

# GLOBAL ECONOMIC OUTLOOK – MARCH

Monetary and Statistics Department  
External Economic Relations Division

2013

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The March 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 this issue, we also focus on the analysis of financial market conditions using financial stress indicators. Monitoring such indicators is useful from the point of view of both financial stability (identification of systemic risk) and effective monetary policy-making (functioning of the transmission mechanism).

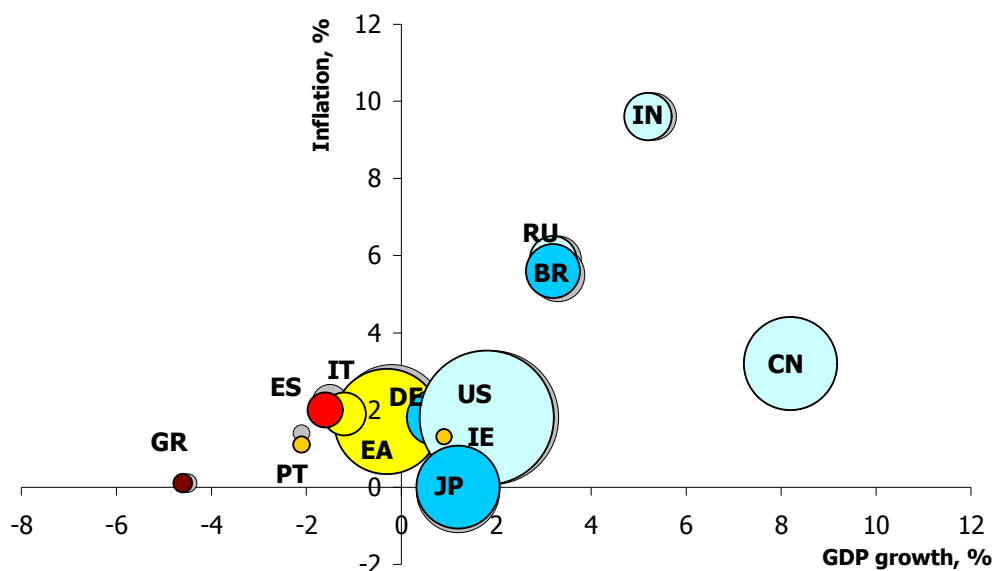
The economic outlooks for advanced economies in 2013 are not improving. This is due to still elevated uncertainty about future economic developments, currently being fuelled by the instability of the Cypriot financial system. In addition, public finance consolidation, which has been going on for several years now, is negatively affecting household consumption and corporate investment.

The euro area economy will remain in recession this year, and the same can be said for most of its national economies. The German economy is virtually stagnant, with higher-than-1% growth not expected until 2014. The Japanese economy is gradually slowing, but is steadily extricating itself from the feared deflation. Modest optimism can thus again be derived only from the data on the US economy. However, this is conditional on medium-term stabilisation of the USA's fiscal situation. Most emerging economies and BRIC countries, which we monitor in more detail, should maintain robust growth rates until the end of 2014, although these are reflected in higher expected inflation rates.

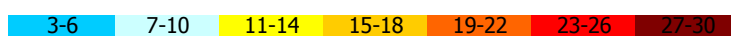
The interest rate outlooks indicate modest sustained growth across all maturities in 2014 in both the euro area and the USA. The US dollar should depreciate slightly against the euro and the currencies of other advanced countries (the Japanese yen and the Swiss franc) at the one-year horizon. By contrast, it is expected to appreciate against some of the BRIC currencies.

Dollar prices of oil and natural gas still indicate a slight decline in late 2013 from their currently elevated levels. A decline is also expected at the one-year horizon for food commodity prices. By contrast, prices of metals and non-food agricultural commodities should be broadly flat throughout 2013, close to their current levels.

#### Outlook for the global economy in 2013



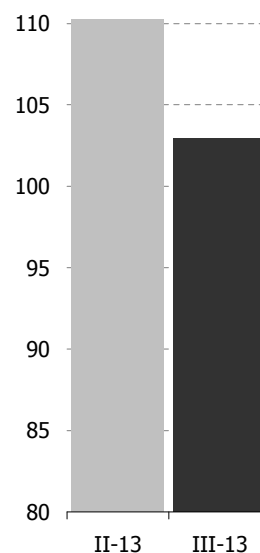
#### Unemployment, %



Note: The size of each point represents the size of the country/region according to nominal GDP in US dollars in 2011. The colour of the points is assigned according to the unemployment rate expected in 2013. The grey colour is the CF forecast (GDP, inflation) or Bloomberg survey (oil price) from the previous month. [Cut-off date for data: 20 March 2013]

