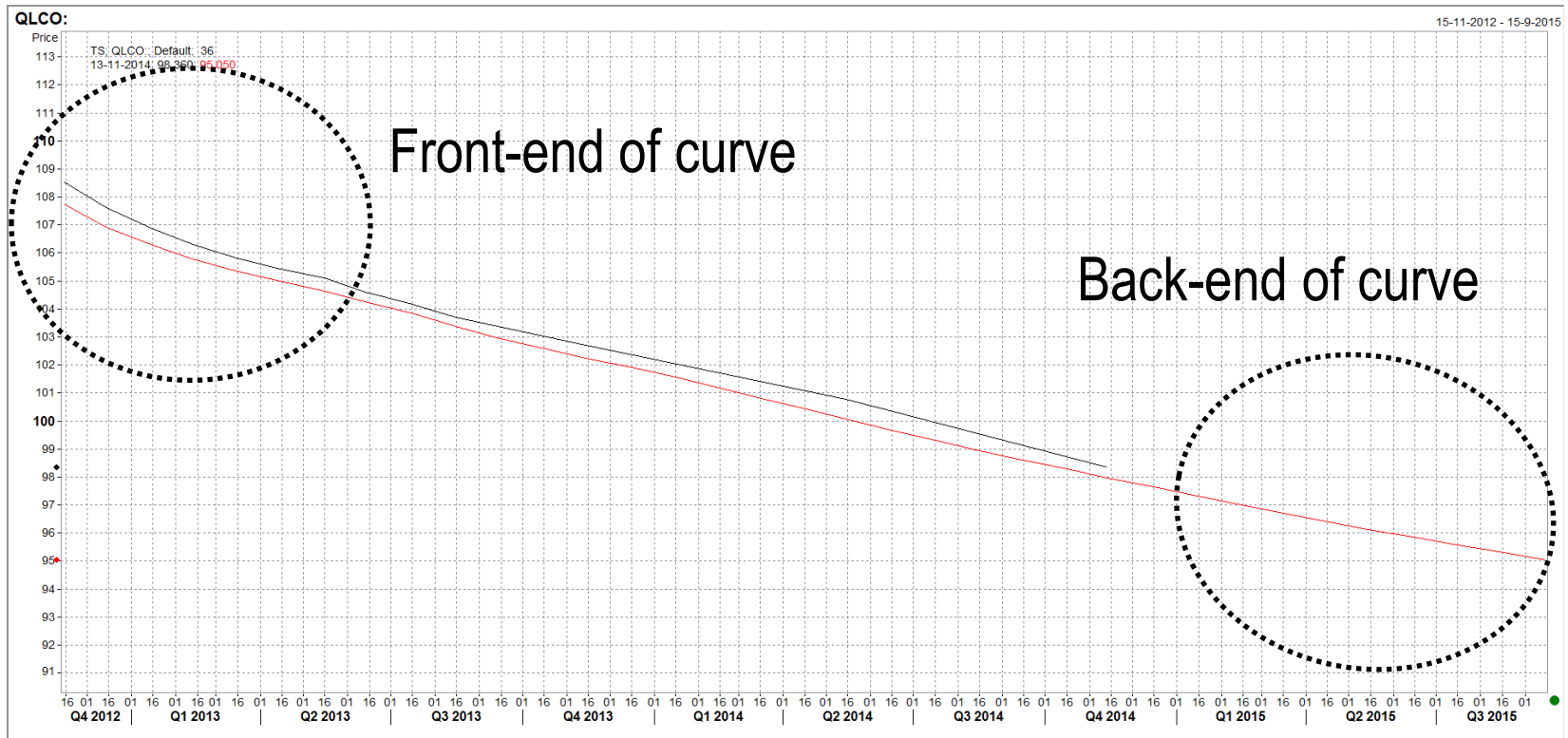
3. Crude and oil products forward curves are linked:



What fundamentals drive crude oil forward curves?

Distinguish between front-end and back-end of forward curve

1. Back-end of curve
 2. Front-end of curve
- } *Both ends are connected by arbitrage mechanisms*



What fundamentals drive crude oil forward curves?

1. Back-end of curve → **long term fundamentals**

Supply side of crude market

→ **Price** to justify investments/divestments in exploration and development of oil wells

Demand side of crude market

→ **Price** to justify investment/divestment programs for

- developing alternative fuels
- increasing fuel efficiency
- Etc..

Price = expected marginal 'exploration, development and production' costs to balance market in the "long run"

What fundamentals drive crude oil forward curves?

2. Front-end of curve → **short term fundamentals**

- Current and expected supply and demand
- Current and expected inventory levels

If supply > demand: price drops to stimulate players to increase inventories to balance market

If demand > supply: price rises to stimulate players to free up inventories and/or lower or postpone consumption to an extent that the market is balanced

Arbitrage mechanisms connect front and back end of curve

Storage arbitrage play

- Prevents time spreads from becoming too large
- Links futures prices along the curve



Storage arbitrage play?

If contango

and

-(time spread) > marginal storage cost:

- Long 1st month, short 2nd month*
- Hold both futures contracts till expiry*
- After expiry 1st month: collect and store product*
- After expiry 2nd month: deliver product*

Profit = -(time spread) – storage costs

Storage costs:

- Transportation costs (transport product to tank terminal)*
- Tank Terminal lease fee (opportunity costs: only if 'spot' market for storage capacity)*
- Finance costs*

Inventory levels are critical !

Storage arbitrage play?

If backwardation

and

time spread > shipping costs - interest

Subject to:

inventory level > min. level + replenishment lot:

- Short 1st month, long 2nd month*
- Hold futures contracts till expiry*
- After expiry 1st contract: deliver product from storage tank*
- After expiry 2nd contract: collect product → stock is replenished*

Inventory levels are critical !

Profit = time spread – shipping costs + interest

Shipping costs:

- Freight rate*
- Insurance*

Link crude oil & oil products forward curves?

- Crude oil is feedstock for refineries to produce oil products*
- Most important input cost!*

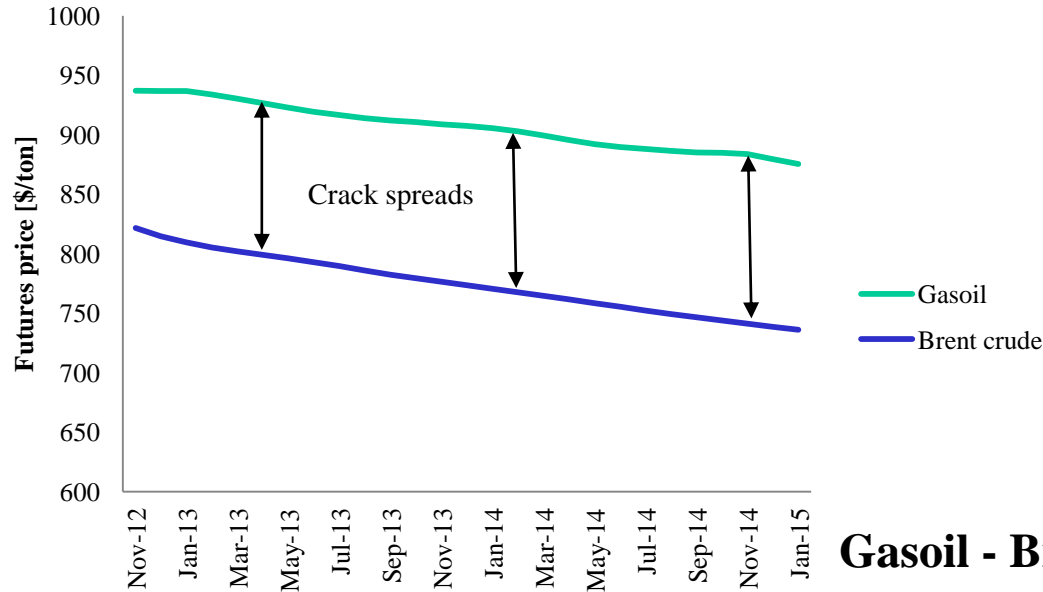
Difference between oil product price and crude price:

“Crack spread”

- Proportional to refiner's gross profit margin*

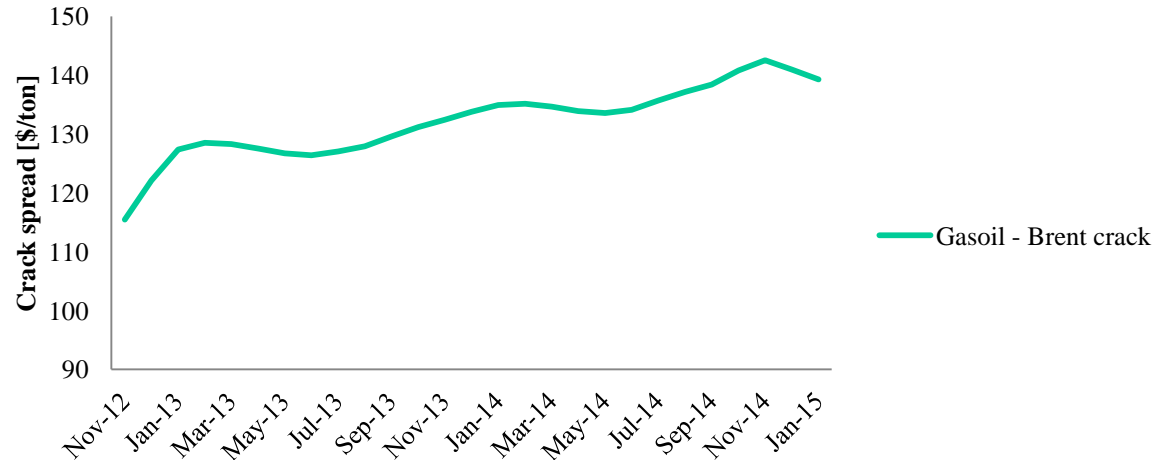
ICE Gasoil – ICE Brent crack spreads

Forward curves Gasoil, Brent crude



6th of Nov. 2012

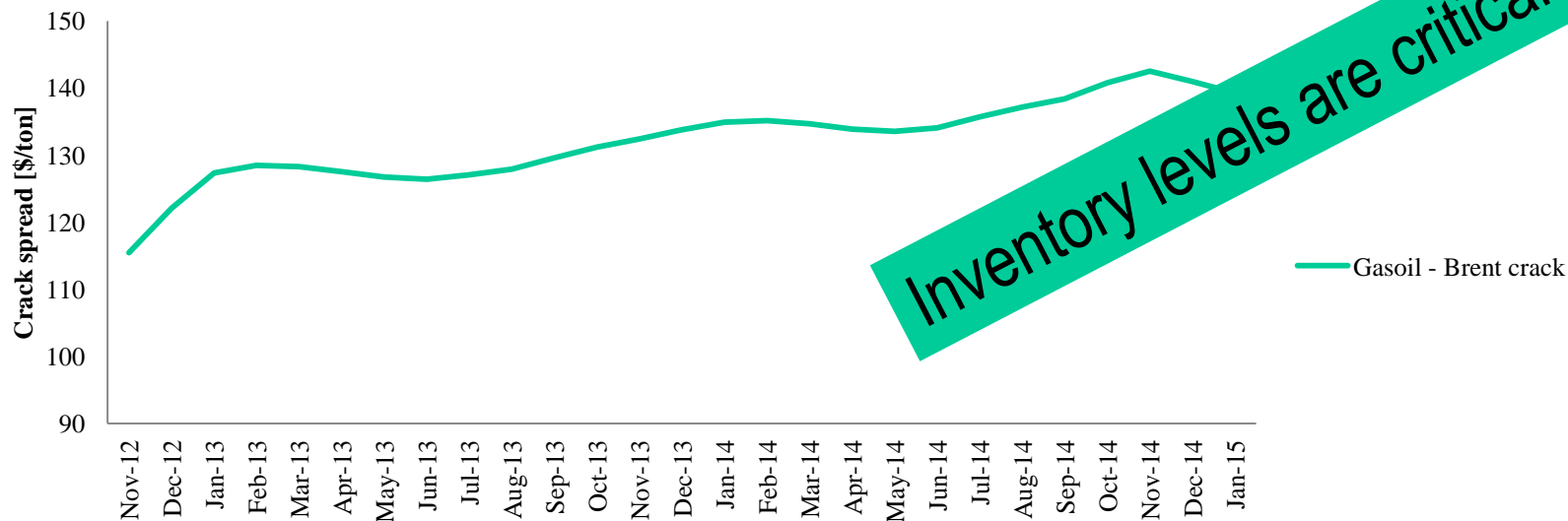
Gasoil - Brent crack spread



Crack spread forward curve:

- **Back-end:** gross profit margin to justify investments/divestments in refining assets
- **Front-end:** short term fluctuations in supply/demand + inventory levels
- **Storage arbitrage** play limits spreads
- Refiner's **production capacity** is limiting factor in arbitrage play

Gasoil - Brent crack spread



Inventory levels are critical !



ICE gasoil futures are traded all over the world....

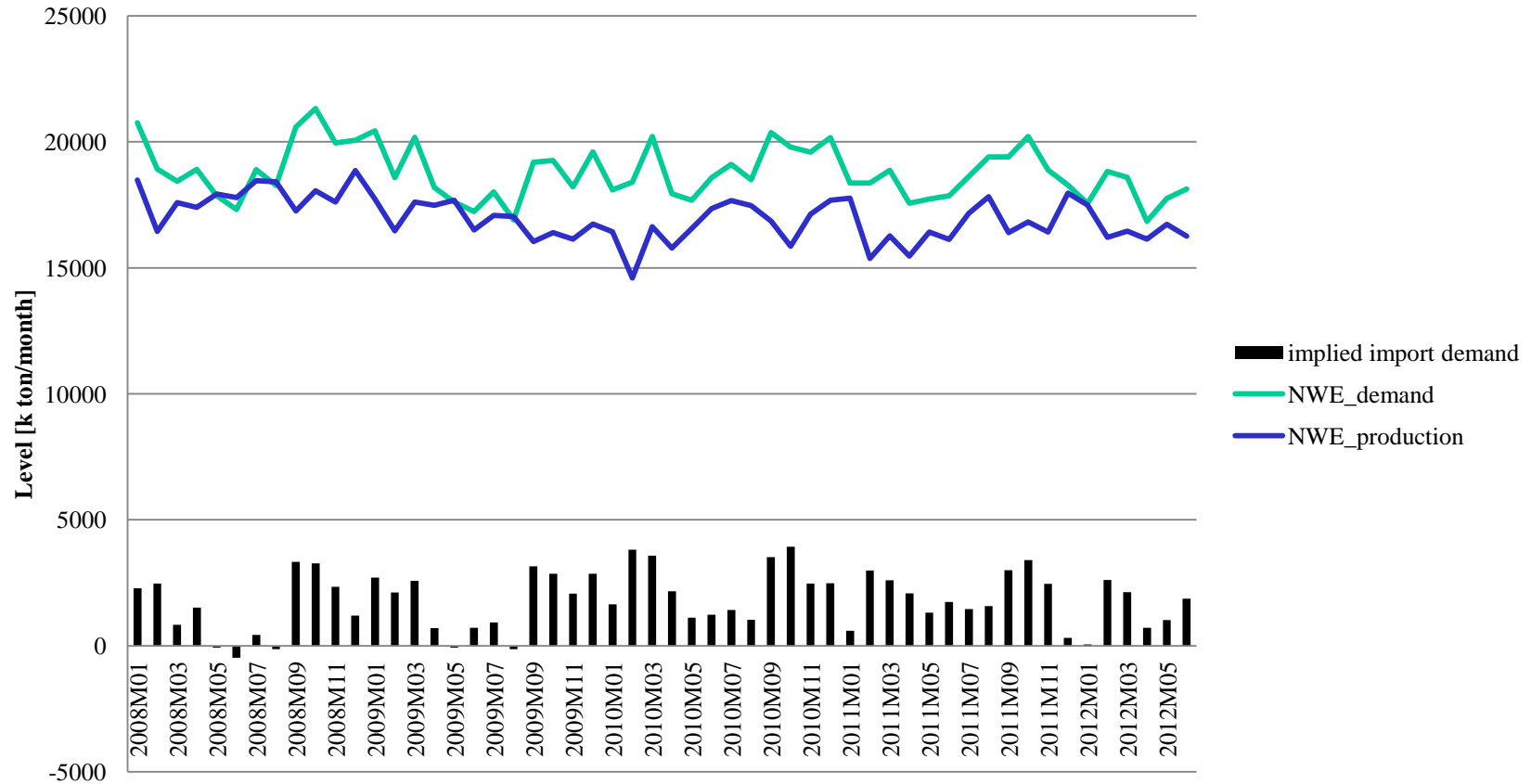
...so why should ARA stocks be important?

