

GLOBAL ECONOMIC OUTLOOK – FEBRUARY

Monetary and Statistics Department
External Economic Relations Division

2013

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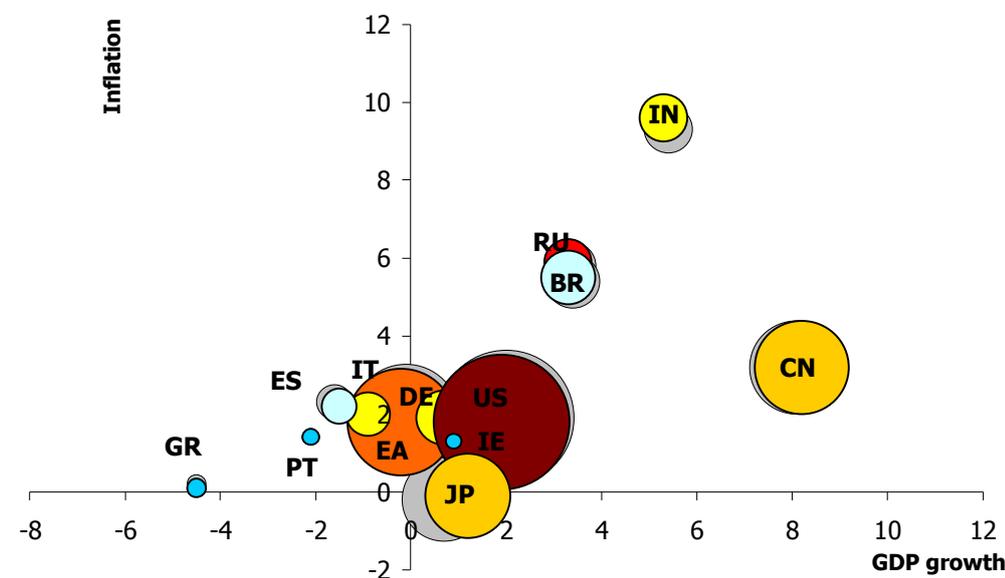
The February issue of Global Economic Outlook presents its regular overview of recent and expected developments in selected advanced and emerging economies, focusing on key economic variables such as GDP, inflation, leading indicators, interest rates, exchange rates and commodity prices. In the second issue of this year, we also focus on the market for natural gas, the third most important global energy commodity. This section describes the pricing and consumption of natural gas (see the Chart) in various parts of the world, as well as essential features of the global gas trade and the differences between it and the oil market.

The economic outlooks for advanced economies in 2013 showed little improvement again in February. This is due to still elevated uncertainty about future economic developments, which, together with ongoing public finance consolidation, is negatively affecting household consumption and corporate investment. It is also becoming increasingly apparent that the euro area economy will remain in recession this year. Germany – previously the economic engine of the euro area – is not in the best shape either, as shown by the latest German GDP data. Japan, however, should keep its economic growth rate above 1% and gradually extricate itself from the feared deflation. Moderate optimism can be derived only from the data on the US economy. However, this is conditional on a medium-term solution being found to the USA's fiscal problems. Most emerging economies, including the BRIC countries, which we monitor in detail, should maintain robust growth rates in 2013, although these are reflected in higher expected inflation rates.

The interest rate outlooks for 2013 point to steadily rising rates both in the euro area and in the USA, where, however, the rise is slower. At the one-year horizon, the currently weak dollar (especially against the euro) should appreciate against the euro and the currencies of other advanced countries (the Japanese yen and the Swiss franc) and also against some emerging economy currencies (the Brazilian real and the Russian rouble). By contrast, it is expected to weaken against the Indian and Chinese currencies.

Dollar prices of oil and natural gas still indicate a slight decline from their currently elevated levels in late 2013. A decline is also expected at the one-year horizon for food and non-energy commodities. Prices of metals and non-food agricultural commodities should remain broadly stable throughout 2013.

Outlook for the global economy in 2013



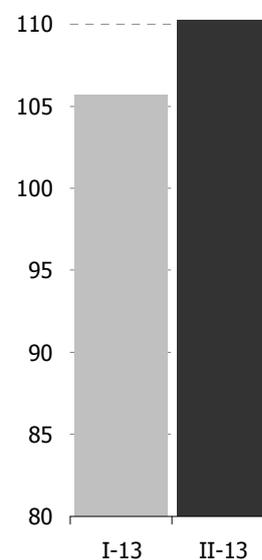
Natural gas cons., bn m3/year

<10	10-40	50-80	110-140	310-340	480-510	660-690
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Note: The size of each point represents the size of the country/region according to nominal GDP in US dollars in 2011. The points are coloured according to natural gas consumption in 2011. The grey colour is the CF forecast (GDP, inflation) or Bloomberg survey (oil price) from the previous month. [Cut-off date for data: 15 February 2013]

Source: Bloomberg, EIU, Consensus Economics, CNB calculations.

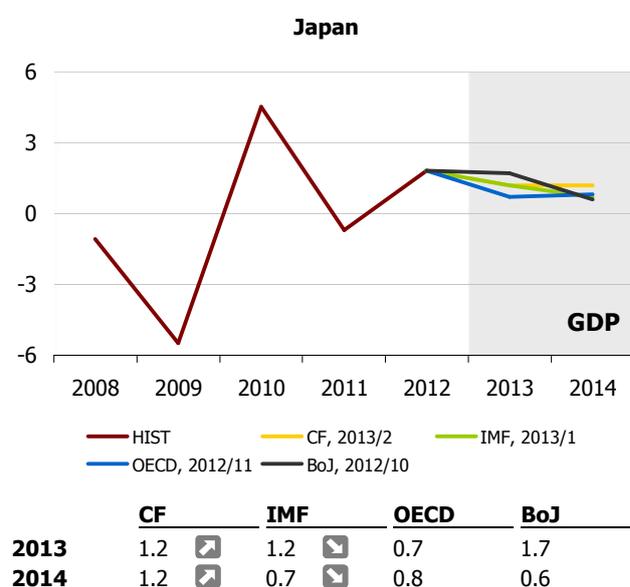
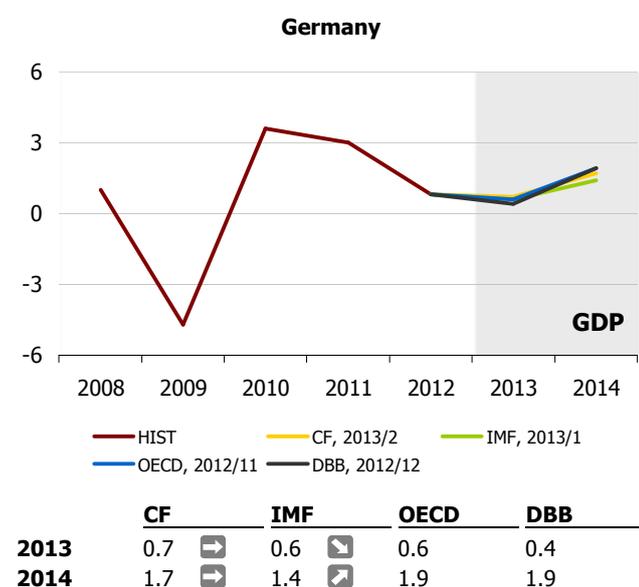
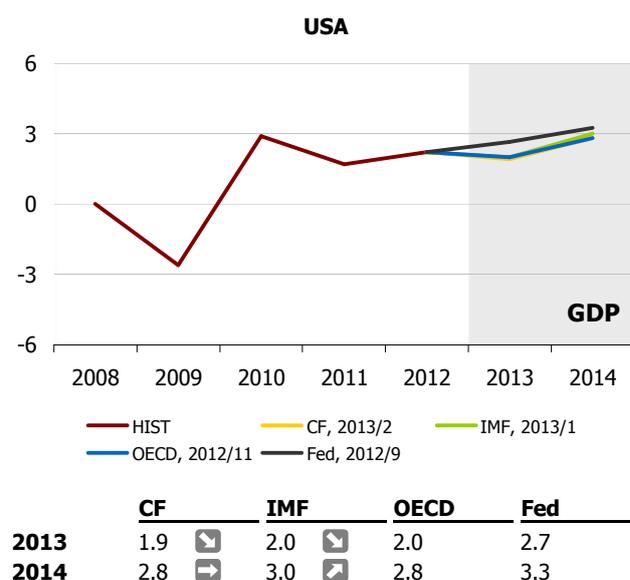
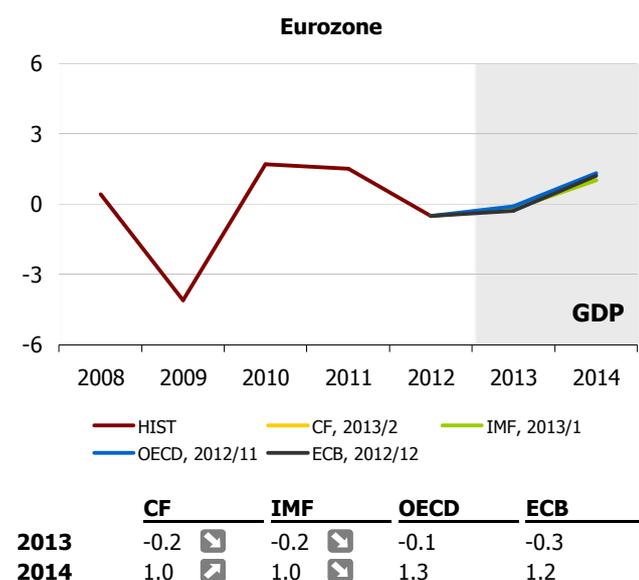
Outlook for Brent crude oil prices in December 2013



II.1 GDP outlook in advanced countries

The January *World Economic Outlook* (IMF) expects global economic growth to go up slightly this year, albeit at a slower pace than expected in the October outlook. It also notes that the euro area's return to growth has been delayed. Although the uncertainty associated with the debt crisis has been replaced by modest optimism in recent weeks, the latest CF outlook expects a 0.1 pp larger contraction of the euro area economy than the January outlook (see the Annex). The question remains to what extent this outlook has been affected by the 0.5% quarter-on-quarter decrease in German GDP in 2012 Q4. Overall, euro area GDP will contract by 0.2% in 2013 according to both CF and the IMF. By contrast, Germany should record growth of 0.6%–0.7%. The outlook for the USA is rather better, with both institutions expecting growth of 1.9%–2.0% this year. According to CF and the IMF, economic activities aimed at boosting growth, government actions and tax reforms should keep GDP growth in Japan this year at 1.2%.