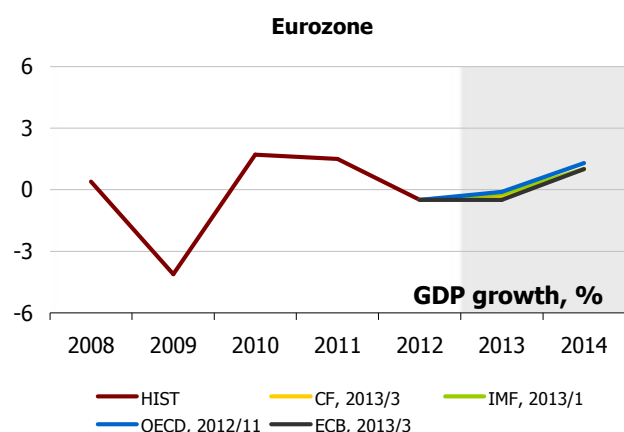
Source: Bloomberg, EIU, Consensus Economics, CNB calculations.

#### Outlook for Brent crude oil prices in December 2013

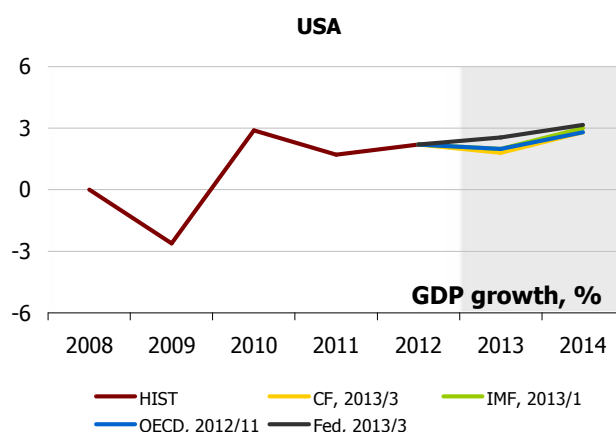


### II.1 GDP outlook in advanced countries

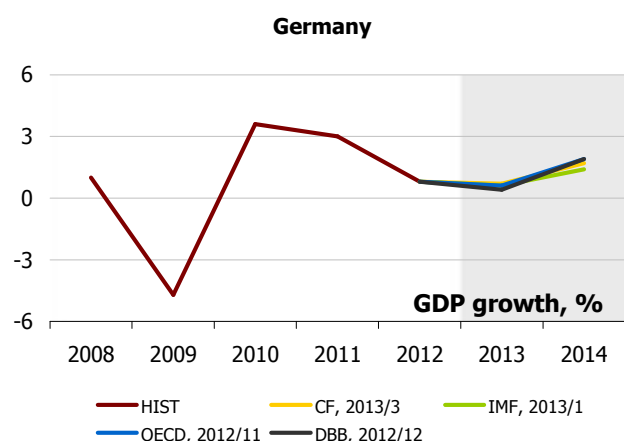
The current macroeconomic situation is better in the USA (where the labour market situation is improving) than in Europe, where macroeconomic data showed a GDP contraction in 2012 Q4 and a decline in both domestic demand and exports. Despite this, CF lowered its outlook for GDP this year for both economies. The ECB also revised its GDP outlook downwards, but expects the euro area economy to stabilise in 2013 H1 and then return to growth. GDP growth will be fostered in the euro area by improved external demand, although this will be partly offset by worse competitiveness owing to an appreciating euro; growth will also be supported by private domestic demand. The CF outlook for Germany was unchanged from the previous month. The Fed expects slower economic growth in the USA this year compared to the December outlook, but points to a gradual recovery, with domestic consumption, private fixed investment and the real estate market already improving. Economic growth in Japan reached technical zero in 2012 Q4. CF left its outlook for 2013 unchanged. In 2014, the advanced economies under review will show slight growth, which, except in the USA, will not exceed 2%. Growth of 2.8%–3.2% is expected for the USA.



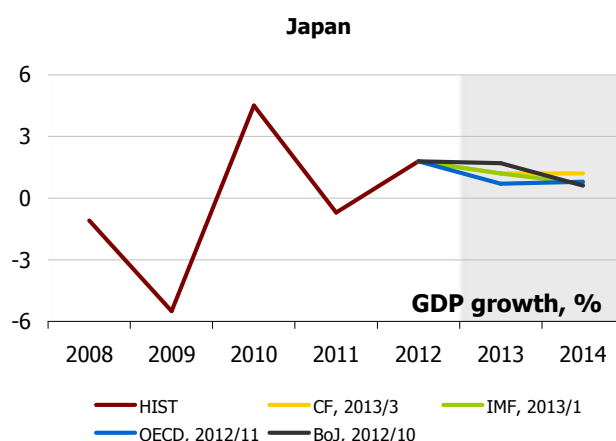
	CF	IMF	OECD	ECB
2013	-0.3 ↘	-0.2	-0.1	-0.5 ↘
2014	1.0 →	1.0	1.3	1.0 ↘



