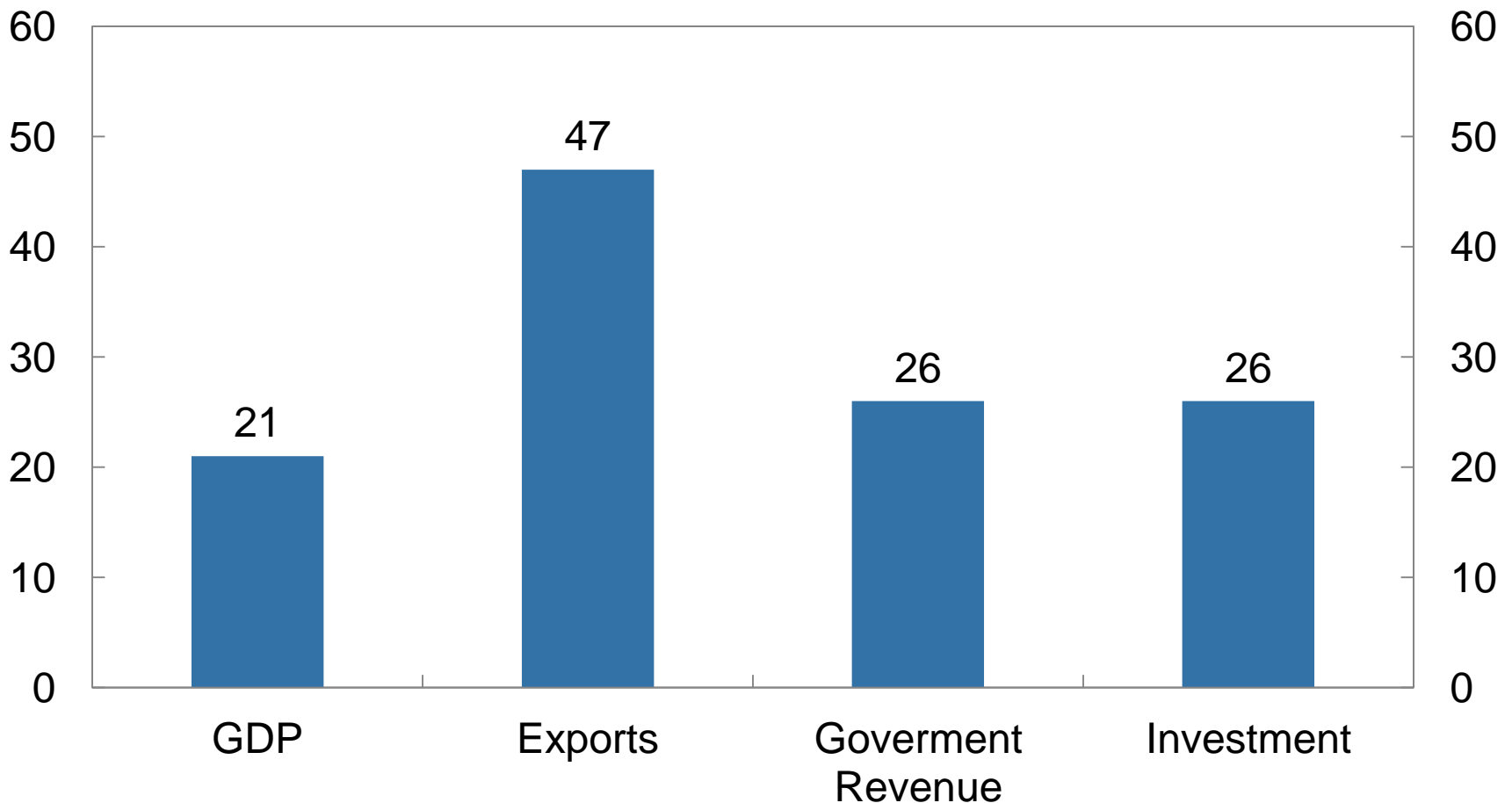


Oil and Natural Gas Analysis at Norges Bank

Pål Winje (International Department), workshop on modeling and forecasting oil prices, 22 March 2012

The Norwegian Petroleum Sector as a Share of Macroeconomic Variables

Percent, 2010



Sources: Ministry of Petroleum and Energy, Norwegian Petroleum Directorate

Three topics for my talk

- Oil price forecasts in the Monetary Policy Report
- The structural story of oil prices
- What about natural gas prices?

Oil prices in the Monetary Policy Report

Four options for forecasting oil prices

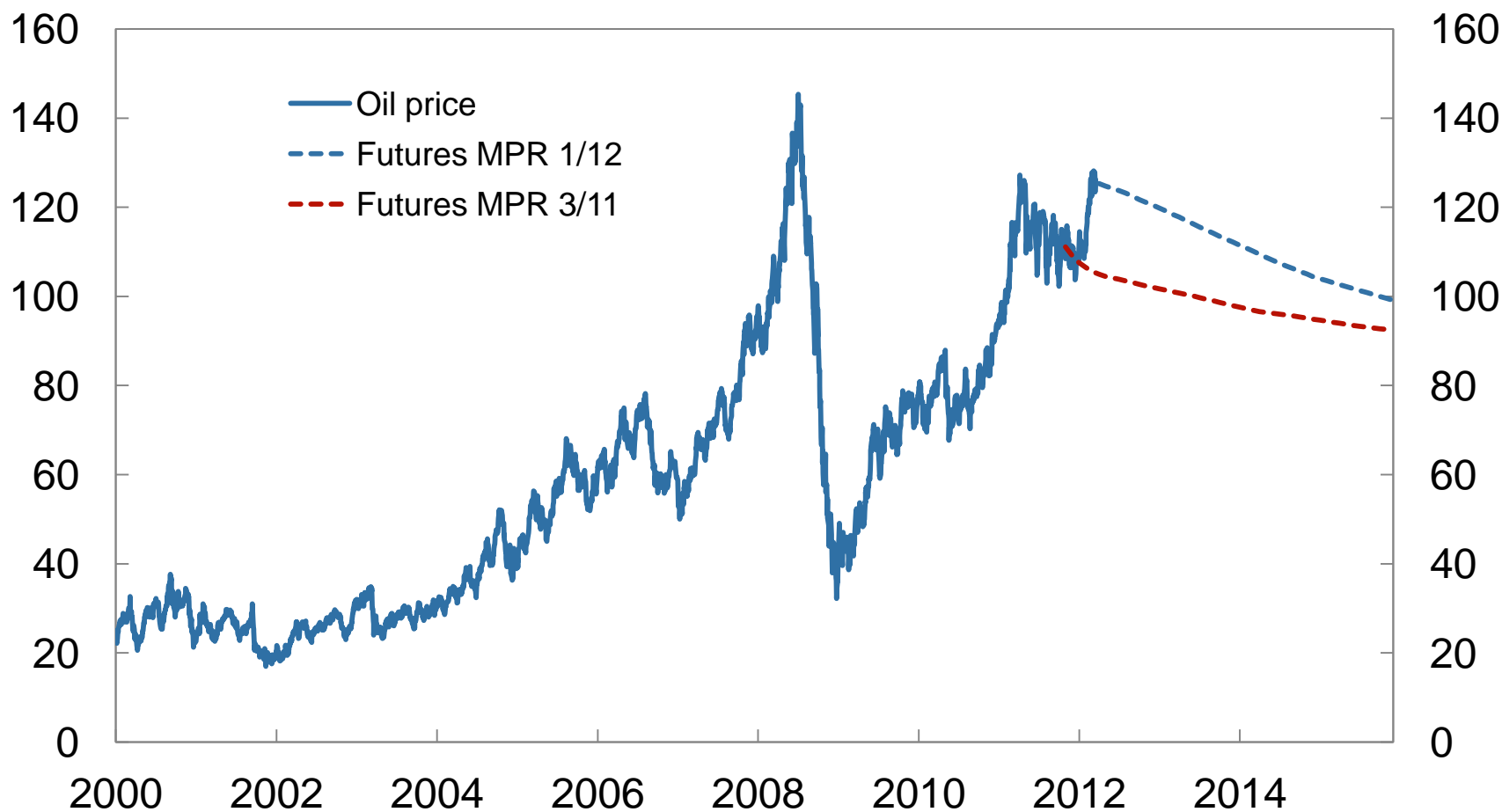
- Spot price
- Futures prices
- Judgement based
- Model based