Next year, the euro area will return to growth and Germany and the USA will record faster growth.



Note: Legend shows latest forecast data in format "Source, year/month" of forecast publication. HIST: historical values. ECB and Fed: midpoint of range. Arrow indicates direction of revision of newly published forecast. If no arrow is shown, no new forecast was available in previous month or by cut-off date in current month. Asterisk indicates first published forecast for given year.

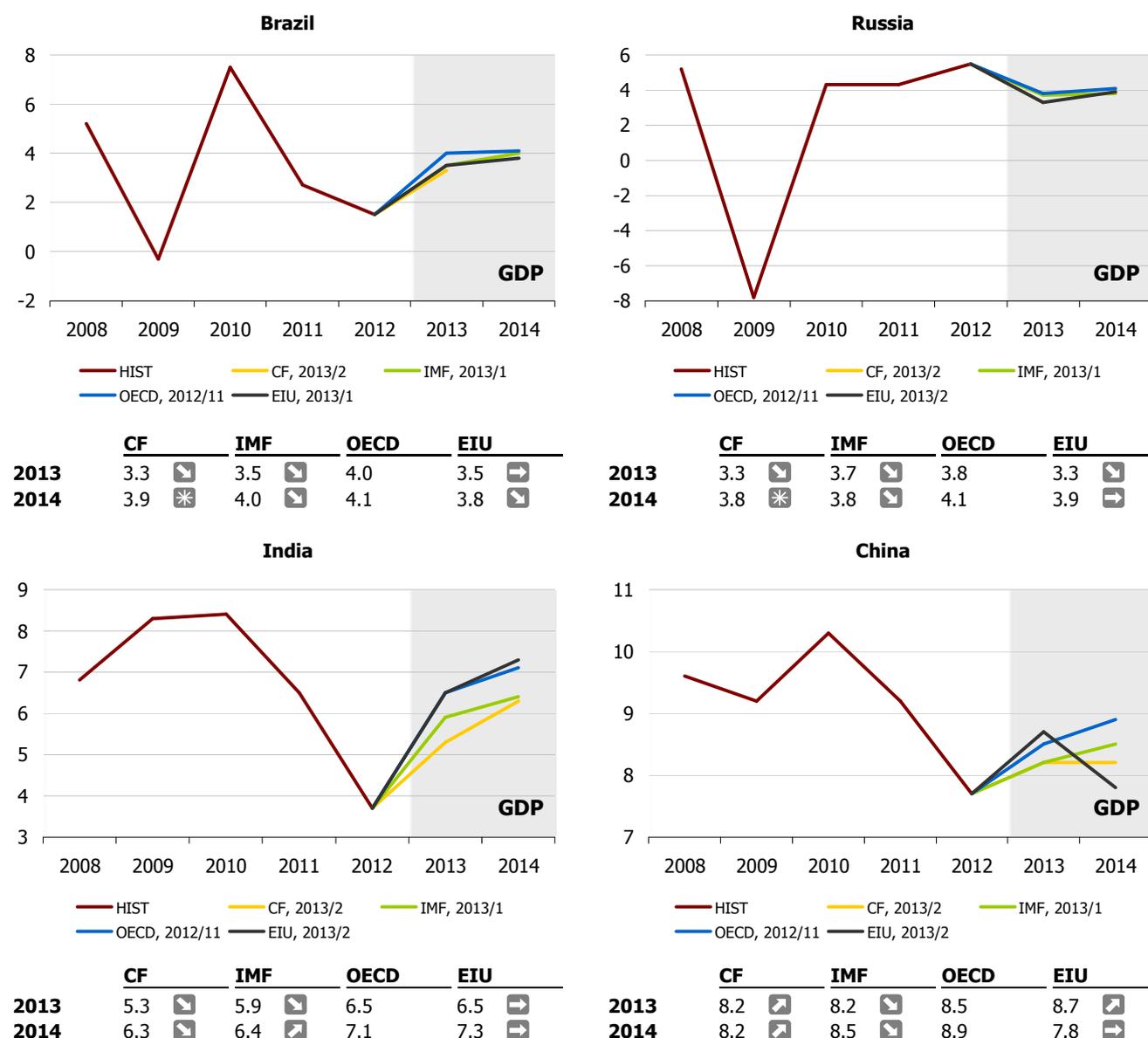
[Cut-off date for data: 15 February 2013]

Source: CF, IMF, OECD, ECB, Fed, DBB, BoJ, CNB calculations.

II.2 GDP outlook in BRIC countries

The forecast for economic growth in the BRIC countries deteriorated slightly from the previous month. The Industrial Production Index in India declined for the second consecutive month, and the Russian economy is showing no signs of recovery either. Moreover, the IMF expects lower prices of commodities, exports of which form a major part of the GDP of some emerging economies. The CF and IMF outlooks for GDP growth thus declined for Brazil, Russia and India. According to the new forecasts, Brazil will grow by 3.3%–4.0%, Russia by 3.3%–3.8% and India by 5.3%–6.5% this year. Accelerating inflation is preventing economic policy in these countries from being any more expansionary. On the other hand, faster economic growth in China is expected by both the new CF forecast (8.2%) and the EIU (8.7%). The IMF revised its forecast slightly downwards. However, China's growth outlook is being supported by a recovery in domestic demand.

China will record the highest economic growth in 2014, with GDP increasing by 7.8%–8.9%. Faster economic growth is also expected in India; according to the new forecasts, it will grow by 6.3%–7.3%. The forecasts for Brazil and Russia both lie within a narrow band of 3.8%–4.1%.



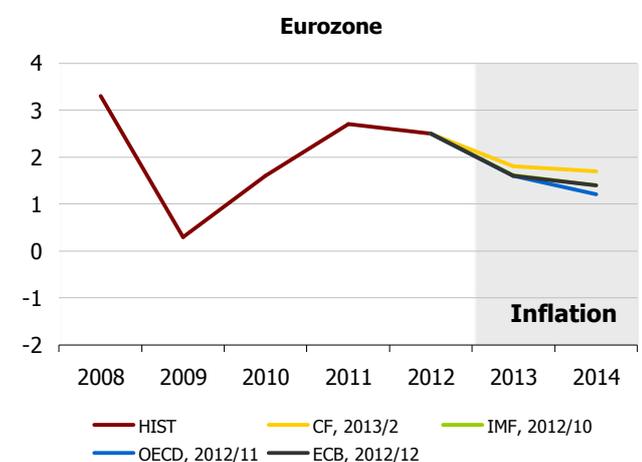
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[Cut-off date for data: 15 February 2013]

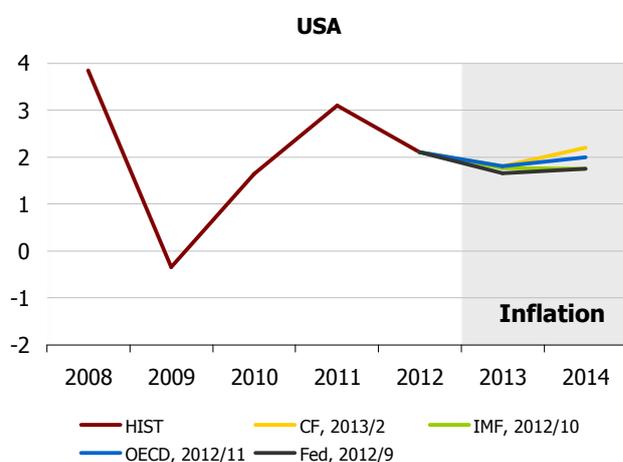
Source: CF, IMF, OECD, EIU, CNB calculations.

II.3 Inflation outlook in advanced countries

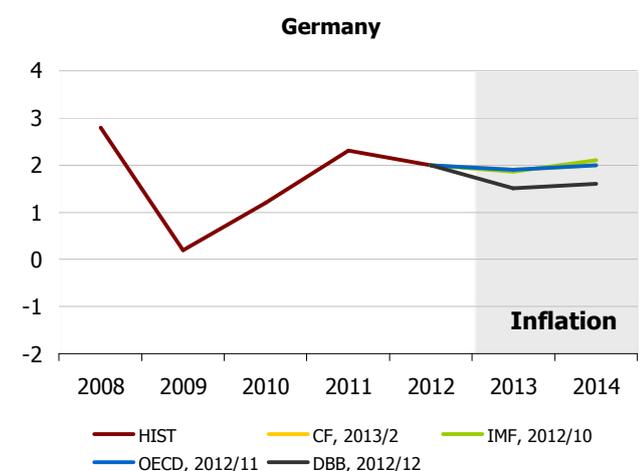
According to the new CF, inflationary pressures will remain subdued. The expected slowdown in consumer price inflation in the euro area and in the United States is greater this year than in the previous CF outlooks. The outlook for inflation in Germany remained unchanged from January (see the Annex). At the two-year horizon, the inflation rate will range from 1.8% to 2.2% in all the monitored advanced countries except Japan. In Japan, inflation should increase from slightly negative levels in 2013 to 1.7% in 2014.



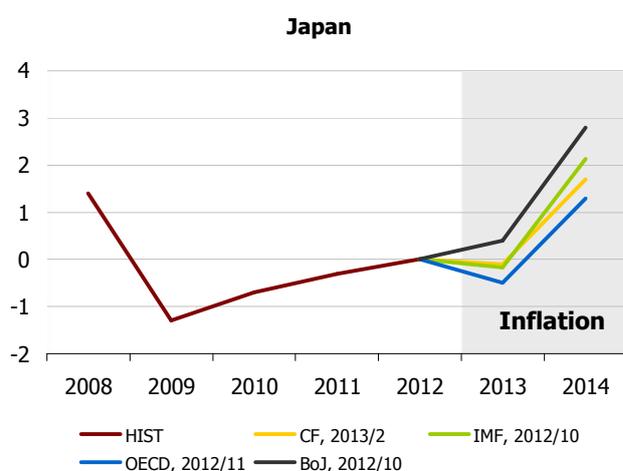
	CF	IMF	OECD	ECB
2013	1.8 ↘	1.6	1.6	1.6
2014	1.7 ↘	1.4	1.2	1.4



	CF	IMF	OECD	Fed
2013	1.8 ↘	1.8	1.8	1.7
2014	2.2 ↘	1.8	2.0	1.8



	CF	IMF	OECD	DBB
2013	1.9 →	1.9	1.9	1.5
2014	2.0 →	2.1	2.0	1.6



	CF	IMF	OECD	BoJ
2013	-0.1 ↘	-0.2	-0.5	0.4
2014	1.7 ↘	2.1	1.3	2.8

Note: Legend shows latest forecast data in format "Source, year/month" of forecast publication. HIST: historical values. ECB and Fed: midpoint of range. Arrow indicates direction of revision of newly published forecast. If no arrow is shown, no new forecast was available in previous month or by cut-off date in current month. Asterisk indicates first published forecast for given year.