	CF	IMF	OECD	Fed
2013	1.8 ↘	2.0	2.0	2.6 ↘
2014	2.8 →	3.0	2.8	3.2 ↘



	CF	IMF	OECD	DBB
2013	0.7 →	0.6	0.6	0.4
2014	1.7 →	1.4	1.9	1.9



	CF	IMF	OECD	BoJ
2013	1.2 →	1.2	0.7	1.7
2014	1.2 →	0.7	0.8	0.6

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.

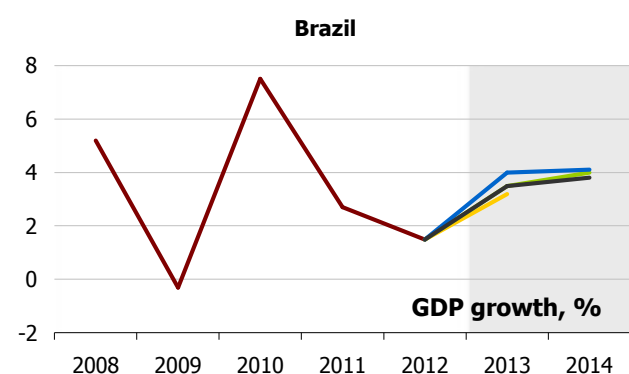
[Cut-off date for data: 20 March 2013]

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

## II.2 GDP outlook in BRIC countries

According to the March CF, the GDP growth outlook for 2013 fell slightly in all the emerging economies under review except China. The survey results probably reflected the weakening industrial output in Brazil, Russia and China. The outlook for China, however, is still being maintained by export growth, although retail sales and lending data in early 2013 brought bad news. This may have been reflected in the new EIU forecast, which expects somewhat lower growth in China than in the previous month. The other EIU outlooks for the emerging economies under review were unchanged. The fastest growth this year is thus expected for China (8.2%–8.5%). GDP growth in India should pick up to 4.2%–6.5%. Slower growth is expected in Russia (3.2%–3.8%). Growth in Brazil should reach 3.2%–4.0%.

The only change in the GDP growth forecasts for 2014 is a decrease by CF for China and Brazil. However, China should maintain growth of above 8%. Growth in Brazil and Russia should be around 4%. In the case of India, the range of the forecasts for 2014 is wider at 6.3%–7.3%, indicating some uncertainty.



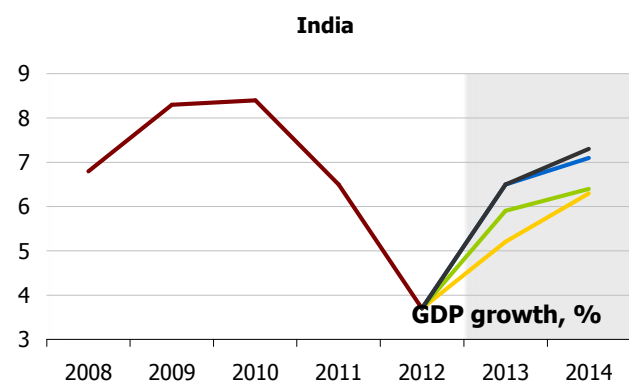
— HIST — CF, 2013/3 — IMF, 2013/1  
— OECD, 2012/11 — EIU, 2013/3

	CF	IMF	OECD	EIU
<b>2013</b>	3.2 ↘	3.5	4.0	3.5 →
<b>2014</b>	3.8 ↘	4.0	4.1	3.8 →



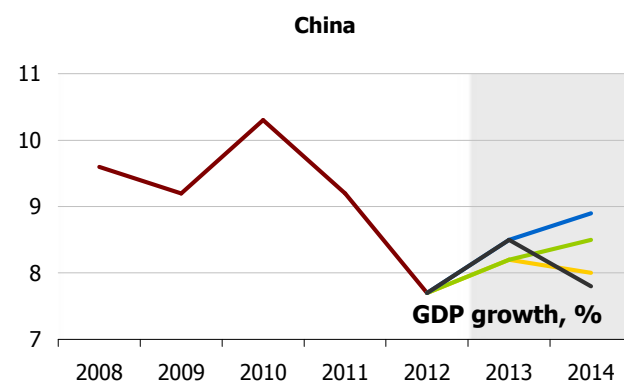
— HIST — CF, 2013/3 — IMF, 2013/1  
— OECD, 2012/11 — EIU, 2013/3