Why futures prices?

- Consistent with the approach for other exogenous variables
- Cautious – a technical assumption in line with the market
- Close to the alternatives
- Common among other central banks
- Context – allow for discussion

Oil price (Brent Blend)

USD per barrel. Daily figures. January 2000 – December 2015

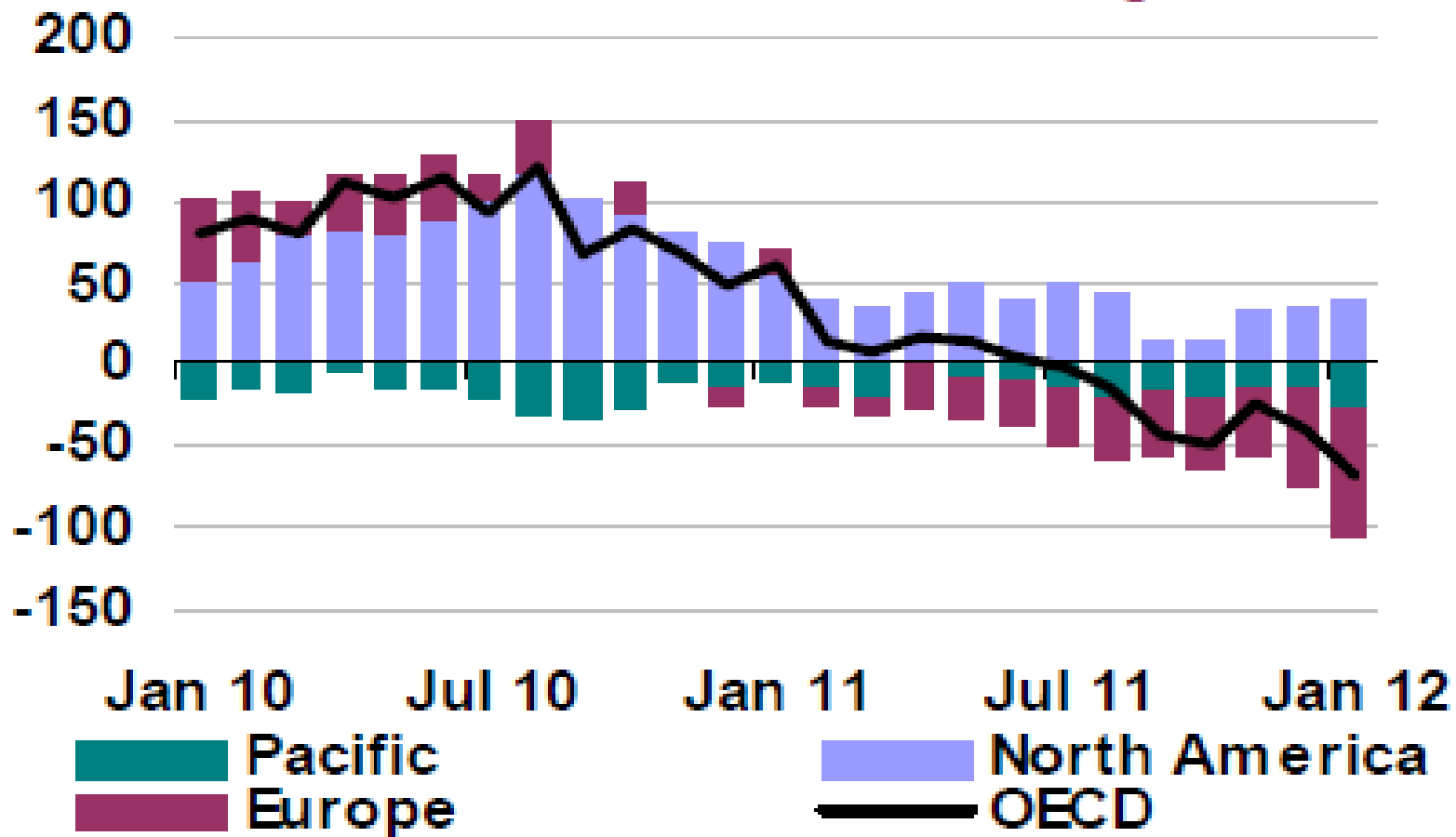