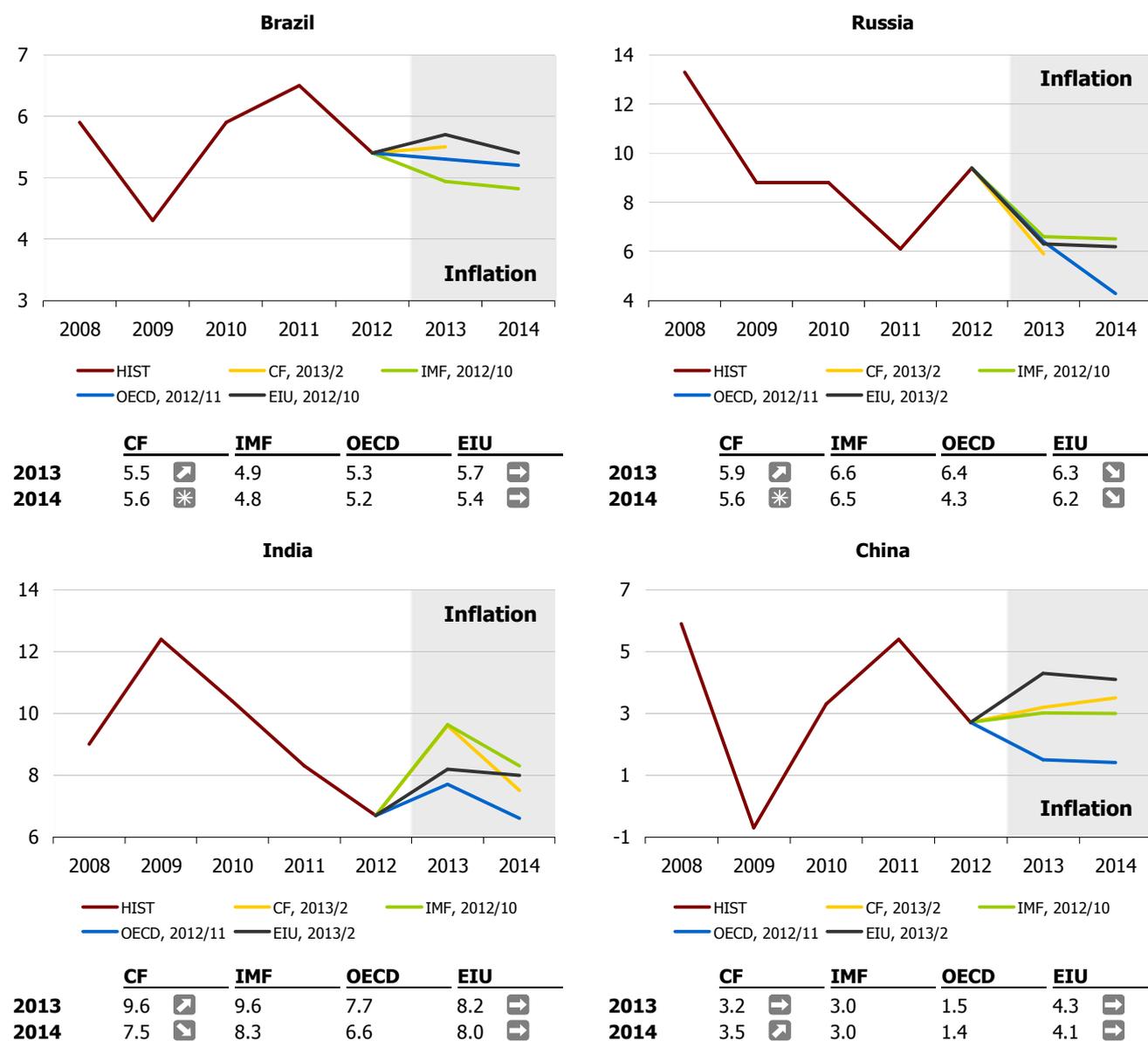
[Cut-off date for data: 15 February 2013]

Source: CF, IMF, OECD, ECB, Fed, DBB, BoJ, CNB calculations.

II.4 Inflation outlook in BRIC countries

Among the BRIC countries, Brazil is experiencing strong upward pressure on prices, while inflation in Russia reached a 15-month high. CF thus increased its inflation outlook for both these countries – to 4.9%–5.7% in Brazil and to 5.9%–6.6% in Russia this year. The slowdown in prices should also halt in India, where inflation is expected to edge up to 7.7%–9.6% this year. The outlook for China remains unchanged. China should maintain the lowest inflation of the BRIC countries (1.5%–4.3%).

Inflation should slow in all the monitored emerging economies in 2014. China will maintain the lowest inflation. By contrast, India will record relatively high inflation, but it will return to a falling path.



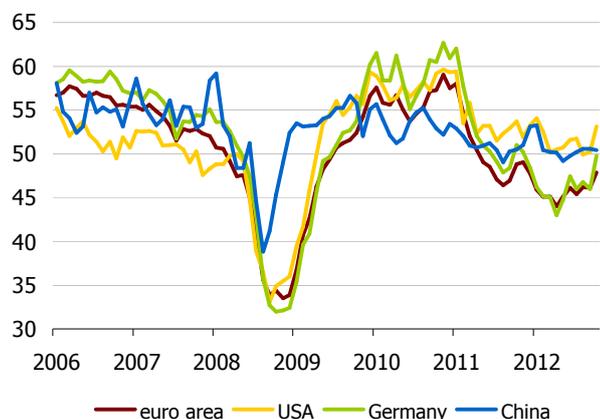
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[Cut-off date for data: 15 February 2013]

Source: CF, IMF, OECD, EIU, CNB calculations.

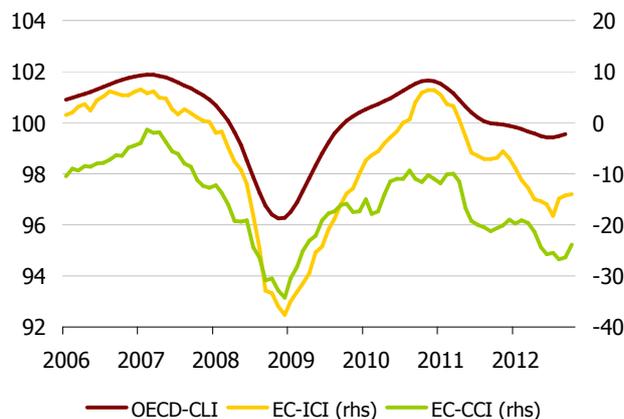
The outlook for the countries and regions under review for the first half of this year improved significantly in January 2013. The US PMI (Purchasing Managers' Index) in industry surged to 53.1 points. The composite indicators also increased. The outlook for US household consumption remains stable. In the euro area, all the leading indicators under review rose. Although PMI growth was robust, the index stayed below 50 points. The other leading indicators also went up. The German PMI recorded a particularly pronounced increase and was very close to the 50-point level. The rise in consumer sentiment was also very strong. The PMI in China fell slightly and was close to the 50-point level.

PMI IN MANUFACTURING



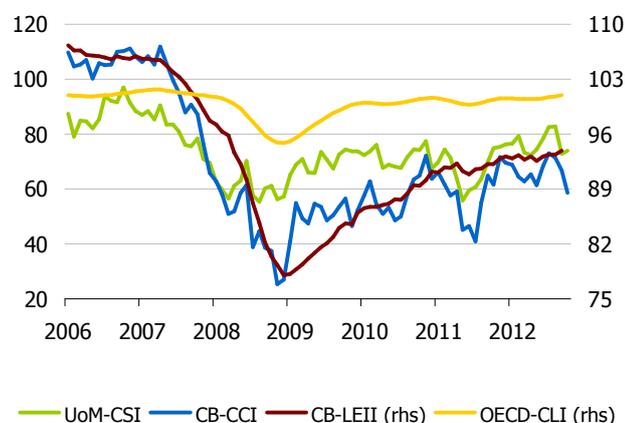
	EA	US	DE	CN
11/12	46.2	49.9	46.8	50.6
12/12	46.1	50.2	46.0	50.6
1/13	47.9	53.1	49.8	50.4

EURO AREA



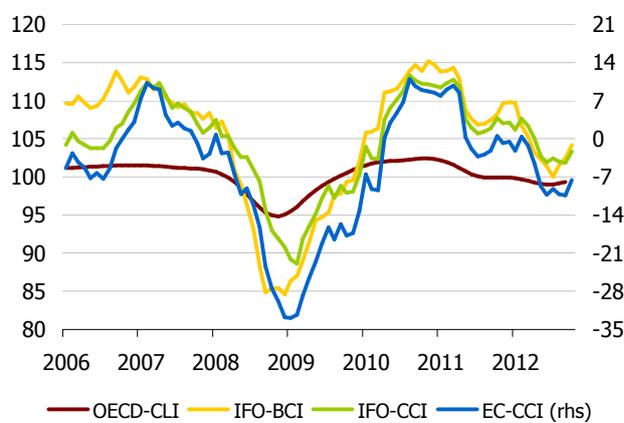
	OECD-CLI	EC-ICI	EC-CCI
11/12	99.5	-14.9	-26.7
12/12	99.6	-14.2	-26.3
1/13		-13.9	-23.9