Several reasons:

1. NWE main importer of middle distillates
2. ARA main trading hub in NWE
3. ARA physical delivery point of ICE gasoil contract

NWE main importer of middle distillates

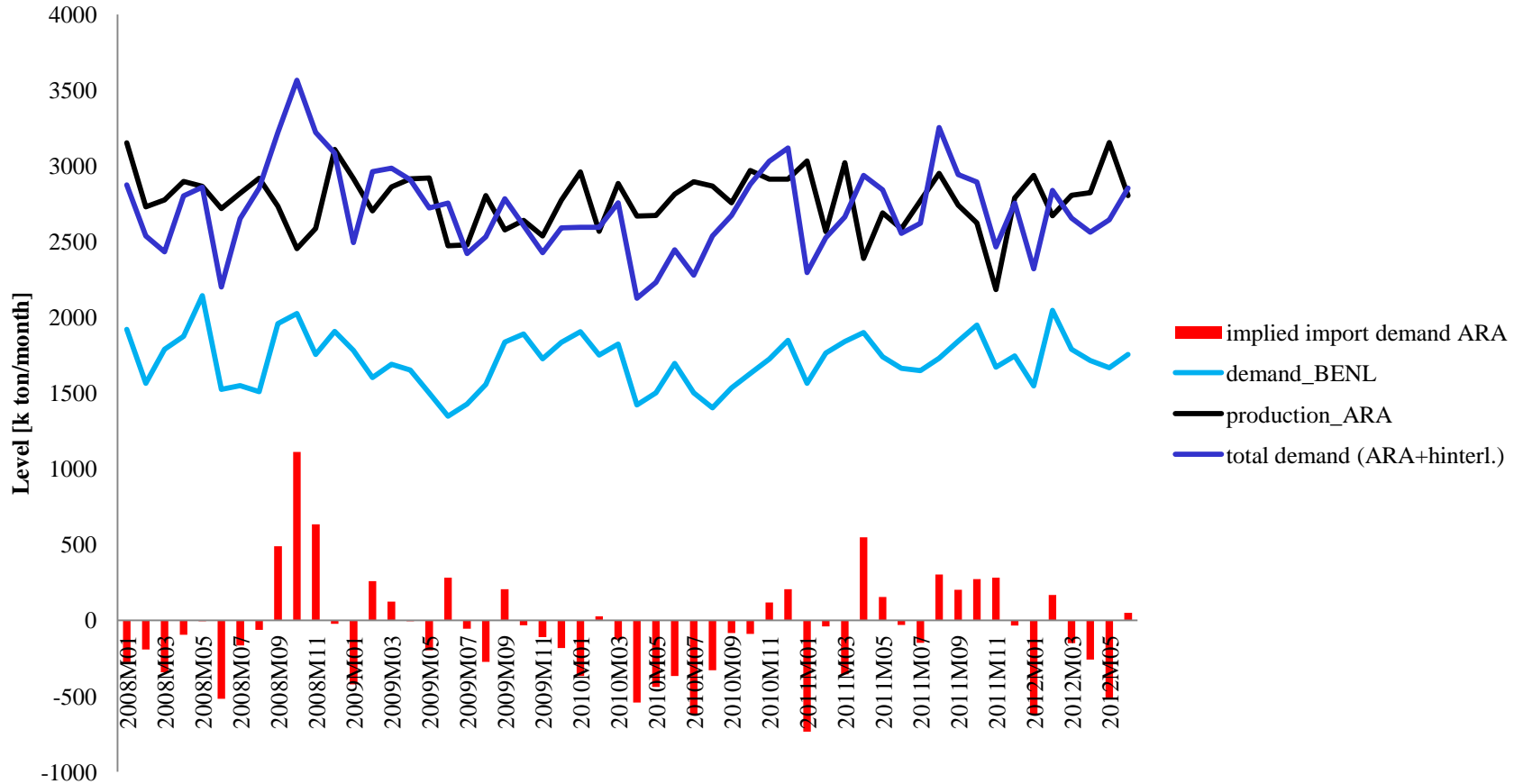
S/D 'NWE' (broad definition)



Source: Eurostat (NWE incl. Iberian peninsula + Scandinavia)