Source: Thomson Reuters

OECD Industry Total Oil Stocks

Relative to Five-Year Average

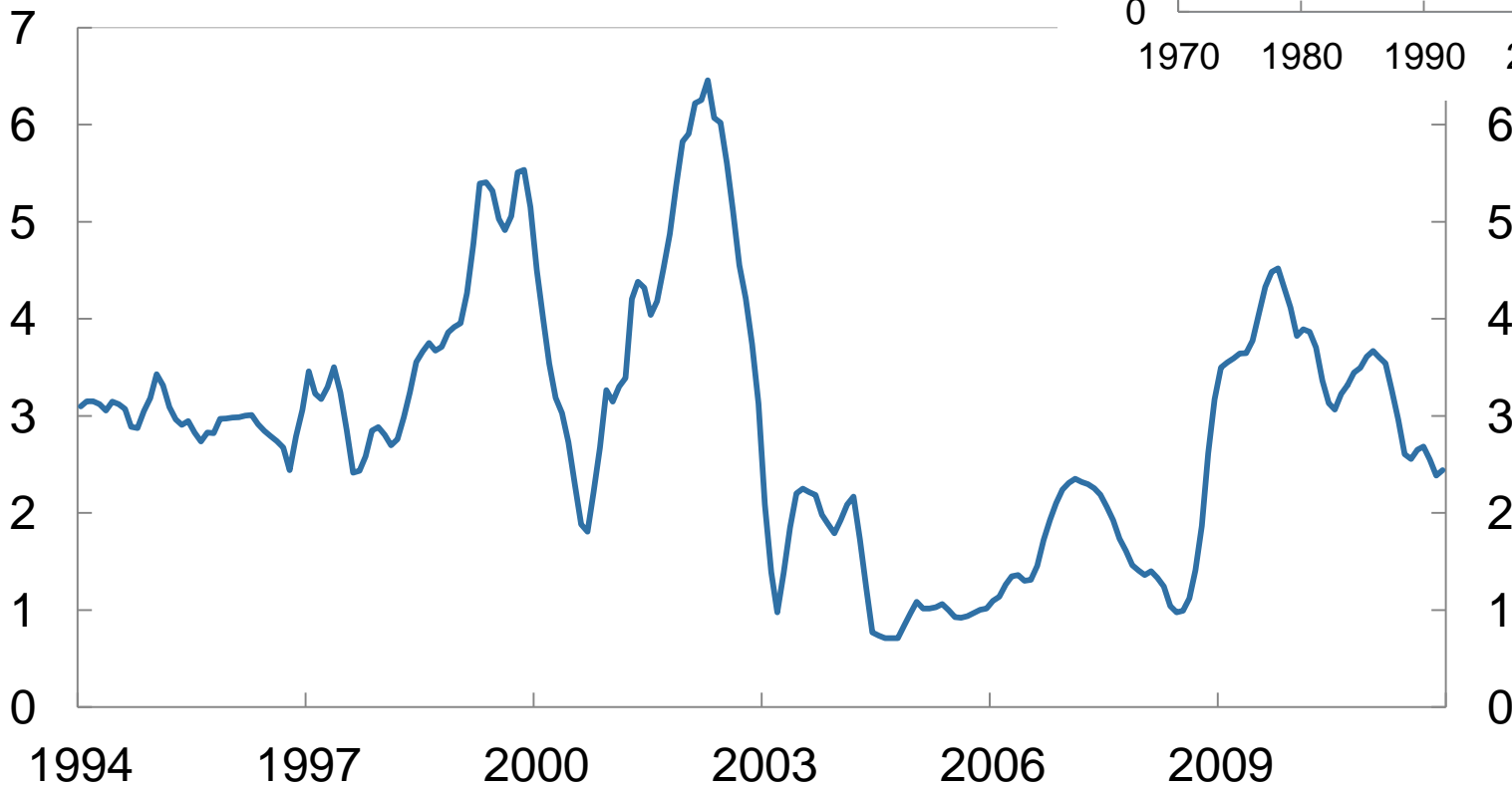
m b



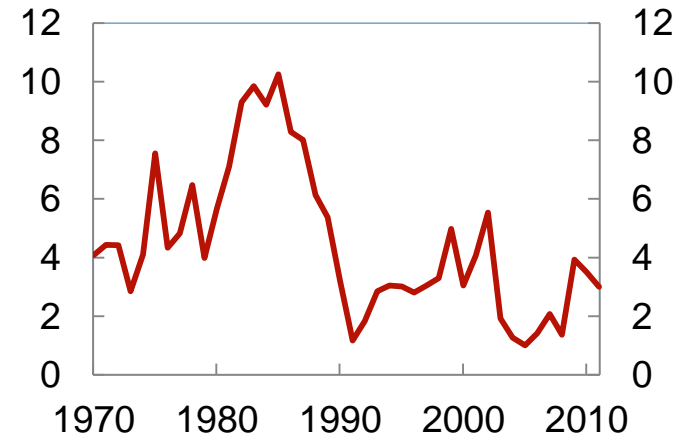
Source: IEA

Spare production capacity for crude oil in OPEC

Million barrels per day. Three month moving average. March 1994 – February 2012.



Annual figures. 1970 – 2011.