USA



	CB-LEII	OECD-CLI	UoM-CSI	CB-CCI
11/12	93.4	100.8	82.7	71.5
12/12	93.9	100.9	72.9	66.7
1/13			73.8	58.6

GERMANY



	OECD-CLI	IFO-BCI	IFO-CCI	EC-CCI
11/12	99.1	101.5	102.0	-10.2
12/12	99.3	102.4	101.8	-10.4
1/13		104.2	103.3	-7.6

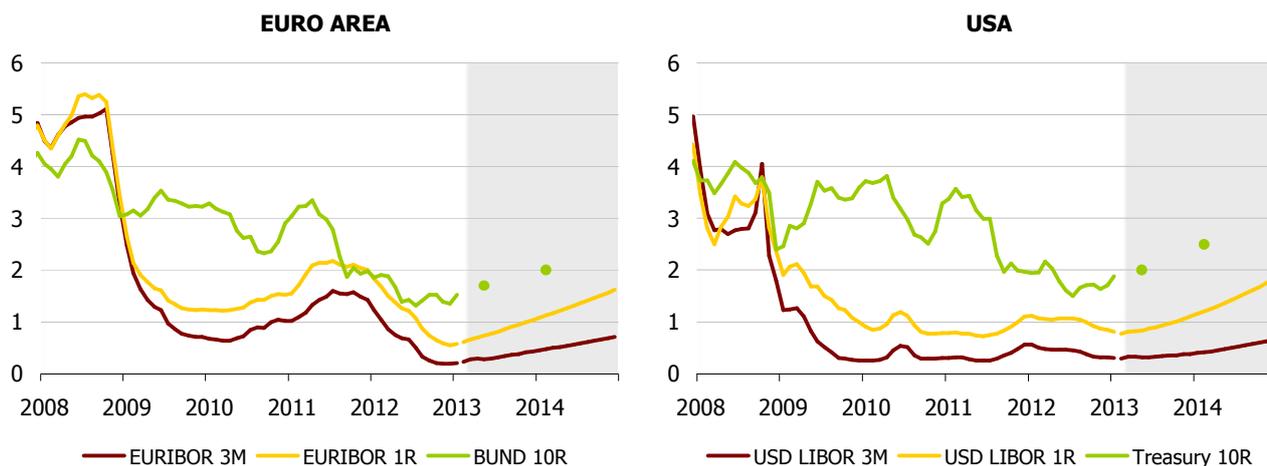
Note: OECD-CLI stands for OECD Composite Leading Indicator, EC-ICI (right-hand scale) for European Commission Industrial Confidence Indicator, EC-CCI (right-hand scale) for EC Consumer Confidence Indicator, CB-LEII for Conference Board Leading Economic Indicator Index, CB-CCI for CB Consumer Confidence Index, UoM-CSI for University of Michigan Consumer Sentiment Index, IFO-BCI for Institute for Economic Research – Business Climate Index, and IFO-CCI for IFO Consumer Confidence Index. [Cut-off date for data: 14 February 2013]

Source: OECD, EC, IFO, Conference Board, University of Michigan, CNB calculations.

IV.1 Interest rate outlook in the euro area and the USA

3M and 1Y EURIBOR rates have been rising since the start of the year, reaching 0.23% and 0.62% respectively on 10 January. The new outlook based on implied rates expects the upward trend to continue. The 1Y rate should go up by more than 1 pp by the end of 2014. At its latest monetary policy meeting the ECB's Governing Council left key rates unchanged. The February CF for the 3M rate increased by 0.1 pp at the one-year horizon only, while the expected 10Y German government bond yield increased by the same amount over the entire horizon.

The 3M LIBOR rate was flat in the same period, while the 1Y rate even recorded a slight decrease. The outlook based on implied rates still expects rates to rise more sharply in 2014. The US Fed also left its key rate unchanged, but will continue to purchase securities.



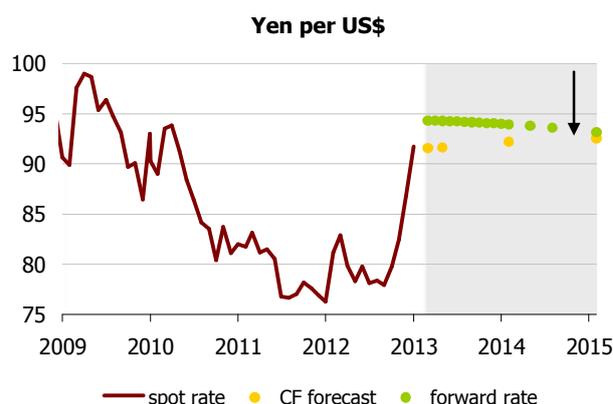
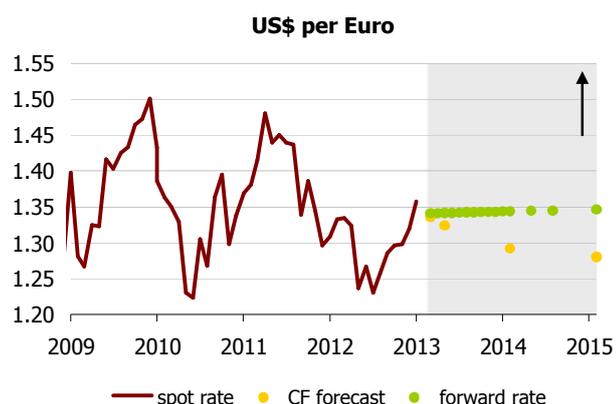
	01/13	02/13	06/13	12/13	06/14	12/14		01/13	02/13	06/13	12/13	06/14	12/14
3M EURIBOR	0.20	0.23	0.30	0.43	0.56	0.71	3M USD LIBOR	0.30	0.29	0.32	0.38	0.50	0.65
1Y EURIBOR	0.57	0.61	0.77	1.03	1.31	1.62	1Y USD LIBOR	0.82	0.77	0.86	1.10	1.42	1.82
10Y Bund	1.52		1.7	2.0			10Y Treasury	1.88		2.0	2.5		

Note: Forecasts for EURIBOR and LIBOR rates are based on implied rates from interbank market yield curve (FRA rates are used from 4M to 15M and adjusted IRS rates for longer horizons). Forecasts for German and US government bond yields (10Y Bund and 10Y Treasury) are taken from CF. [Cut-off date for data: 11 February 2013] Source: Thomson Reuters (Datastream), Bloomberg, Consensus Forecasts, CNB calculations.

IV.2 Outlook for selected exchange rates

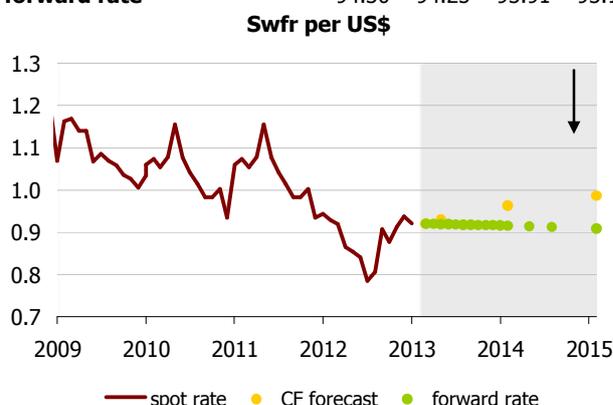
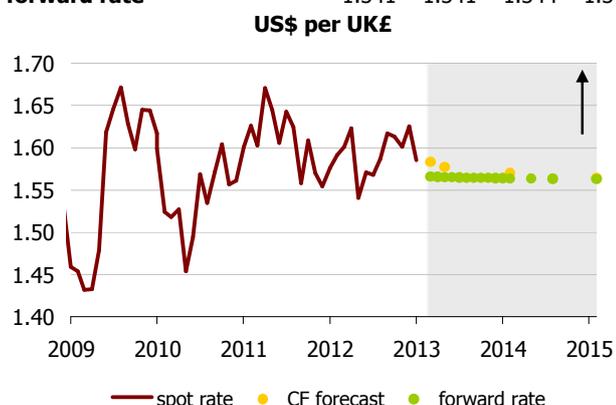
After appreciating against the dollar since mid-November the euro reached a 15-month high in the first week of February. It then weakened after the ECB President said that the current strength of the euro reflected confidence in the single currency, but both the nominal and real effective exchange rates were close to their long-term averages. However, he stressed the importance of the exchange rate for growth and inflation and said it would be closely monitored. On the other hand, in addition to Fed policy, new data from the US economy, especially a quarter-on-quarter dip in 2012 Q4 due to defence spending cuts and falling inventories, speak in favour of a depreciation of the dollar. The new CF forecast was little changed from the previous month and the dollar should appreciate against the euro by 3.4% at the one-year horizon. The yen continued to weaken against major world currencies amid growing international criticism of Japanese policy. However, that policy will stay relaxed this year, as the central bank announced a 2% inflation target. The February CF shifted the outlook towards a weaker yen, which should depreciate against the dollar by 1.4% at the one-year horizon. According to CF, the exchange rate of the UK pound will stay at its current level over the next two years, while the Swiss franc will depreciate slightly against the dollar.

The Brazilian real appreciated to an 8-month high against the dollar in early February. Accelerating manufacturing growth is a good sign, but the central bank announced a worse inflation outlook and there is growing speculation that it will not intervene to stop the currency strengthening further. The Russian rouble also appreciated slightly. The Russian government is trying to persuade the central bank to cut interest rates to boost investment, but a pick-up in consumer inflation in January speaks against such a step. An expected capital inflow from the privatisation of NTPC sparked speculation about appreciation of the Indian currency too. The appreciation trend of the Chinese renminbi was also renewed in January. Moreover, following a significant depreciation of the yen, speculation is growing that South Korea and Taiwan, as direct trade competitors, will take similar steps to affect their exchange rates and currency market tensions will increase further.