ARA and hinterland

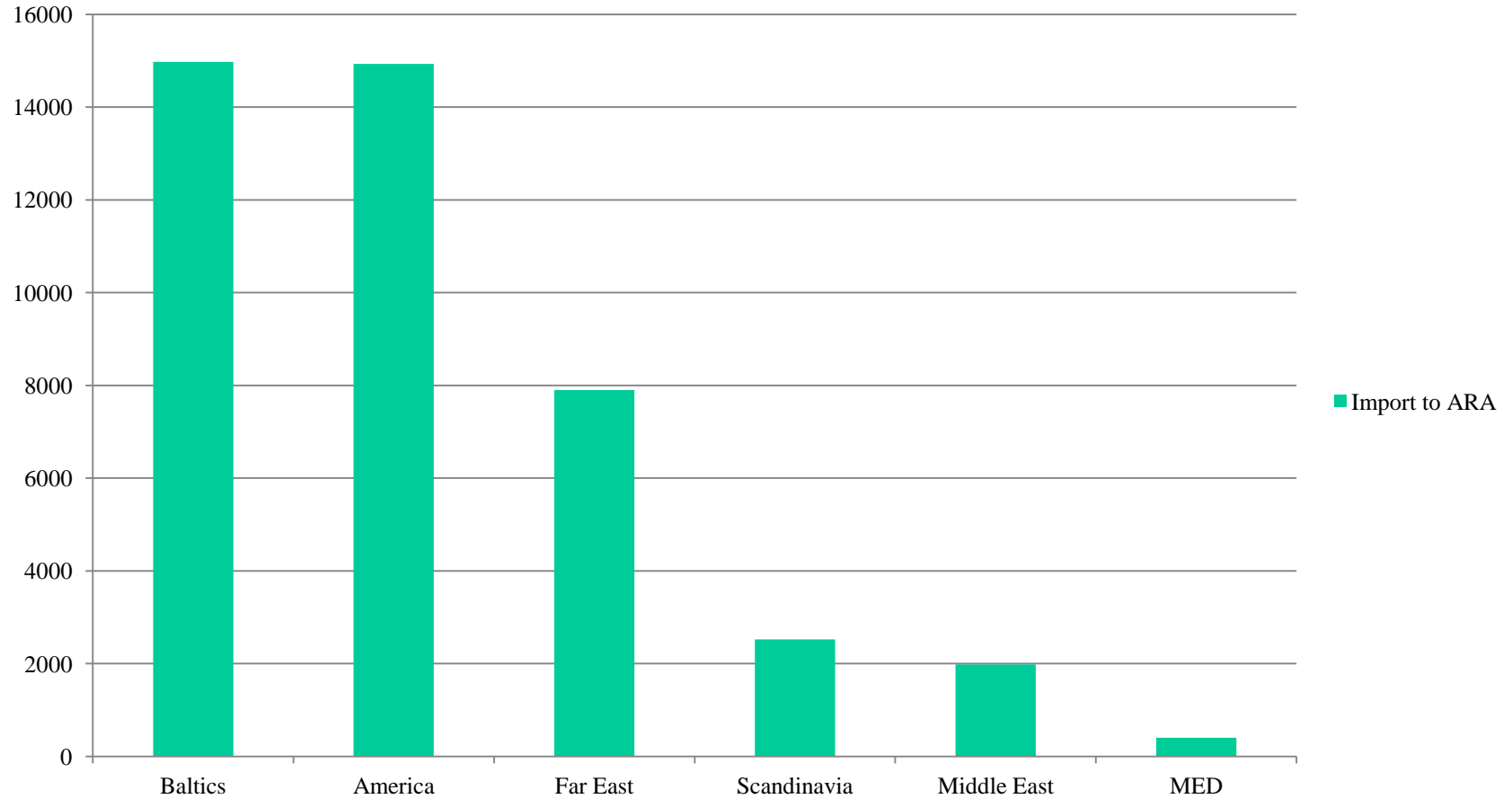
S/D ARA and Hinterland



Source: Eurostat

Import to ARA:

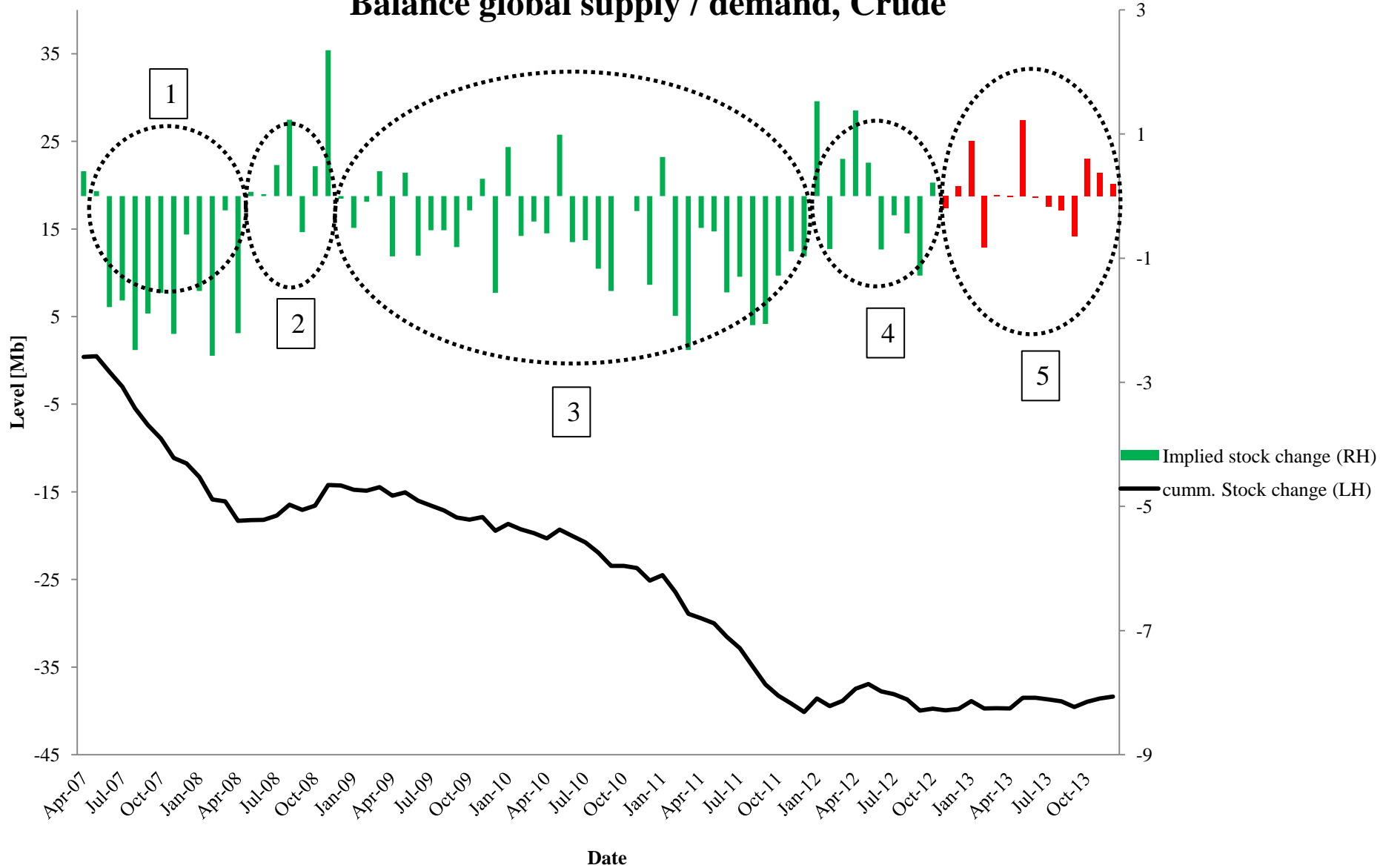
Import to ARA



Source: Eurostat

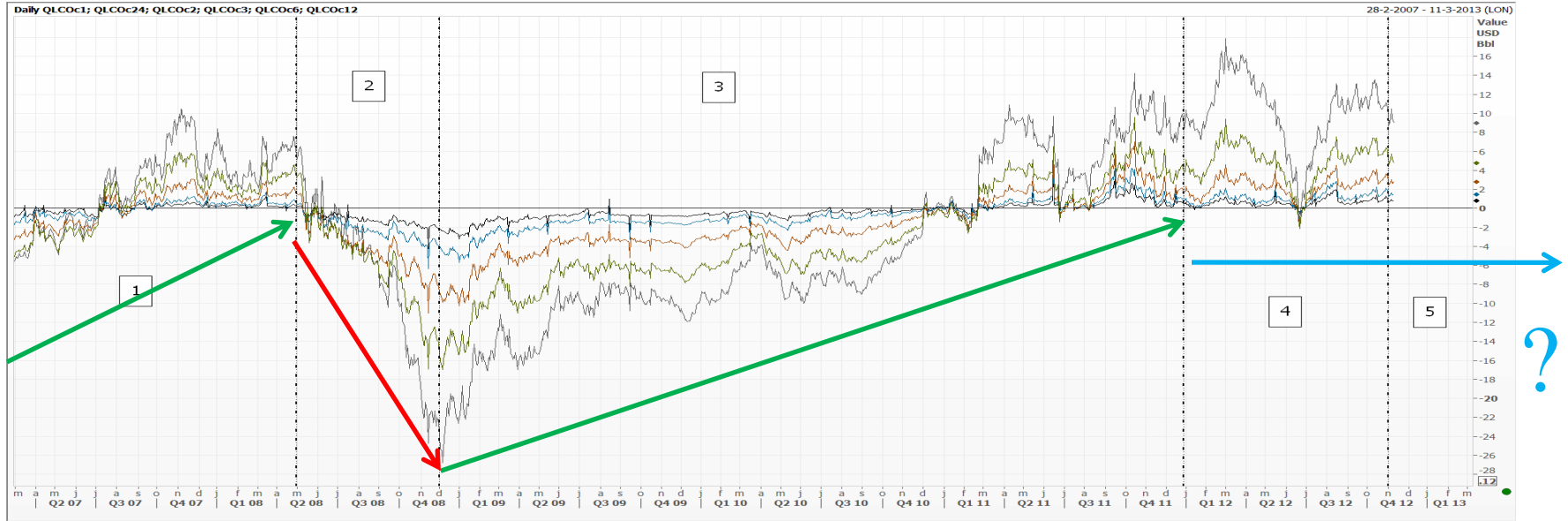


Balance global supply / demand, Crude

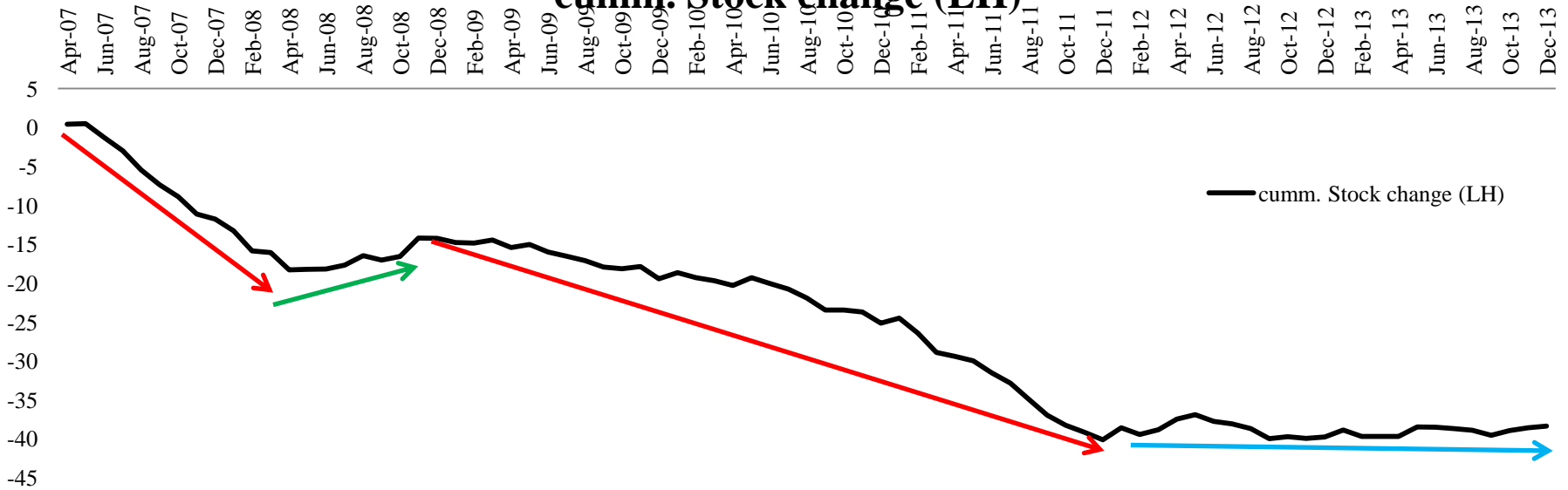




Brent forward curve: time spread analysis (3)



cumm. Stock change (LH)



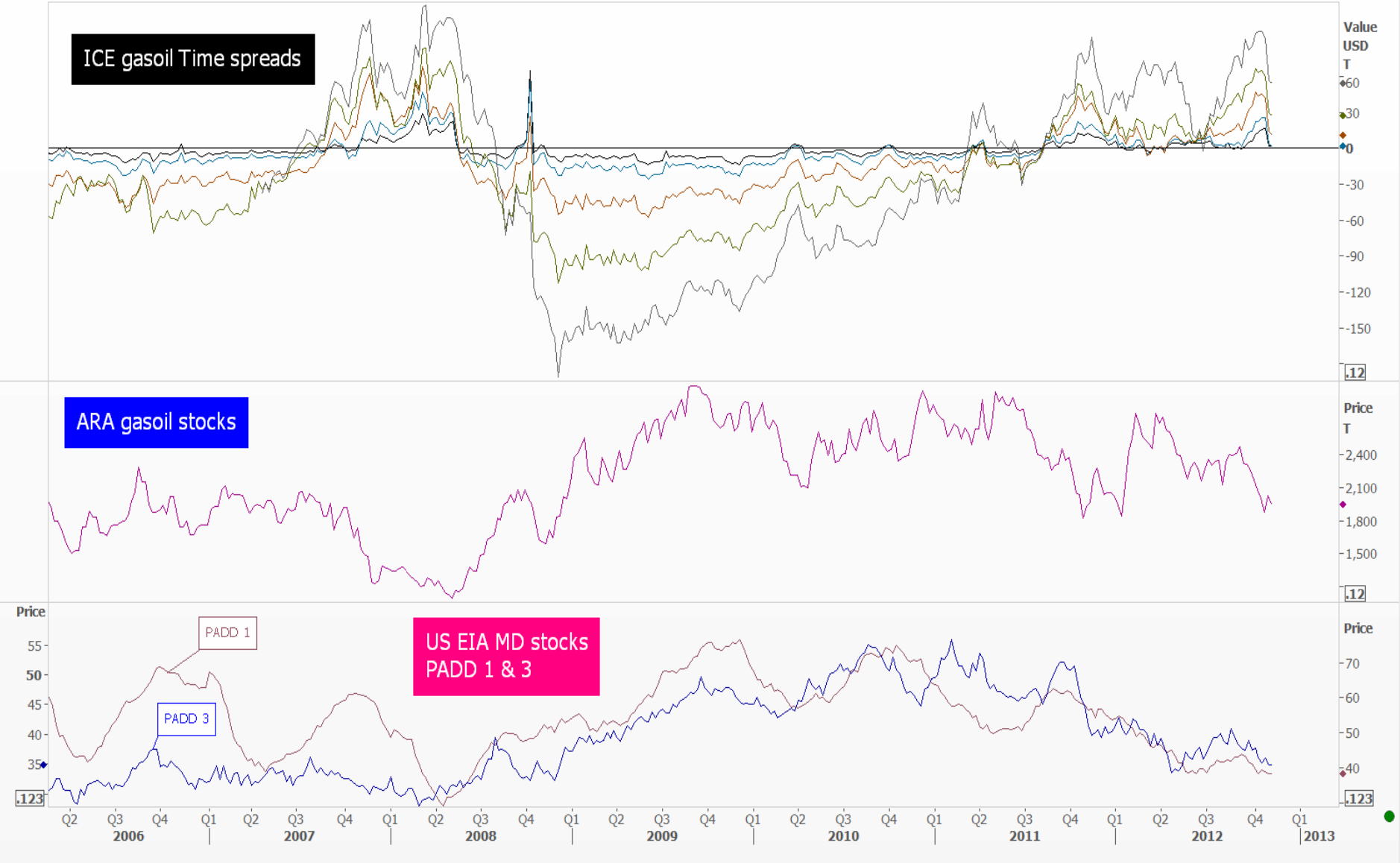


Gasoil forward curve: time spreads vs. stocks



Weekly QLG0c1; QLG0c2; QLG0c3; QLG0c6; QLG0c12; QLG0c24; QSTK-GO-ARA; QDST-STK-1-EIA; QDST-STK-3-EIA

19-2-2006 - 24-3-2013 (LON)