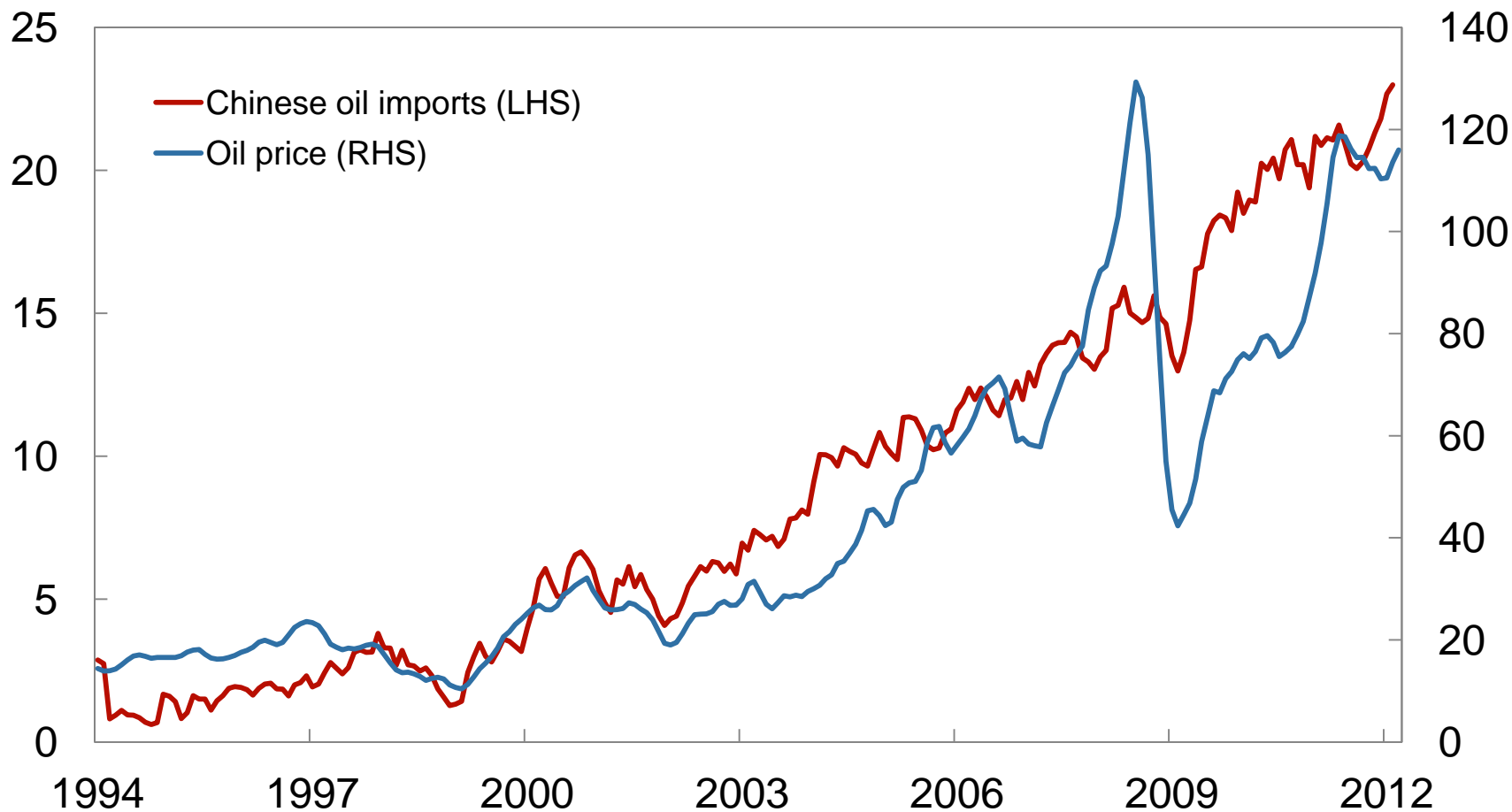
Source: EIA

Structural story

Oil price and Chinese imports of crude oil

3 month moving average. January 1994 – March 2012.

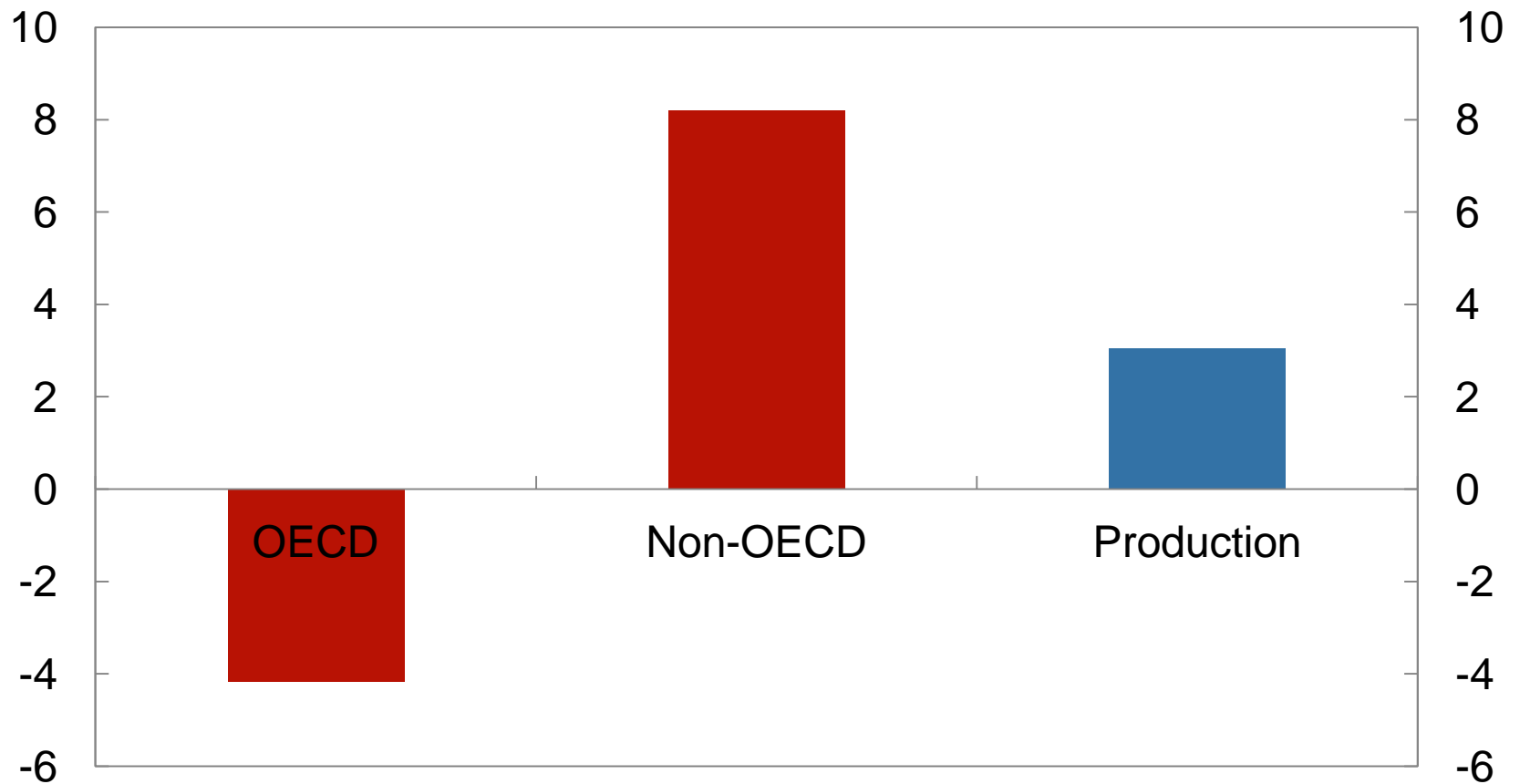
Oil price: USD per barrel. Imports: Million metric ton per month



Source: Thomson Reuters

Change in global oil consumption and production 2005 – 2011

Million barrels per day



Sources: Energy Information Administration and Norges Bank

Long term marginal costs

- World Energy Outlook 2011
 - oil prices in the range from 70 to 90 US dollars per barrel are needed to cover private companies' long-term all-in costs for new oil outside OPEC.
- This composite measure is probably a form of average, so long-term *marginal* costs are arguably higher.