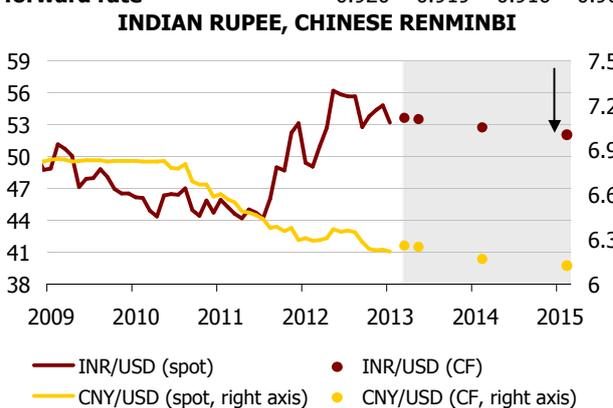
	11/02/13	03/13	05/13	02/14	02/15
spot rate	1.341				
CF forecast		1.336	1.324	1.292	1.280
forward rate		1.341	1.341	1.344	1.346

	11/02/13	03/13	05/13	02/14	02/15
spot rate	94.32				
CF forecast		91.56	91.61	92.16	92.53
forward rate		94.30	94.25	93.91	93.12



	11/02/13	03/13	05/13	02/14	02/15
spot rate	1.566				
CF forecast		1.583	1.577	1.570	1.564
forward rate		1.566	1.565	1.564	1.563

	11/02/13	03/13	05/13	02/14	02/15
spot rate	0.920				
CF forecast		0.921	0.930	0.963	0.987
forward rate		0.920	0.919	0.916	0.909



	28/02/14	03/13	05/13	02/14	02/15
BRL/USD (spot)	1.97				
BRL/USD (CF)		2.02	2.02	2.04	2.09
RUB/USD (spot)	30.21				
RUB/USD (CF)		30.14	30.41	30.86	31.42

	28/02/14	03/13	05/13	02/14	02/15
INR/USD (spot)	53.76				
INR/USD (CF)		53.61	53.49	52.74	52.04
CNY/USD (spot)	6.23				
CNY/USD (CF)		6.26	6.25	6.17	6.12

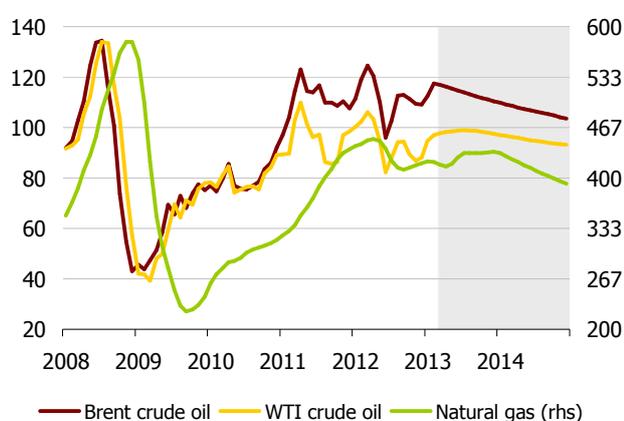
Note: Arrow indicates currency appreciation against US dollar. Exchange rates as of last day of month. Forward rate does not represent outlook; it is based on covered interest parity, i.e. currency of country with higher interest rate is depreciating. Forward rate represents current (as of cut-off date) possibility of hedging future exchange rate. [Cut-off date for data: 11 February 2013]

Source: Thomson Reuters (Datastream), Bloomberg, Consensus Forecasts, CNB calculations.

V.1 Oil and natural gas

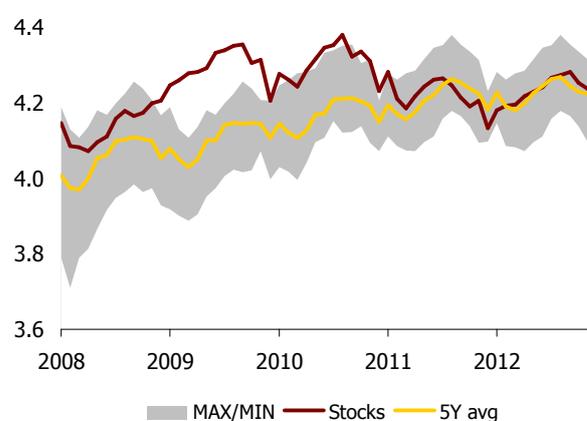
The Brent crude oil price started rising quickly in mid-January, reaching a 9-month high of more than USD 118 a barrel in mid-February. This meant it went up by more than USD 6 a barrel in a single month. This rise is attributed mainly to growing optimism about the global economic outlook based on signals from the Chinese and US economies. The improved sentiment is also reflected in growth in speculative purchases on futures markets. The high current price is being supported by persisting geopolitical tensions in the Middle East and by the depreciating dollar (the correlation between oil prices and the USD/EUR exchange rate has been 0.75 for Brent and 0.8 for WTI over the last two months). However, market fundamentals do not indicate greater imbalances, as expected growth in supply (non-OPEC) should cover the moderately rising demand without any problems. Equilibrium on the market is also being signalled by stocks in OECD countries, which are still slightly above the five-year average, and expected increasing spare extraction capacity in OPEC countries should be a guarantee against any extraction disruptions. The price outlook based on futures contracts thus remains declining, as does the EIA forecast. The CF forecast expects a return to USD 111 a barrel at the three-month horizon and then stagnation at the one-year horizon.

OUTLOOK FOR PRICES OF OIL AND NATURAL GAS

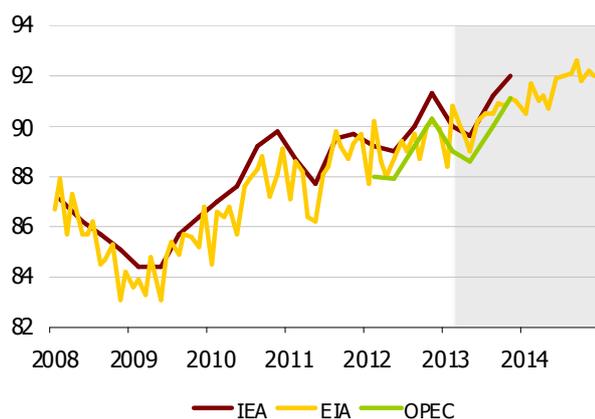


	Brent	WTI	Natural gas
2013	1.93 ↗	4.00 ↗	-1.00 ↘
2014	-6.28 ↘	-2.98 ↘	-3.47 ↘

TOTAL STOCKS OF OIL AND OIL PRODUCTS IN OECD

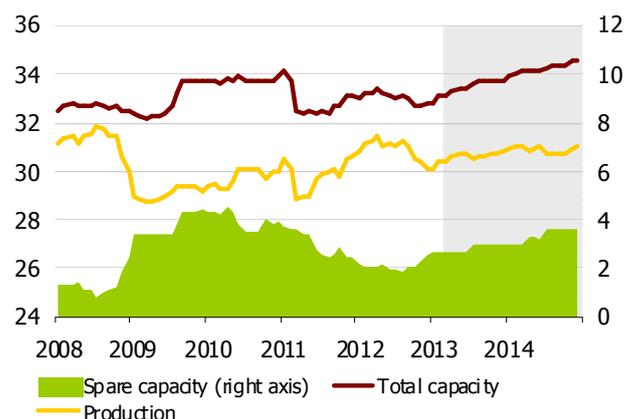


GLOBAL CONSUMPTION OF OIL AND OIL PRODUCTS



	IEA	EIA	OPEC
2013	0.97 ↘	1.18 ↗	0.96 ↗
2014		1.56 ↗	

PRODUCTION, TOTAL AND SPARE CAPACITY IN OPEC COUNTRIES



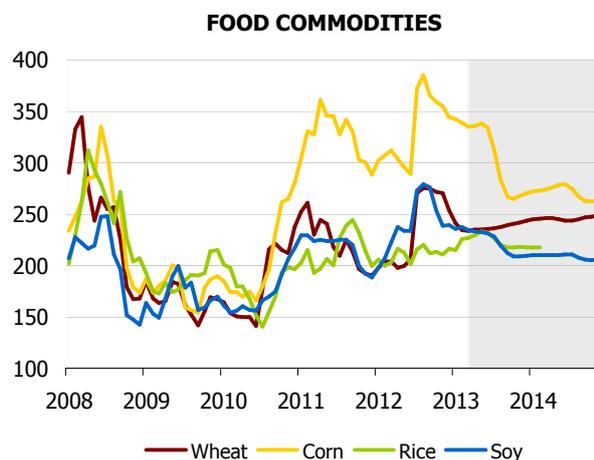
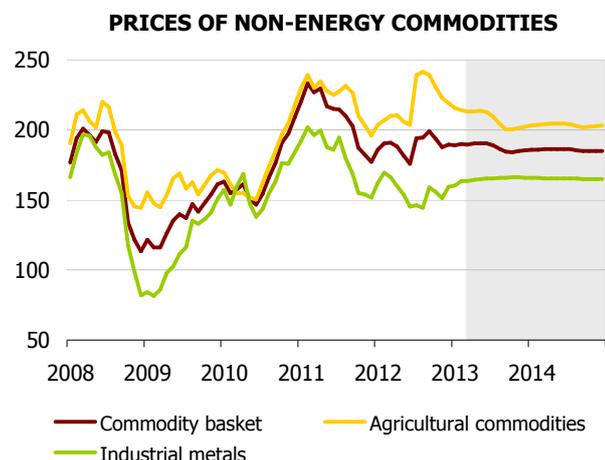
	Production	Total capacity	Spare capacity
2013	-1.12 ↘	1.25 ↘	36.36 ↘
2014	0.90 ↗	2.38 ↗	18.33 ↘

Note: Oil price in USD/barrel, price of Russian natural gas at German border in USD/1,000 m³ (IMF data, smoothed by the HP filter). Future oil prices (grey area) are derived from futures and future gas prices are derived from oil prices using model. Tables show annual percentage changes. Total oil stocks (commercial and strategic) in OECD countries including average, maximum and minimum in past five years in billions of barrels. Global consumption of oil and oil products in millions of barrels a day. Production and extraction capacity of OPEC in million barrels a day (EIA estimate). [Cut-off date for data: 15 February 2013]