ARA stocks vs. US stocks (PADD 3)



Weekly QSTK-GO-ARA; QDST-STK-3-EIA

22-12-2002 - 26-5-2013 (UTC)

Line: QSTK-GO-ARA; Last Quote(Last)
8-11-2012; 1,948.00; N/A; N/A

ARA gasoil stocks

Price
T
-2,600
-2,400
-2,200
-2,000
-1,800
-1,600
-1,400
-1,200
12

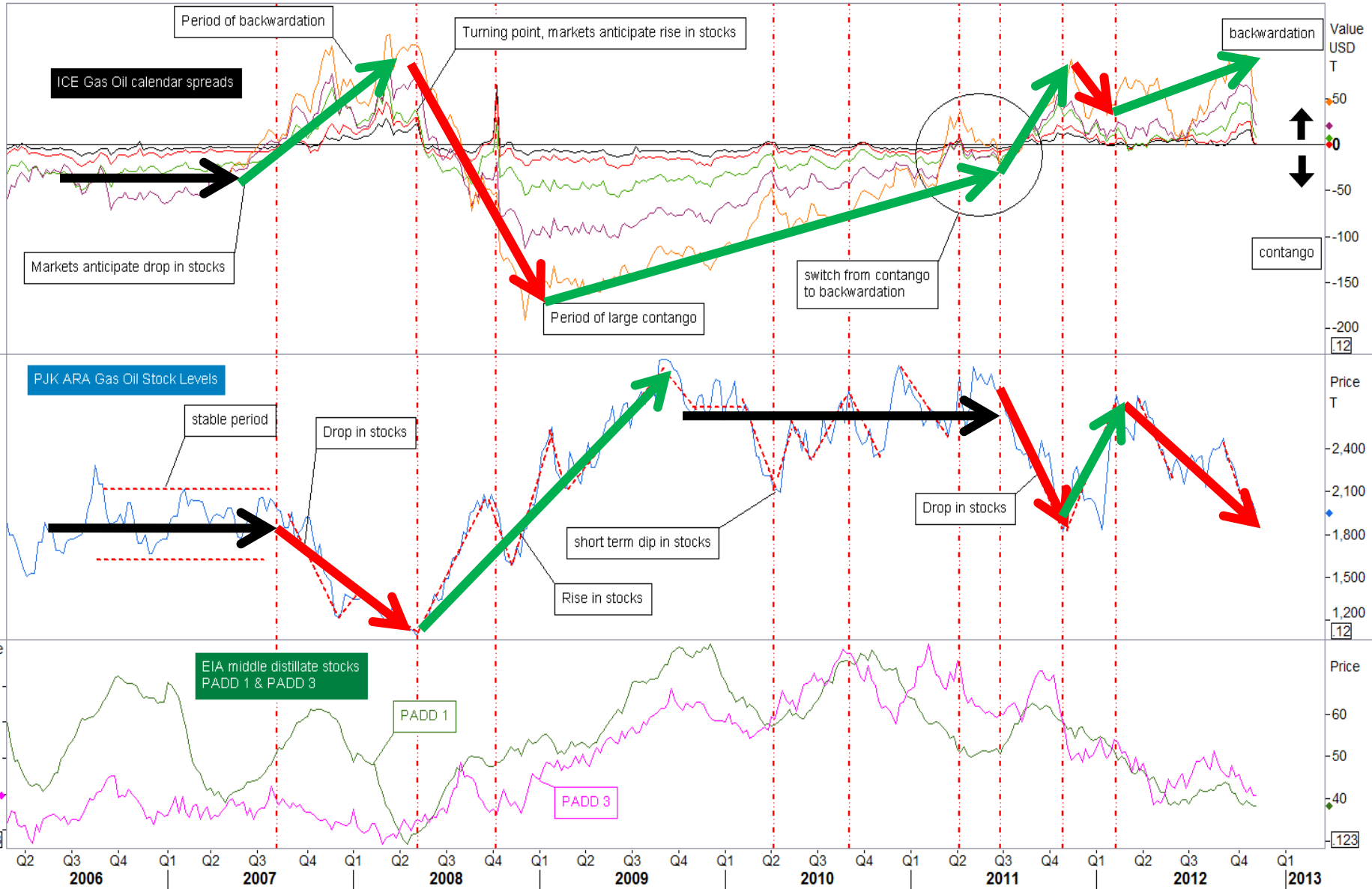
Line: QDST-STK-3-EIA; Last Quote(Last)
11-11-2012; 34.814; N/A; N/A

US EIA MD stocks PADD 3

Price
-51
-48
-45
-42
-39
-36
-33
-30
-27
123

Q1 2003 Q2 2003 Q3 2003 Q4 2003 Q1 2004 Q2 2004 Q3 2004 Q4 2004 Q1 2005 Q2 2005 Q3 2005 Q4 2005 Q1 2006 Q2 2006 Q3 2006 Q4 2006 Q1 2007 Q2 2007 Q3 2007 Q4 2007 Q1 2008 Q2 2008 Q3 2008 Q4 2008 Q1 2009 Q2 2009 Q3 2009 Q4 2009 Q1 2010 Q2 2010 Q3 2010 Q4 2010 Q1 2011 Q2 2011 Q3 2011 Q4 2011 Q1 2012 Q2 2012 Q3 2012 Q4 2012 Q1 2013 Q2 2013

Weekly





Visit PJK website

For outlook on oil forward curves see:
www.pjk-international.com/scenarios

For more theory on forward curves see:
www.pjk-international.com/downloads



?? – Questions - ??





Crude oil market: main themes

Downside risks:

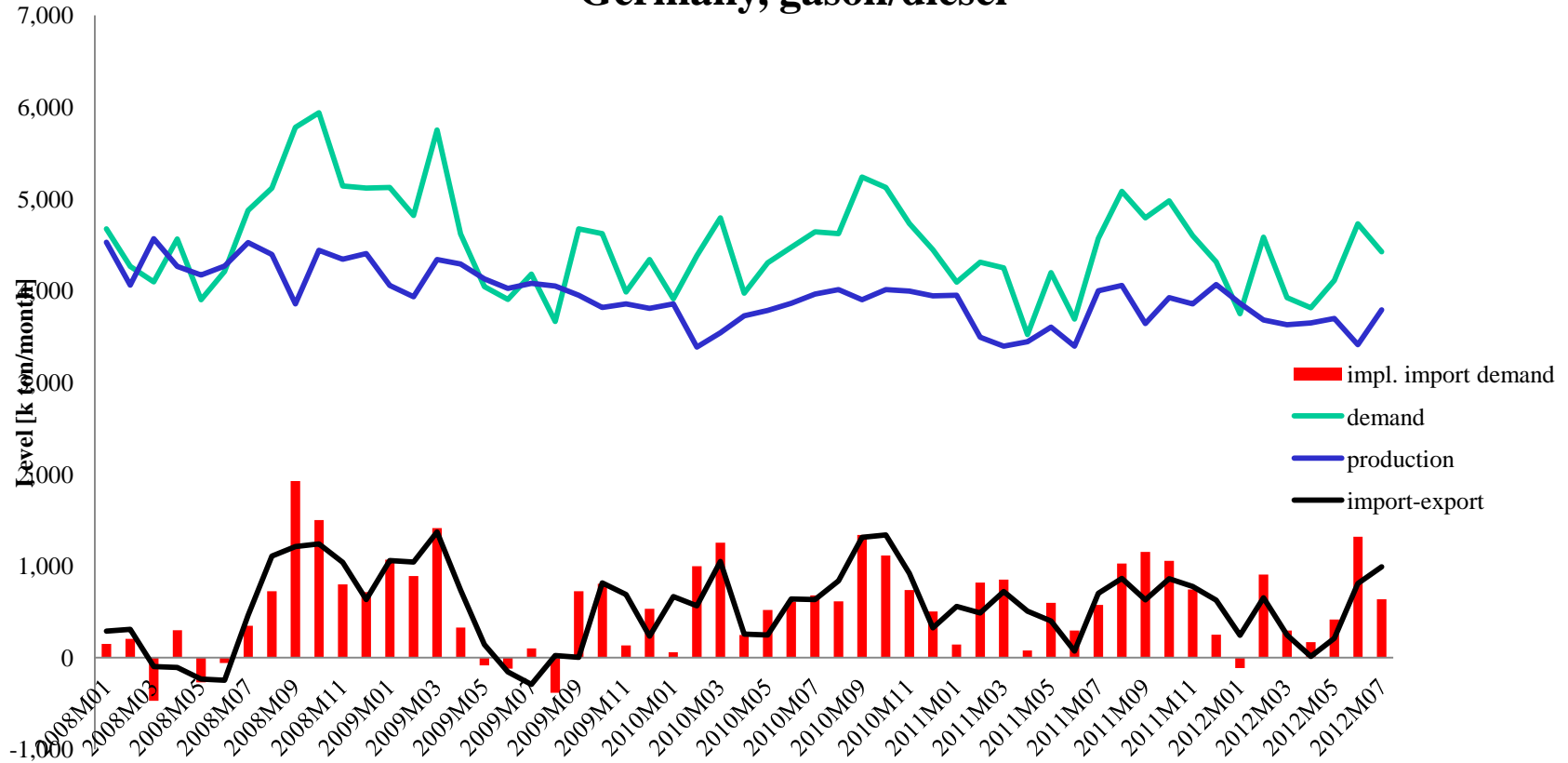
- Global economic slowdown
- Demand destruction due to high oil prices
- Political risks: Eurozone crisis & Fiscal Cliff
- Further surge in US tight oil production

Upside risks:

- Unrest Middle-East
- Militant clashes in Libya
- North-Sea production outages

Individual countries: Germany

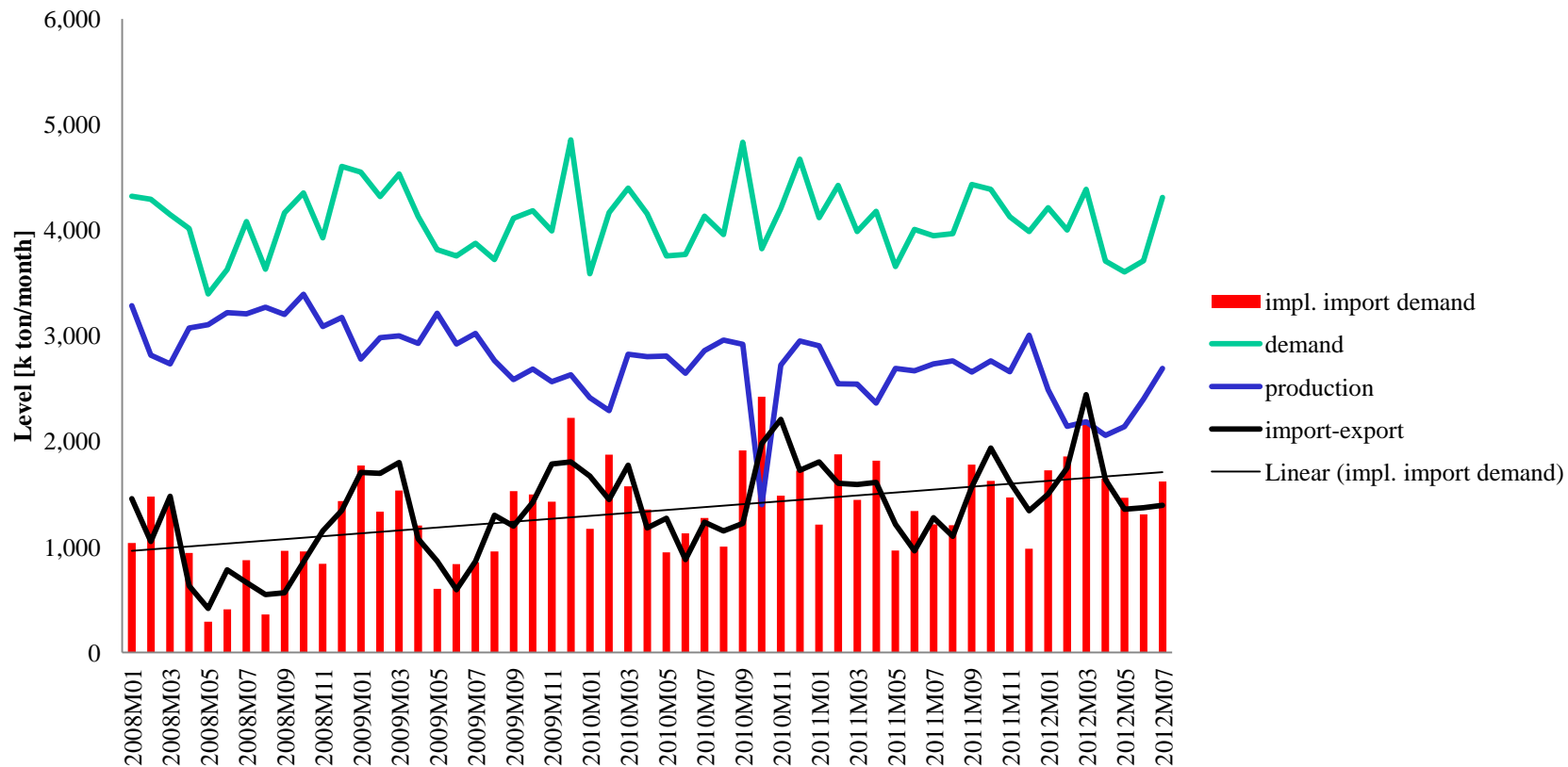
Germany, gasoil/diesel



Source: Eurostat

Individual countries: France

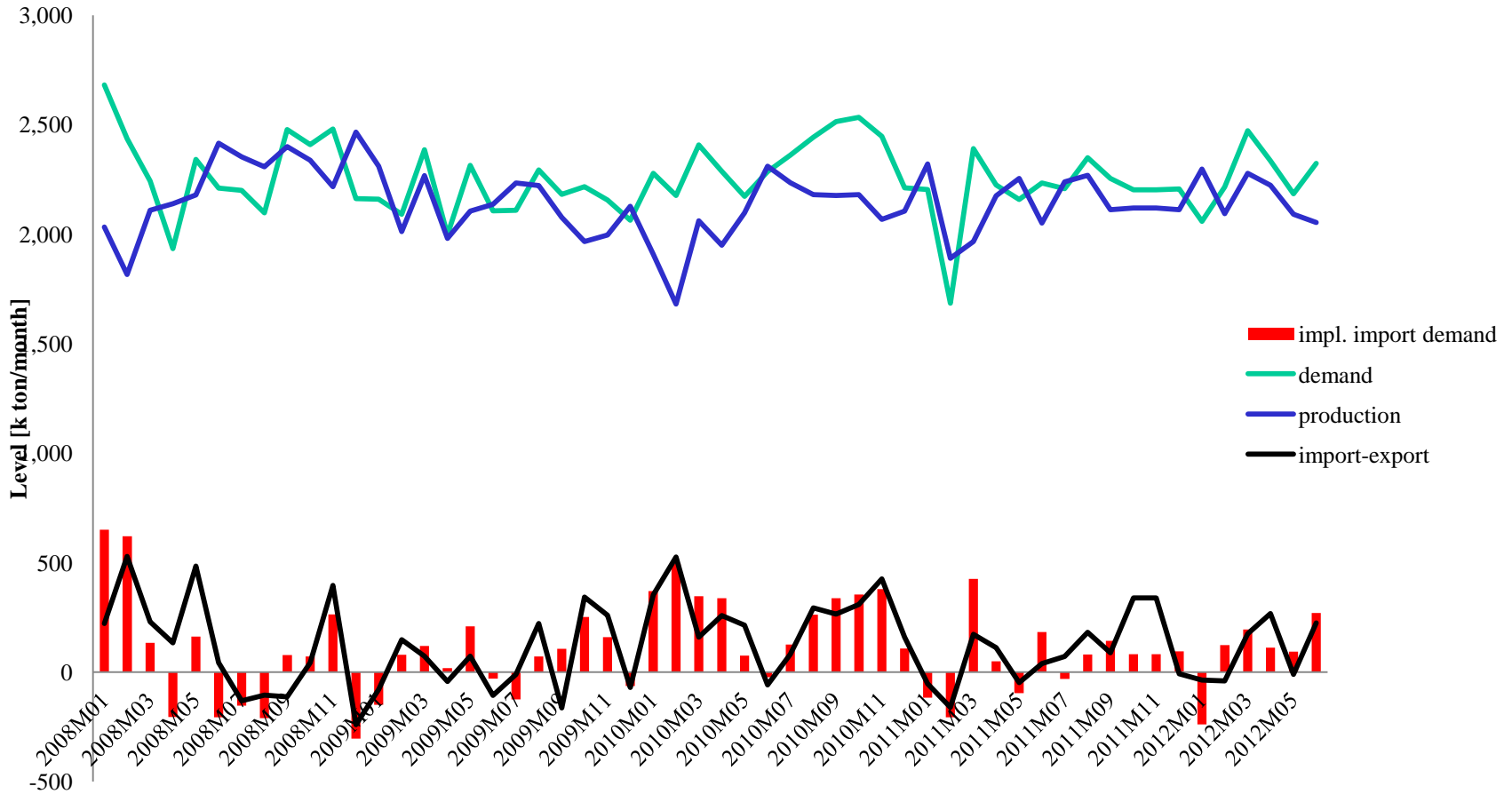
France, gasoil/diesel



Source: Eurostat

Individual countries: UK

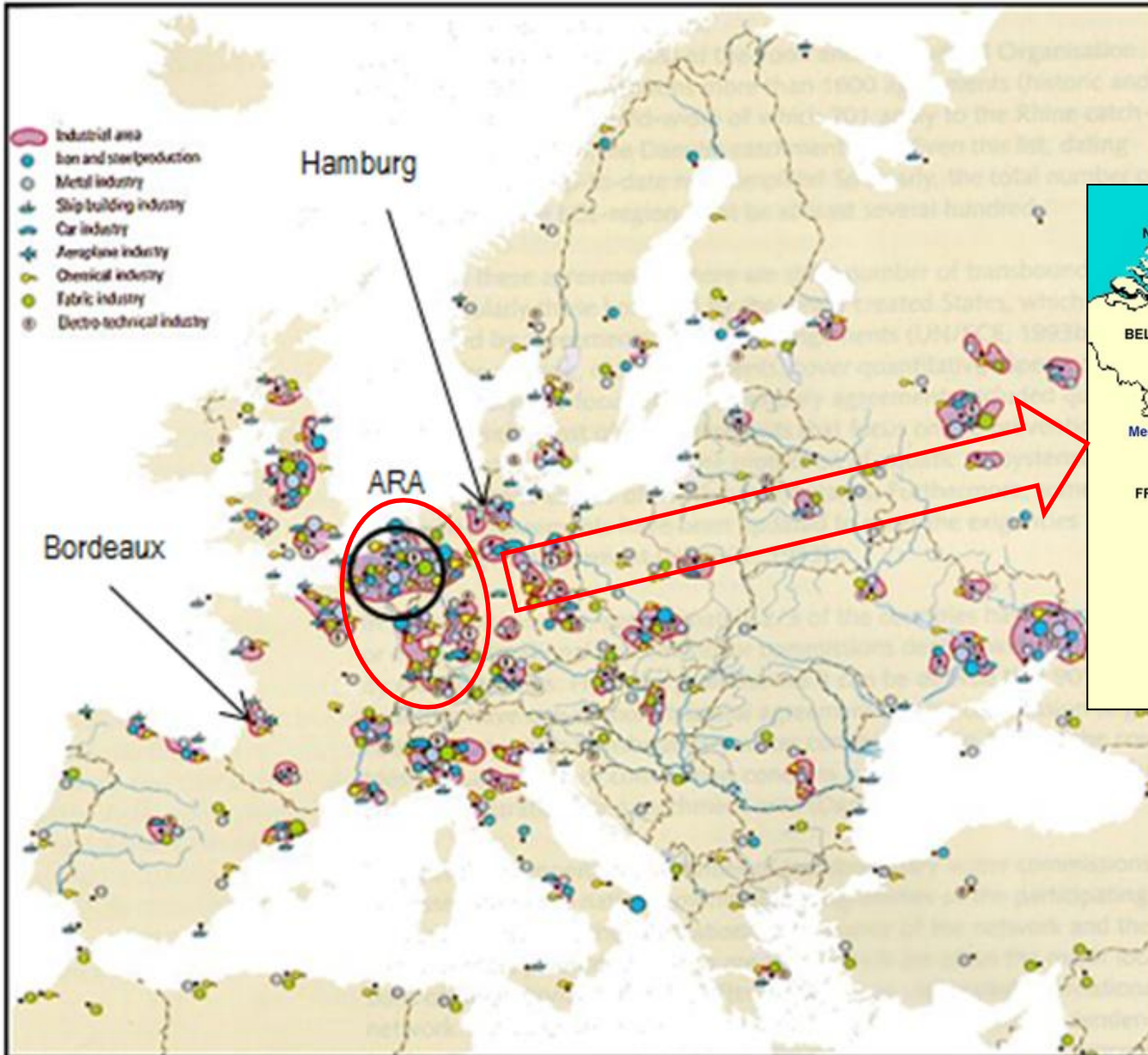
UK, gasoil/diesel



Source: Eurostat



ARA ideal location for trading in NWE





- **Ideal topographical position in NWE:**
 - North Sea oil fields
 - Large consumer markets in Benelux, Germany, France, Switzerland and UK
 - Highly industrialized area and hinterland
 - Good logistics: sea ports, Rhine & canals
- **Large oil infrastructure:** refineries + tank terminals
- **Global trading hub**, links to: Med, USA, Caribbean, South-America, West Africa, the Mid East and the Far-East
- **Liquid physical** oil products market and oil **derivatives market**
- ICE Europe **futures** exchange and OTC **swap** markets for hedging physical positions
- **Brent crude**, a worldwide oil pricing benchmark



EIA stocks: PADD 1 and 3