Supply challenges ahead

- IEA's chief economist Dr Fatih Birol
 - Due to high decline rates in current oil fields, fresh sources of oil equivalent to the output of four Saudi Arabias will have to be found simply to maintain present levels of supply by 2030
 - i.e. even without any growth in global oil demand over that period

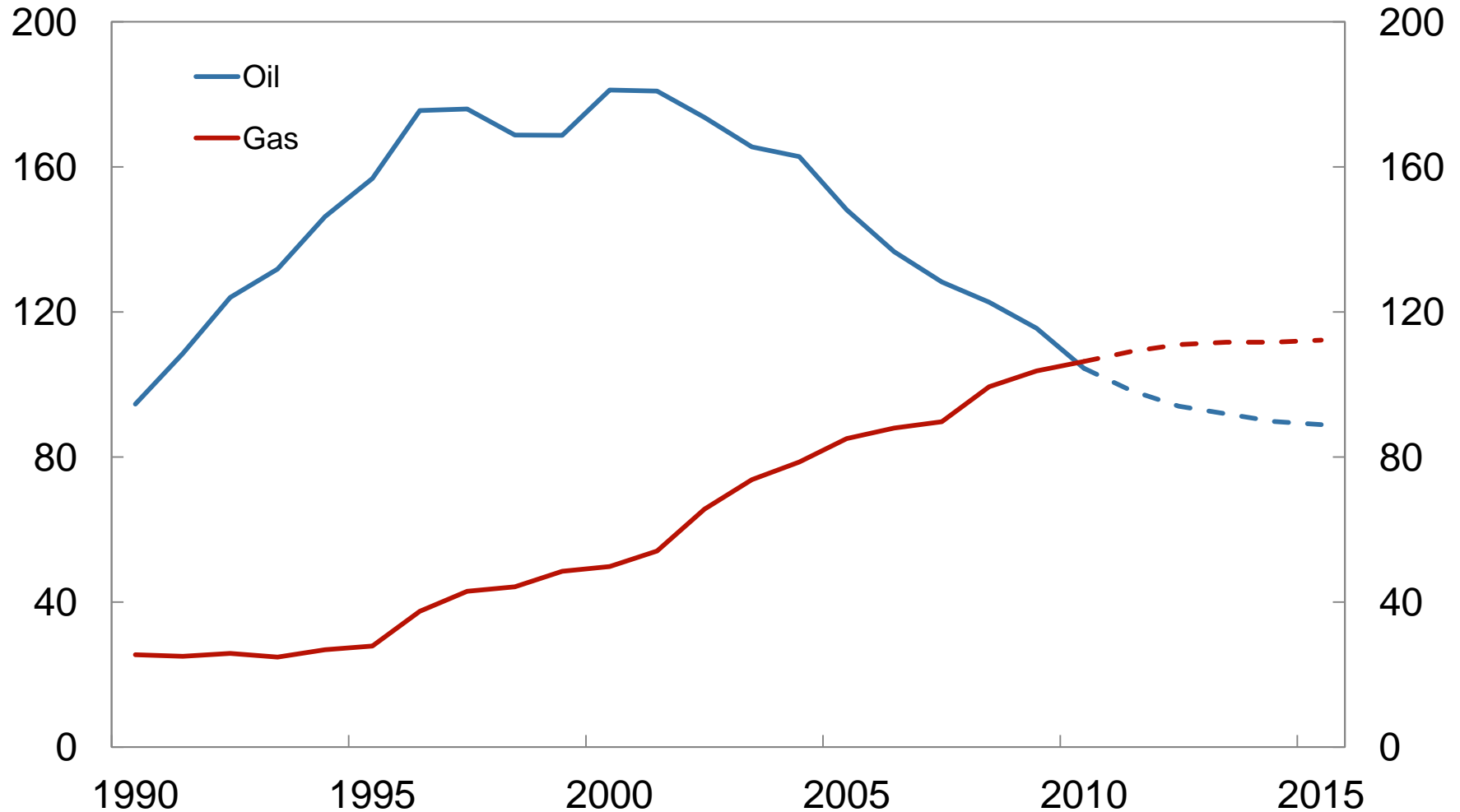
Target price from OPEC

- Saudi Arabia, as the key OPEC swing producer, has recently stated that it aims at an oil price around 100 dollars per barrel.