Source: Bloomberg, IEA, EIA, OPEC, CNB calculations

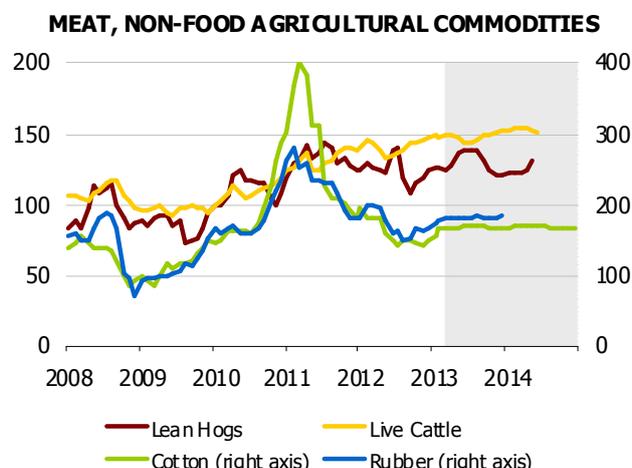
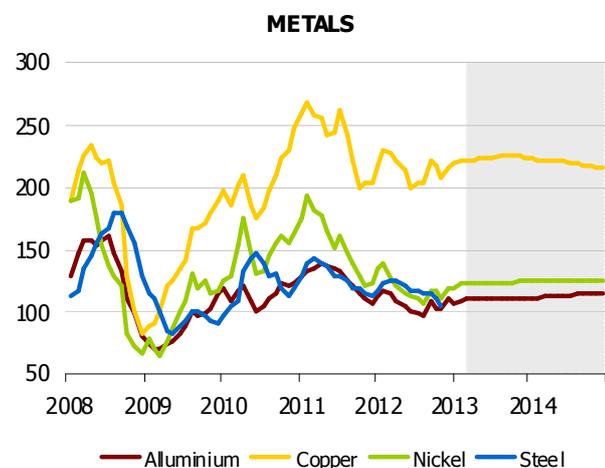
V.2 Other commodities

On other commodity markets the trends observed in previous months weakened. The previous decline in the food commodity price index thus slowed, and a further fall in prices is expected in mid-2013 following the new maize and soy harvest. Prices should then stabilise. By contrast, the industrial metals price index edged up over the past month on the back of improved sentiment about the Chinese and US economies. Metal prices should continue rising until mid-2013 and then flatten out. Prices of technical crops (cotton in particular) also increased in the previous period.



	Overall comm. basket	Agricultural comm.	Industrial metals
2013	-0.8 ↗	-5.0 ↘	5.6 ↗
2014	-1.1 ↘	-2.3 ↘	0.3 ↗

	Wheat	Corn	Soy	Rice
2013	1.1 ↘	-7.5 ↘	6.0 ↗	-6.9 ↘
2014	3.3 ↗	-12.0 ↘	-2.4 ↘	-7.0 ↘



	Aluminium	Copper	Nickel
2013	3.6 ↗	4.2 ↗	3.5 ↗
2014	2.9 ↗	-1.7 ↗	1.4 ↗

	Lean hogs	Live Cattle	Cotton	Rubber
2013	4.0 ↘	5.1 ↘	4.7 ↗	4.9 ↗
2014	-4.0 ↘	3.6 ↗	0.8 ↘	↗

Note: Structure of non-energy commodity price indices corresponds to composition of The Economist commodity indices. All prices are given as indices, 2005 = 100. [Cut-off date for data: 15 February 2013].

Source: Bloomberg, CNB calculations.

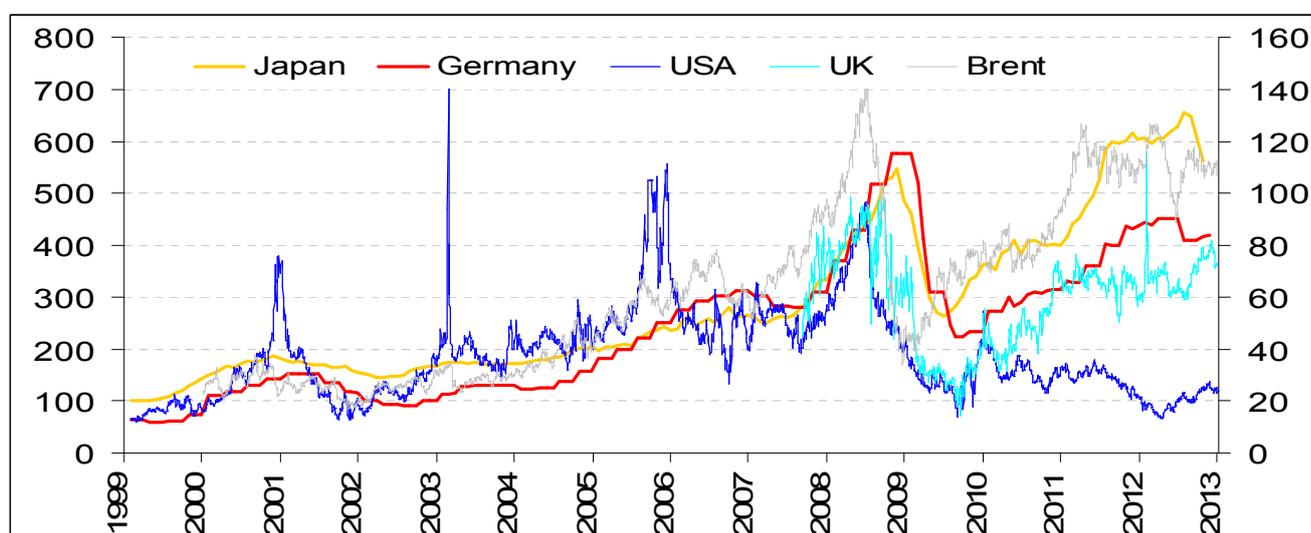
NATURAL GAS MARKET DEVELOPMENTS¹

Natural gas is the third most important energy commodity behind oil and coal. It has recently been attracting attention not only because of rising production from unconventional sources, but also because of diverging prices in different parts of the world. The aim of this article is to introduce the issue of world gas trade and to explain some specificities that distinguish the gas market from the oil market. We will briefly describe developments in different parts of the world and conclude by summarising the main uncertainties that make it difficult to predict the future of the natural gas market.

Introduction

Natural gas prices have recently been attracting increasing attention. Until about 2008, gas prices mirrored oil prices and therefore differed little across markets. However, the situation has since changed and gas prices have been showing very different trends in different parts of the world (see Figure VI-I).

Figure VI-1: Gas prices in selected countries compared to the Brent crude oil price



Note: gas price in USD/1,000 m³ (left-hand scale), Brent oil price in USD/barrel (right-hand scale)

Source: Bloomberg, CNB calculations.

Prices of natural gas can differ significantly across markets because arbitrage between them is difficult. Transporting gas by sea is far more difficult technically and far more costly than transporting oil. Consequently, three large markets still exist. These markets have their own specifics, and prices on them can evolve relatively independently in response to the situation of local economies.

Natural gas is becoming an increasingly promising source of energy as the need to curb growth in global production of greenhouse gases increases. At the same time, new extraction technologies are making it possible for many countries to become self-sufficient in gas by extracting it in their own territory and to reduce their dependence on traditional producers (Russia and the Middle East). Box 1 summarises the main characteristics of natural gas.

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Box 1: Important characteristics of natural gas

Natural gas is one of the most important fossil² energy commodities and is a source of both primary³ and secondary energy. It is currently obtained mainly from conventional reservoirs, which are large areas below the Earth's surface from which gas flows spontaneously through classic wells. These reservoirs are either associated, i.e. found in oil fields, or non-associated. Extraction from unconventional reservoirs has been on the rise in recent years (especially in the USA). In this case, the gas is dispersed in small hollows, usually in sandstone (tight sand gas) or shale⁴ (shale gas). Some natural gas is also extracted from coal beds.

Natural gas varies considerably in composition from one reservoir to another. However, it is always made up mostly of the simplest hydrocarbon – methane, which has a share of 70–90%. It also contains higher hydrocarbons (the alkanes ethane, propane, butane and pentane), CO₂, nitrogen and hydrogen sulphide. In this state it is referred to as raw, or wet, natural gas. When the higher hydrocarbons are separated out (and the gas is almost pure methane), it is described as dry. By analogy to oil, it is described as sour if it contains a significant amount of hydrogen sulphide.

Natural gas is growing in importance as the need to cut greenhouse gas⁵ emissions increases. When 1 GJ of electricity is generated in a thermal power station, about 50 kg of CO₂ is emitted when using natural gas, 69 kg when using fuel oil and 86 kg when using coal (US Energy Information Administration, EIA). Emissions of other pollutants are also significantly lower when gas is used. Gas power stations are also cheaper to build and more flexible to run, so they can respond faster to sudden surpluses or shortages of electricity in the distribution network. This is particularly important given the increasing use of wind and solar power. According to the EIA's optimum scenario, the proportion of gas in the global energy mix will rise to 25% by 2035, with gas replacing coal in second place behind oil. Production of unconventional gas is set to more than triple to 1.6 trillion m³ by 2035, with its share rising from 14% to 32% of total gas production. Most of the rise is expected after 2020, with the USA, China, Australia, India, Canada and Indonesia having the greatest potential. Unconventional resources might make up for the gradual decline in conventional extraction in Europe, with Poland having the biggest potential. However, unconventional extraction requires a larger number of wells and entails significant environmental risks (heavy consumption of water, large amounts of waste water, contamination of groundwater with chemicals).

Gas storage differs from oil storage. Underground caverns in the Earth's surface (depleted mines, salt caverns) or sealed layers of porous materials are mostly used for this purpose.

² Fossil energy sources (unlike renewable sources) were formed hundreds of millions of years ago by the deposition of organic material (residues of plants and organisms) in thick layers. These layers were gradually buried under sediments of inorganic materials both in the seas and on land and were later converted by the effects of pressure and heat into coal, oil and natural gas.

³ Gas is used as a source of primary energy, for example, in households for cooking and heating. Gas burnt in thermal power stations to generate electricity is a source of secondary energy.

⁴ Shale is a fine-grained rock that breaks easily along thin parallel layers. Shale gas extraction was facilitated by the development of horizontal-drilling technology. Such wells are initially drilled vertically and then, after a gas-abundant shale layer is reached, they bend and continue more or less horizontally in this layer. The surroundings of the horizontal part of the well are first fractured using pressurised water and chemicals. The fractured rock then releases gas into the well.

⁵ Methane is a dangerous greenhouse gas which leaks into the atmosphere from coal mines, oil and gas wells, natural gas reservoirs, pipes and processing plants. If this gas cannot be captured, it is usually flared directly at the leak location, as the CO₂ formed in this way is less dangerous.