Natural gas prices

Oil and gas production on the Norwegian continental shelf

Millions of Sm³ oil equivalents. 1990-2015¹⁾

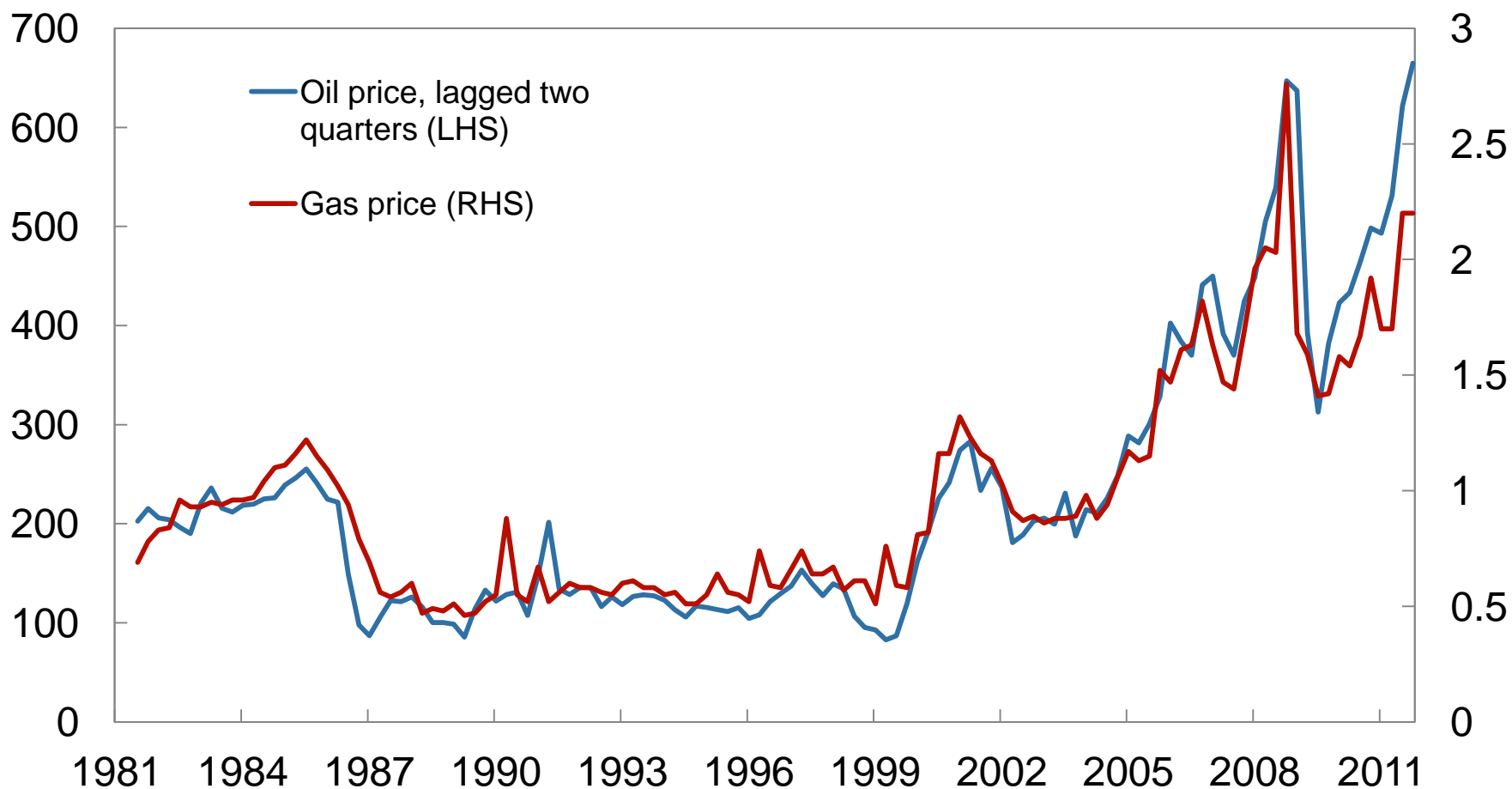


¹⁾ Figures for 2011 - 2015 are projections from *The shelf 2010*

Source: Norwegian Petroleum Directorate

Export price of Norwegian gas and oil

Oil: NOK/barrel. Gas: NOK/Sm³



Source: Statistics Norway and Norges Bank

Crash course in international gas pricing

- Much of the traded gas across borders in Europe and OECD Asia is sold under long-term contracts, with linkages to the price of oil or refined products.
- In a growing number of markets¹⁾, gas prices are set freely in the market, an approach known as gas-to-gas competition.

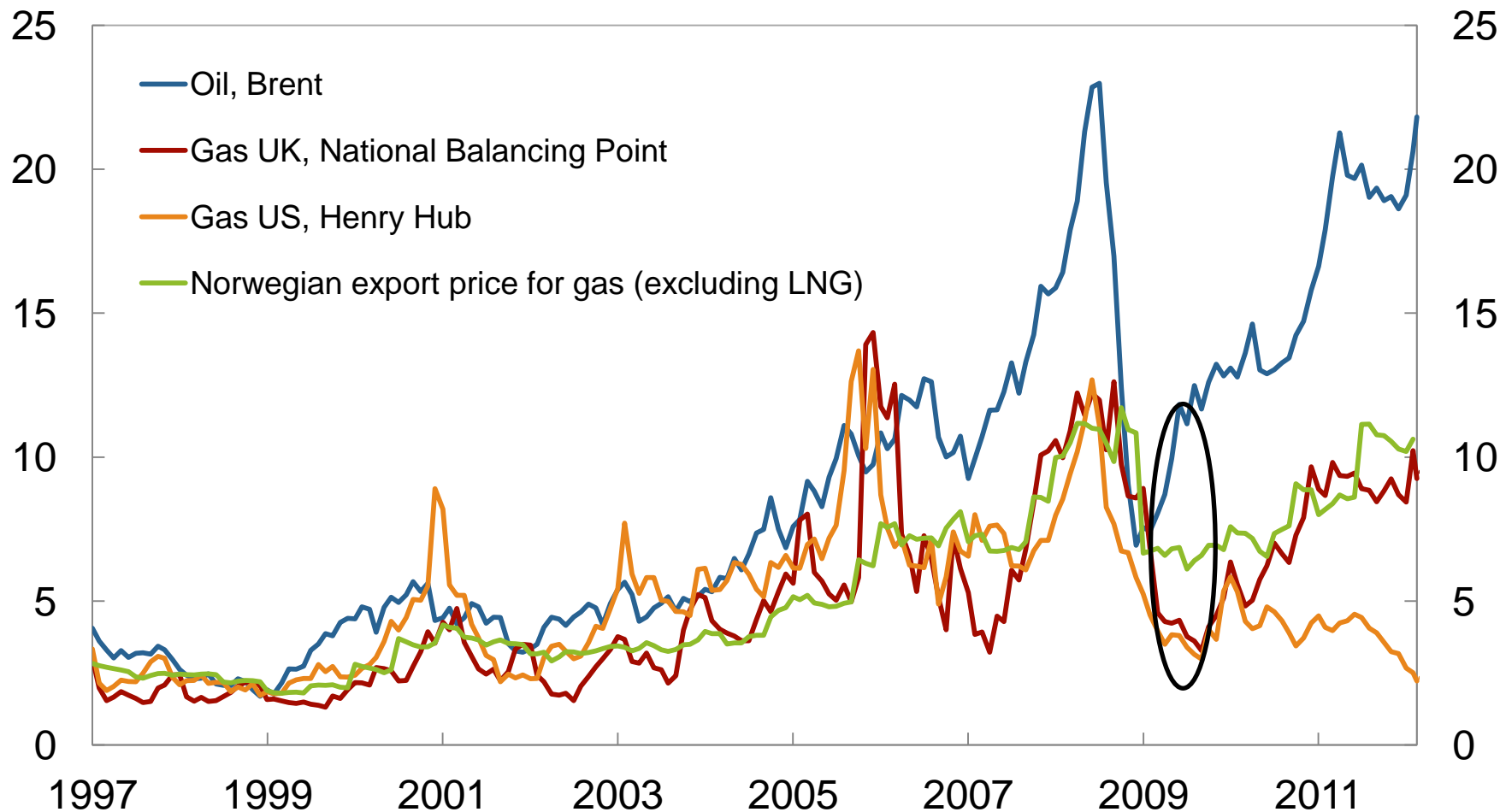
1) North-America, United Kingdom, Australia and increasingly in continental Europe

The relationship between prices for oil and natural gas

- Substitution effects both on the demand and supply side
- Common factors
- Arbitrage activity

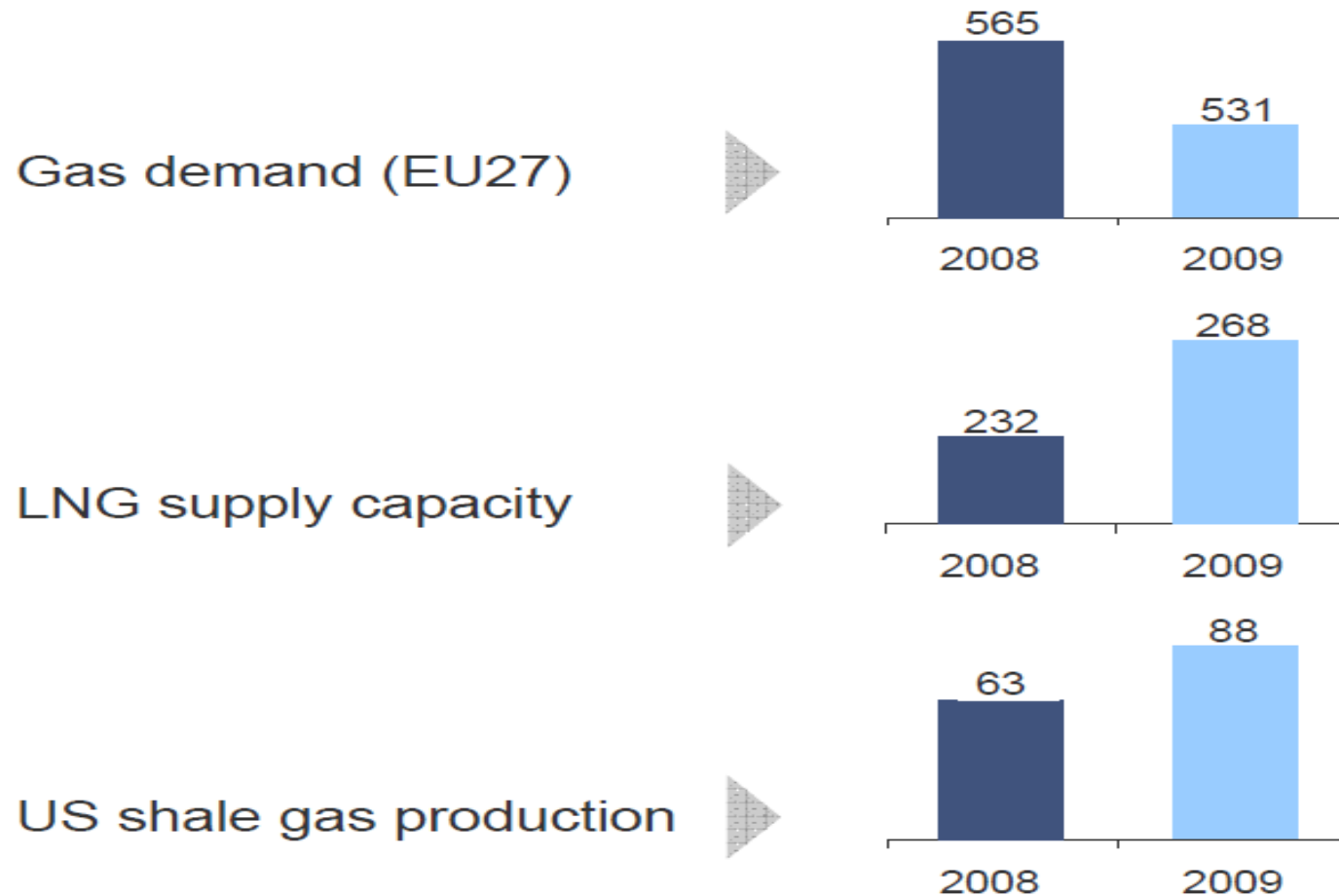
Oil and gas prices

Monthly figures. USD/MMBtu. January 1997 – March 2012.