1. Gas market developments in North America

The North American continent is the largest gas market (see Table VI-1). Gas there is extracted from both conventional and unconventional reservoirs, and some gas is imported as LNG (see Box 2). A well-connected network of gas lines is in operation and gas prices are determined almost solely by fundamentals – demand and supply (gas-on-gas competition). While the price at gas terminals (or directly at the wells) is not subject to seasonal effects, retail prices for consumers show strong seasonality. The price is highest in the winter months, when consumption of gas for heating increases, and falls in the summer. However, this pattern is gradually changing as summer consumption of electricity for air-conditioning goes up and the rising number of gas power stations drives up gas consumption in the summer months, especially in extreme weather.

A sharp rise in unconventional extraction of natural gas from shale sediments has led to a significant fall in prices in the USA since 2010. By 2020, the USA should be independent of gas imports and exporting some LNG. However, exporting gas is a highly controversial topic in the USA, as its impacts would not be positive for all economic groups.⁶ The USA has a large number of coal- (and oil-)fired thermal power stations that are gradually being replaced by gas power stations, with favourable consequences for both the environment and oil and fuel prices.

Table VI-1: Expected natural gas consumption and production (billions of m³)

Country	Consumption				Production			
	2005	2010	2020	2035	2005	2010	2020	2035
OECD America	773	830	912	1051	736	821	934	1065
USA	623	674	716	750	513	597	663	748
OECD Europe	544	544	578	657	309	269	212	235
OECD Asia	150	176	193	227	51	59	93	167
Japan	88	105	105	113	6	6	6	6
Non-OECD Europe	699	685	691	753	813	830	923	1144
Russia	456	462	456	493	640	643	705	883
Non-OECD Asia	241	371	589	903	292	396	493	694
Middle East	278	354	481	680	320	459	631	816
World, total	2883	3197	3777	4777	2826	3200	3789	4791

Source: US EIA.

2. Developments in the Pacific region

The biggest natural gas consumers in the Pacific region are Japan and South Korea, but consumption in China and India has recently been rising fast. LNG makes up a large proportion of the gas supplied. Supplies are agreed largely under long-term contracts, where prices continue to be indexed to oil prices (usually with a lag of 3–6 months). The

⁶ If US companies want to export LNG to countries that do not have a free trade agreement with the USA, they must apply to the Department of Energy (DoE) for authorisation. The DoE issues authorisation only if it finds it to be in the public interest. The DoE is currently registering applications for authorisations to export more than 566 million m³ of gas per day, which is almost one-third of domestic production. It has thus commissioned a study of whether it is in the USA's political and economic interests to permit such exports so that it can profit from higher prices in Asia (which are around four times higher). Representatives of industry (the chemical industry in particular), which are benefiting from cheap gas in the USA, are against this, fearing that it will give their Asian competitors an edge by reducing their costs. The study concluded that although gas prices in the USA would increase, the benefits of exporting would outweigh the higher costs of domestic consumers. However, the impacts would not be positive for all economic groups. Wages would drop in the economy, and this might be interpreted as a massive shift of wealth from workers to oil and gas companies. The DoE will consider further applications on the basis of this study (only one application, amounting to 62.3 million m³/day, has been granted so far).

market situation is tense not only because of rising demand in developing countries, but also because all 50 nuclear reactors in Japan were gradually shut down between March 2011 and May 2012. Not surprisingly, therefore, gas prices remain high and this market has been absorbing large quantities of LNG originally destined for the European market since the Fukushima disaster. Nevertheless, even this region (especially Japan) is partially abandoning oil-linked contracts⁷ and switching gradually to prices quoted in the USA (Henry Hub, Louisiana). This is a further step towards a global natural gas market.

Box 2: Liquefied natural gas (LNG)

In cases where natural gas cannot be piped to the customer in the gaseous state, it is usually transported as a liquid (LNG – liquefied natural gas).⁸ Liquefaction is a technology and energy-intensive process⁹ whereby gas is gradually cooled to its condensation temperature of -162°C (at normal pressure). This shrinks its volume about 600 times. It is then stored and transported in the liquid phase at this temperature in thermally insulated containers. The price of LNG therefore includes the costs of liquefaction, transport and regasification as well as the raw gas. LNG carrier ships have a capacity of around $150,000\text{ m}^3$ and are much more expensive than normal oil tankers because they have to keep their cargo very cold. Owing to the risks involved, they are also more expensive to run. Investment in the liquefaction plant entails considerable risks. Supplies of the commodity must be guaranteed for at least 20 years, which may pose a problem in terms of both the abundance of reservoirs and the political situation in the region. On the other hand, building the regasification terminal involves much lower investment costs and risks. For instance, Clayton Williams Energy Inc. (2008) estimated the costs in the end price of LNG (with a 20-year amortisation period) as follows: liquefaction USD $39\pm 7/1,000\text{ m}^3$, shipping USD $25\pm 10/1,000\text{ m}^3$ (depending on distance), regasification USD $12/1,000\text{ m}^3$, conventional gas extraction USD $25\text{--}70/1,000\text{ m}^3$ (lower for associated oil fields). More recent data are provided, for example, by Levi (2012), who states that the costs of LNG liquefaction and transport from the USA are about USD $145/1,000\text{ m}^3$ to Europe and USD $215/1,000\text{ m}^3$ to Asia. However, the costs of production and transport of LNG from Australia, which has the greatest potential for growth in production, are higher. Since LNG is an oil substitute for most purposes, it is interesting to compare the prices of gas and oil per unit of energy content.¹⁰ In this comparison, an oil price of USD 100 a barrel corresponds to a gas price of USD $630/1,000\text{ m}^3$.

3 The situation on the natural gas market in Europe

Natural gas prices in Europe are somewhere between those in the USA and those in the Pacific area, as gas is sold in Europe under long-term contracts as well as at current market prices (gas supplies from various sources are summarised in Box 3). The Russian Gazprom and the Norwegian Statoil are traditional suppliers of pipeline gas to

⁷ This change is driven by the fact that many long-term contracts that were concluded in the 1970s and 1980s are nearing expiration. This is giving importers a rare opportunity to re-negotiate the conditions of new supplies.

⁸ Another form is compressed natural gas (CNG), which is used in alternative-fuel vehicles. It, however, is at high pressure at normal temperatures (250 bar) and requires pressure vessels for storage. Liquefied petroleum gas (LPG), which can be kept in liquid form at normal temperatures at much lower pressure, is used in a similar way. LPG has about twice (and LNG 2.4 times) the energy content as the same volume of CNG. LNG should not be confused with NGL (natural gas liquids), which are liquefied gases reported within the oil extraction statistics.

⁹ The EROEI (Energy Returned on Energy Invested) is around 20 for natural gas, but only around 8 for LNG.

¹⁰ To convert from energy units to volume units of natural gas, we use the EIA energy calculator, according to which $1,000\text{ m}^3 = 36.1$ million Btu (British Thermal Units, MMBtu).

the European continent. The supplies are based mostly on indexed long-term contracts with a “take-or-pay” clause.¹¹ The price of gas under these contracts depends on oil prices instead of on demand and supply. Demand for gas can thus fluctuate markedly¹² without any change in its price. Buyers may then buy less than the contractual amount (and also buy partly from a different supplier depending on prices), but must purchase a certain minimum amount. Otherwise, they must pay for the gas they fail to take over and take it over within next five years. Traditional long-term contracts are facing increased competition with the free market. The UK gas market was deregulated in 1986. This brought gas-on-gas competition to Britain. Gas is traded at spot prices at a virtual business terminal (the National Balancing Point, NBP). In 1998, a gas pipeline was inaugurated between Norfolk in the UK and Zeebrugge on the Belgian coast (the Bacton-Zeebrugge Interconnector). It enables gas to be sent to Northern Europe whenever the spot price in the UK is lower than oil-indexed prices in Europe. In addition to UK North Sea gas (whose production will gradually decline), the spot market is fed mainly by newly constructed coastal LNG terminals, making it possible for Europe to access the global gas market. Shale gas extraction is not significant in Europe yet and regulations for such extraction (especially environmental protection rules) are awaited. A large number of customers (companies) have thus obtained access to (currently) cheap spot gas from Northern Europe, which they can supply to end-users. This puts buyers that have concluded long-term contracts with Gazprom and Statoil at a disadvantage, especially at a time of high oil prices. Not only these companies, but also the EU as a whole, are thus putting great (and fairly successful) pressure on Gazprom and Statoil to offer better prices amid increasing European competition while maintaining long-term contracts.¹³ After all, the changes are also in the interest of large suppliers of pipeline gas. In order to keep market share in the long run, Gazprom and especially Statoil have been gradually introducing a spot gas price criterion and an option of bargaining every three years into their pricing formulas, in addition to prices of oil products. Although the share of the gas-on-gas market has risen from around 20% in 2005 to a current 50%, the pipeline network in Europe (unlike that in North America) is not yet sufficiently interconnected and full liberalisation of the European market is thus still a long way off. Prices vary considerably across the continent. They are highest in Southern Europe, which is fed mostly by LNG supplies from Algeria and, in the south-east, by gas pipelines from Russia. Gazprom charges different customers different prices (differing by as much as 30%) and contractually prevents former Eastern bloc countries from reselling gas to third countries. The EU is demanding the same prices for all Member States and is pressuring Gazprom to make its pipelines available to third parties. Legislation is also being considered to prevent individual EU countries from signing bilateral agreements with Gazprom under the single energy policy. On the other hand, Russia is taking many steps to defend its strategic interests. It is starting to realise that its sales might be jeopardised if shale gas extraction increases, and is speeding up the construction of new gas pipelines (see Box 3), which should weaken the bargaining position of the current transit countries (Ukraine and Belarus) and discourage investors from building new LNG terminals (thereby reducing gas imports to Europe)

¹¹ From the perspective of liberalisation, the “take-or-pay” clauses pose a serious problem (which is being solved through a top-level dialogue between the EU and Russia), as they prevent new suppliers from entering the market. However, they are necessary for large exporters, as they guarantee a long-term return on investment in new reservoirs and the construction of long-distance gas pipelines, so this way of safeguarding sales is still counted on in continental Europe. The usual “take-or-pay” limit is 80% of the contracted amount.

¹² According to Gazprom, demand for gas in Europe depends much more on weather than on volatile GDP growth.