Sources: Thomson Reuters, Statistics Norway and Norges Bank

Reduced demand and increased supply in 2009



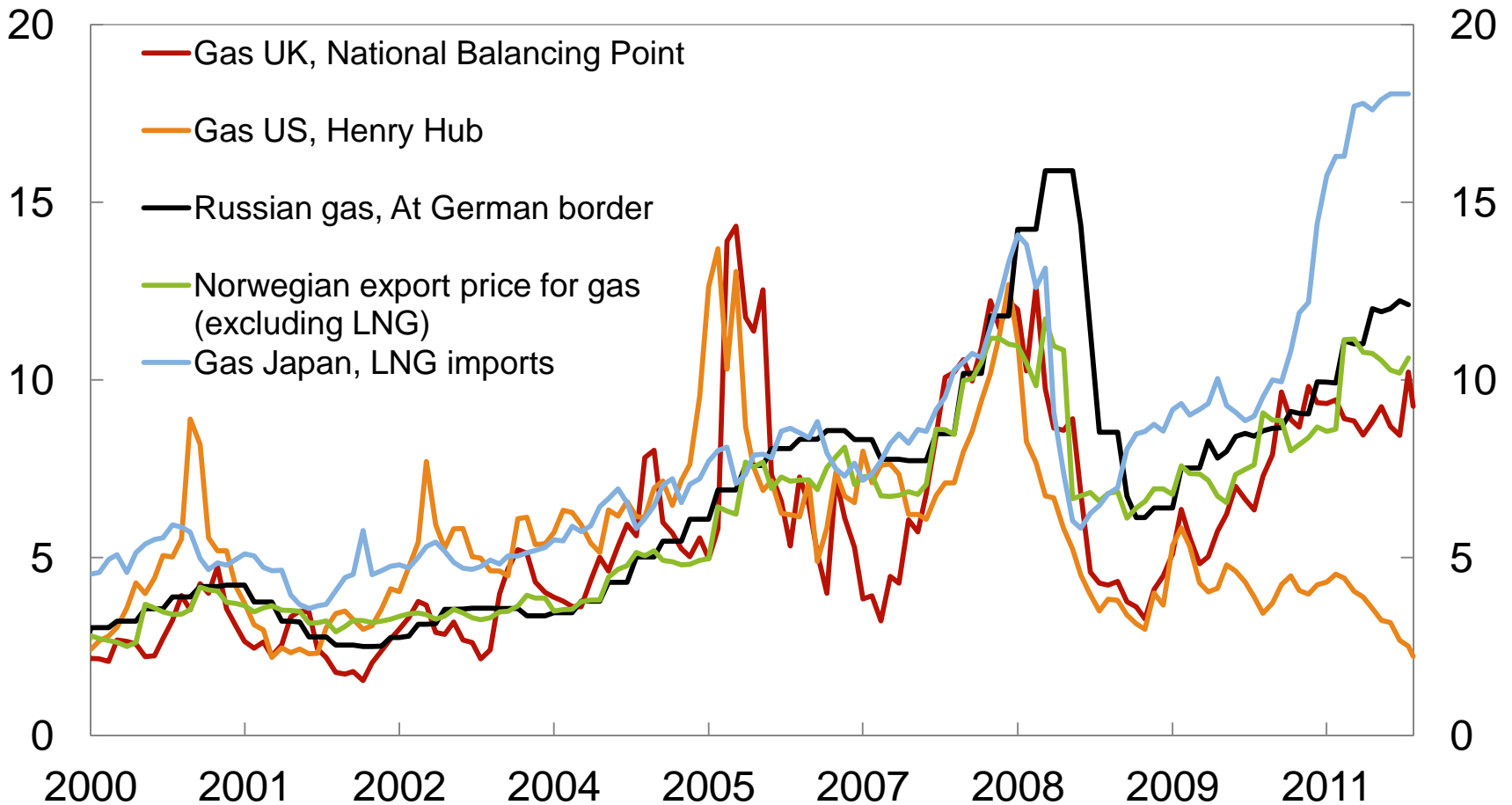
Sources: Statoil

Decoupled?

- Certainly for US natural gas prices
- Not for market based prices in UK
- And not for oil-indexed Norwegian prices, although renegotiations are reportedly intensifying
- See Economic Commentaries 4/11: "Increased gas exports, but what about prices?"

Gas prices

Monthly figures. USD/MMBtu. January 2000 - March 2012¹⁾



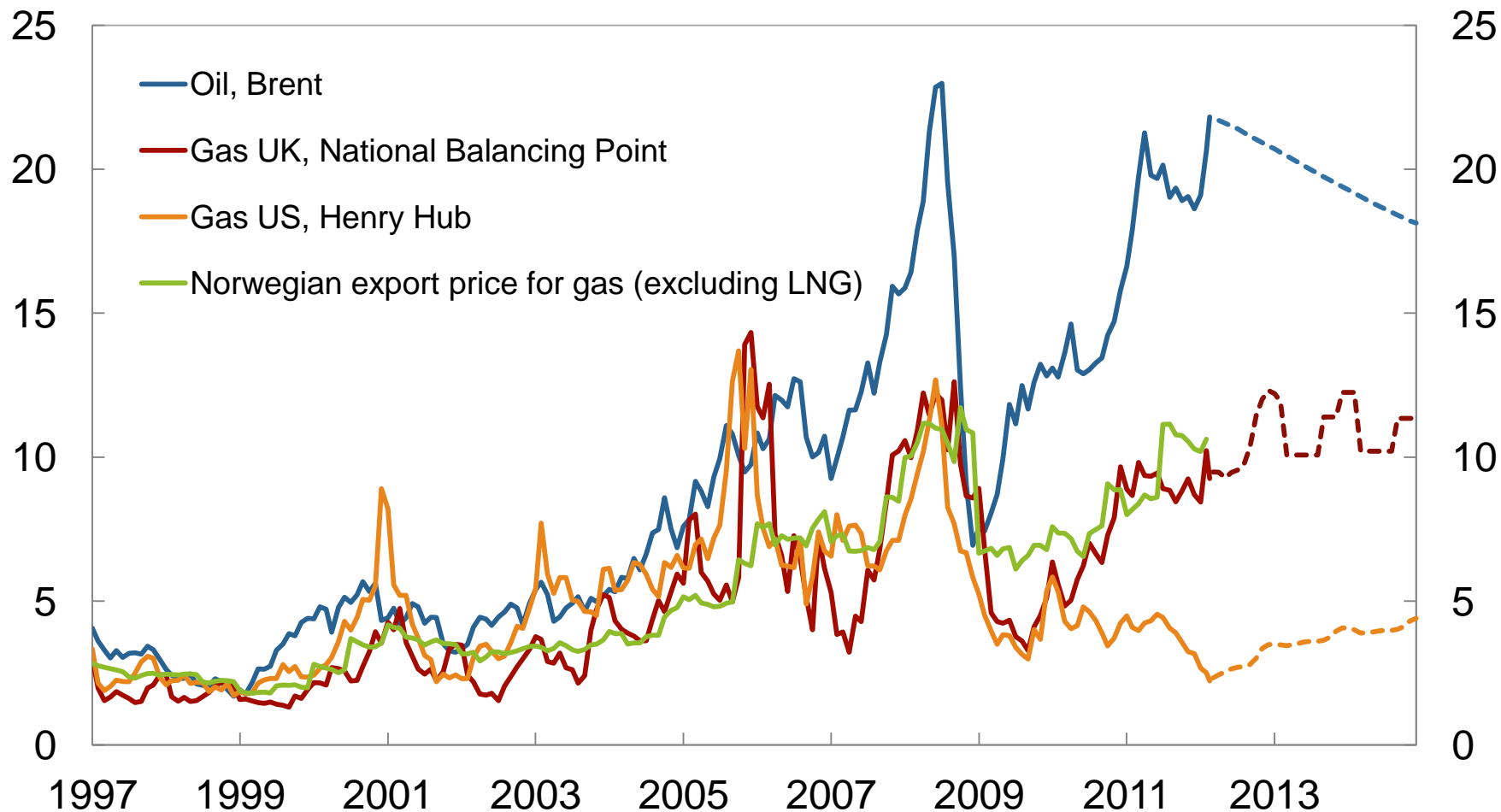
1) For March 2012 calculated as daily average

Sources: Thomson Reuters, IMF and Statistics Norway

Oil and gas prices

Monthly figures. USD/MMBtu. January 1997 - March 2012.

Broken lines indicate futures prices April 2012 – January 2015¹⁾



¹⁾Futures prices as at 19 March 2012

Sources: Thomson Reuters, Statistics Norway and Norges Bank

To summarize:

- We use futures prices for forecasting oil prices, but maybe some new insights today or tomorrow?
- We believe oil prices are high for fundamental reasons, but may come down somewhat in the time ahead.
- Natural gas prices deserve attention.