¹³ Long-term contracts benefit both suppliers, who thus have guaranteed consumption and can optimise their investment activities (e.g. Gazprom in the Arctic), and buyers, who have a legitimate fear that unless suppliers are tied to long-term contracts they might manipulate prices by limiting supplies to the European market.

and from developing shale gas reservoirs. Since 2003, Gazprom has been buying gas from Central Asia¹⁴ (Kazakhstan, Turkmenistan, Uzbekistan and Azerbaijan). Since 2008, it has been paying them almost the same prices as it is charging in Europe, whereas it used to pay them about half that amount. By doing so, it is limiting these countries' support of the Nabucco pipeline, which would be independent of Russian influence. This pricing policy is also intended to discourage intermediaries who would like to supply gas from Central Asia to Ukraine.

Box 3: Supplying Europe with natural gas: status quo and planned projects

According to IEA data for 2011, most gas flows into Europe from the east, through existing Russian transit pipelines from Western Siberia. These pass mostly via Ukraine into Slovakia (annual flow 54 billion m³) and Romania (19 billion m³). Around 30 billion m³ is piped through Belarus to Poland. Together with Western partners, Russia built the North Stream pipeline, which runs under the Baltic Sea directly to the north of Germany. The first line was inaugurated at the end of 2011 and the second in October 2012. The pipeline will have a capacity of 55 billion m³ at full operation (currently 10 billion m³) and will continue to the Netherlands, Denmark, France and the UK. Gas is transported to continental Europe also from the north through subsea pipelines from the Norwegian sector of the North Sea. The largest customers are Germany (49 billion m³), France (17 billion m³) and Belgium (14 billion m³). Norwegian gas is also imported by the UK (26 billion m³), while some UK gas is sent to the European continent (8 billion m³). Subsea pipelines from Algeria and Libya run to Italy (26 billion m³), while Spain is supplied from Morocco and Algeria (12 billion m³).

In addition to pipelines, gas is transported to Europe by sea in a liquefied form (LNG), mostly from Algeria and Nigeria. The continental EU purchased 44 billion m³ in 2011. Most of this went to Spain, France and Italy, while the UK imported 14 billion m³. The rest of European consumption is covered by own production (about 125 billion m³). The highest onshore extraction is recorded by the Netherlands (81 billion m³), followed by Germany, Romania and Italy (31 billion m³ in total).

Given the growing demand, and in order to diversify supplies and reduce dependence on Russian gas, the EU launched a plan in 2002 to build a pipeline to transport gas into Europe through a "southern corridor" from the Caspian coast, i.e. from non-Russian suppliers. This project, called Nabucco, is supported by the European Commission. State-owned companies engaged in gas distribution in the countries through which the pipeline was planned to run were originally supposed to co-fund the project. The original plan has been modified several times and in particular has been shortened (Nabucco West is currently planned to run from Turkey's European frontier via Bulgaria, Romania, Hungary and Austria). A consortium of companies that extract gas in the Azerbaijani Shah Deniz field, from which the Nabucco pipeline is to be fed, is now interested in co-financing it (up to 50%). This increases the chances of it being implemented. The full capacity should be 31 billion m³/year. An alternative project to the Nabucco gas pipeline is the TAP (Trans-Adriatic Pipeline), which should also be fed from Azerbaijan and run from Turkey via Greece, Albania and the Adriatic Sea to Italy. It is possible, however, that both options will be implemented (the one heading into Central Europe and the other into South-East Europe). Azerbaijani gas should be piped from the Caspian Sea initially through Georgia via the BTE (Baku, Tbilisi, Erzurum) pipeline and on to the Western frontier of Turkey via the TANAP (Trans-Anatolian Pipeline), which would partially cover the growing consumption in Turkey itself.

¹⁴ Gazprom is using this to cover shortages in its resources and may postpone investment in gas extraction in Eastern Siberia and in the Arctic, where extraction is still too expensive.

However, Russia does not want to lose influence on the European market and Gazprom (in a consortium with three Western companies) has started to build the South Stream pipeline (from Western Siberia along the bottom of the Black Sea to Bulgaria and on via Serbia, Bosnia and Herzegovina, Croatia, Hungary and Slovenia to Italy). It should come on stream in late 2015/early 2016 and also take gas from Azerbaijan. The initial annual capacity should be 15 billion m³ and the final capacity 67 billion m³ in 2019.

4 Links among individual markets

Linking distant natural gas markets is difficult but is on the rise as LNG production and the number of new shore terminals go up. Although the massive extraction of shale gas in the USA, which has led to a sharp drop in local prices, has so far had no direct impact on other regions, gas is replacing coal as the main source of energy. US coal is finding its way into Europe and other regions, where it is reducing the local price. Coal is thus becoming competitive again (thanks also to a large fall in CO₂ emissions prices) and is pushing down the demand for – and hence also the price of – gas in Europe.¹⁵

Conclusion

The future of the gas market is difficult to estimate, as it depends on a large number of factors. For example, it will depend on the stances of individual countries on shale gas extraction and how abundant and stable the existing unconventional reservoirs will be. Great uncertainty surrounds the construction of new gas pipelines and investment in hard-to-extract reservoirs in the Russian Far East and the Arctic. The question remains how demand and supply will develop in populous Asian countries, especially China, and whether Japan will return to nuclear energy. Uncertainty persists regarding the regulation of CO₂ emissions. Greater emphasis on cutting emissions will boost demand for gas. In the opposite case, coal will be burned to generate electricity.¹⁶ The ratio of gas and coal use in electricity generation is even less predictable for China and India. The long-term forecasts therefore also differ. For example, the International Energy Agency (IEA) expects coal consumption to rise and to near oil consumption in 2017. On the other hand, ExxonMobil (2013) in its 2013 outlook predicts that natural gas will replace coal as the second biggest source of energy by 2025.

Owing to rising production of LNG and falling costs of LNG production and transport, natural gas prices should converge across markets. However, uncertainty persists for exports of LNG from the USA, and the relatively high costs of liquefaction and transport mean that some differences will remain. Since gas is a close substitute for oil (except in transport), prices of gas and oil can be expected to converge again after the necessary infrastructure is built.

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¹⁵ The gas extraction boom in the USA has led to falling CO₂ emissions in the USA and rising emissions in Europe.

¹⁶ For example, Germany is postponing the construction of gas power stations and is building new coal power stations after having shut down its nuclear power stations.

A1. Change in GDP predictions for 2013

	CF		IMF		OECD		CB / EIU	
EA	-0.1	2013/2 2013/1	-0.4	2013/1 2012/10	-0.3	2012/11 2012/5	-0.8	2012/12 2012/9
US	-0.1	2013/2 2013/1	-0.1	2013/1 2012/10	-0.1	2012/11 2012/5	-0.3	2012/9 2012/6
DE	0.0	2013/2 2013/1	-0.3	2013/1 2012/10	0.1	2012/11 2012/5	-1.2	2012/12 2012/6
JP	0.5	2013/2 2013/1	0.0	2013/1 2012/10	-0.6	2012/11 2012/5	0.0	2012/10 2012/7
BR	-0.1	2013/2 2013/1	-0.5	2013/1 2012/10	-1.7	2012/11 2012/5	0.0	2013/2 2013/1
RU	-0.1	2013/2 2013/1	-0.1	2013/1 2012/10	-1.1	2012/11 2012/5	-0.4	2013/2 2013/1
IN	-0.1	2013/2 2013/1	-0.1	2013/1 2012/10	-2.7	2012/11 2012/5	0.0	2013/2 2013/1
CN	0.1	2013/2 2013/1	0.0	2013/1 2012/10	-0.7	2012/11 2012/5	0.2	2013/2 2013/1

A2. Change in inflation predictions for 2013

	CF		IMF		OECD		CB/EIU	
EA	-0.1	2013/2 2013/1	0.0	2012/10 2012/4	-0.3	2012/11 2012/5	-0.3	2012/12 2012/9
US	-0.1	2013/2 2013/1	-0.1	2012/10 2012/4	-0.1	2012/11 2012/5	-0.1	2012/9 2012/6
DE	0.0	2013/2 2013/1	0.1	2012/10 2012/4	-0.1	2012/11 2012/5	-0.1	2012/12 2012/6
JP	0.1	2013/2 2013/1	-0.2	2012/10 2012/4	-0.3	2012/11 2012/5	-0.2	2012/10 2012/7
BR	0.1	2013/2 2013/1	-0.1	2012/10 2012/4	0.0	2012/11 2012/5	0.0	2013/2 2013/1
RU	0.1	2013/2 2013/1	0.2	2012/10 2012/4	0.6	2012/11 2012/5	-0.2	2013/2 2013/1
IN	0.3	2013/2 2013/1	2.3	2012/10 2012/4	0.6	2012/11 2012/5	0.0	2013/2 2013/1
CN	0.0	2013/2 2013/1	0.0	2012/10 2012/4	-1.3	2012/11 2012/5	0.0	2013/2 2013/1

A3. Abbreviations

BoJ	Bank of Japan
BR	Brazil
BRIC	Brazil, Russia, India and China
CB-CCI	Conference Board Consumer Confidence Index
CB-LEII	Conference Board Leading Economic Indicator Index
CBOT	Chicago Board of Trade
CF	Consensus Forecasts
CN	China
CNB	Czech National Bank
DBB	Deutsche Bundesbank
DE	Germany
EA	euro area

EC	European Commission
ECB	European Central Bank
EC-CCI	European Commission Consumer Confidence Indicator
EC-ICI	European Commission Industrial Confidence Indicator
EIU	The Economist Intelligence Unit database
European Economic Area	ES Spain
EU	European Union
EUR	European Monetary Institute
EURIBOR	Euro Interbank Offered Rate
Fed	Federal Reserve System (the US central bank)
FRA	forward rate agreement
GBP	pound sterling
GDP	gross domestic product
GR	Greece
CHF	Swiss franc
ICE	Intercontinental Exchange
IE	Ireland
IFO	Institute for Economic Research
IFO-BCI	IFO – Business Climate Index
IFO-CCI	IFO – Consumer Confidence Index
IMF	International Monetary Fund
IN	India
IRS	interest rate swap
IT	Italy
JP	Japan
JPY	Japanese yen
LIBOR	London Interbank Offered Rate
N/A	not available
OECD	Organisation for Economic Co-operation and Development
OECD-CLI	OECD Composite Leading Indicator
PMI	Purchasing Managers' Index
PT	Portugal
RU	Russia
UoM	University of Michigan
UoM-CSI	University of Michigan Consumer Sentiment Index
US	United States
USD	US dollar

A4. List of thematic articles published in GEO

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