	CF	IMF	OECD	EIU
<b>2013</b>	3.2 ↘	3.7	3.8	3.3 →
<b>2014</b>	3.8 →	3.8	4.1	3.9 →



— HIST — CF, 2013/3 — IMF, 2013/1  
— OECD, 2012/11 — EIU, 2013/3

	CF	IMF	OECD	EIU
<b>2013</b>	5.2 ↘	5.9	6.5	6.5 →
<b>2014</b>	6.3 →	6.4	7.1	7.3 →



— HIST — CF, 2013/3 — IMF, 2013/1  
— OECD, 2012/11 — EIU, 2013/3

	CF	IMF	OECD	EIU
<b>2013</b>	8.2 →	8.2	8.5	8.5 ↘
<b>2014</b>	8.0 ↘	8.5	8.9	7.8 →

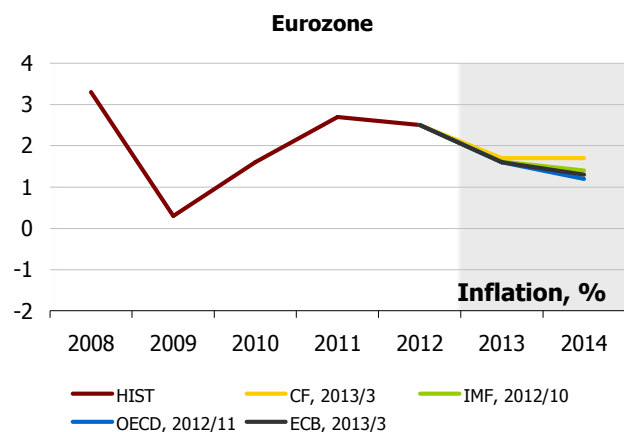
Note: Legend shows latest forecast data in format "Source, year/month" of forecast publication. HIST: historical values. Arrow indicates direction of revision of newly published forecast. If no arrow is shown, no new forecast was available in previous month or by cut-off date in current month. Asterisk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

[Cut-off date for data: 20 March 2013]

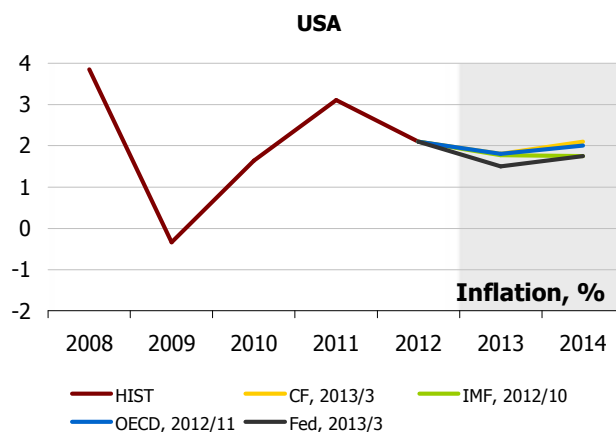
Source: CF, IMF, OECD, EIU, CNB calculations.

### II.3 Inflation outlook in advanced countries

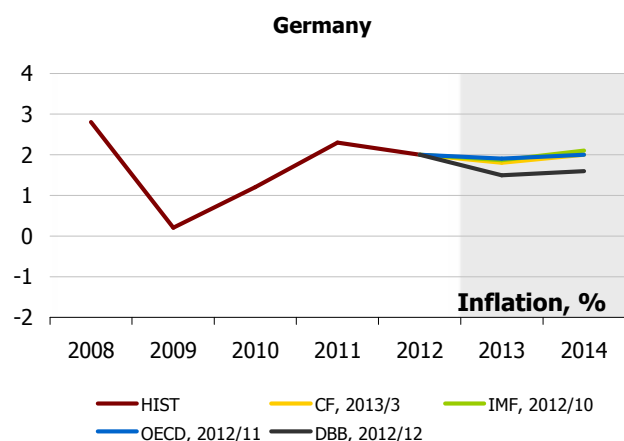
According to the new outlook, the ECB still expects inflation to go down in the euro area owing to an expected fall in the annual rate of growth of energy prices and partly also in food prices from their high 2012 levels. Although the midpoint of the ECB outlook was unchanged from December, the upper and lower bounds shifted 0.1 pp towards the midpoint. CF lowered its inflation outlook for the euro area by 0.1 pp to 1.7%. Inflation will also remain below the 2% level in Germany and the USA this year (CF and Fed). The new governor of the Japanese central bank has promised to try to achieve 2% inflation as soon as possible. The March CF increased the outlook for Japan by 0.1 pp. According to the current outlook, consumer price inflation should stay at last year's level. Next year, CF, the ECB and the Fed expect inflation in the advanced economies under review to lie within a narrow range of 1.7%–2.1%.



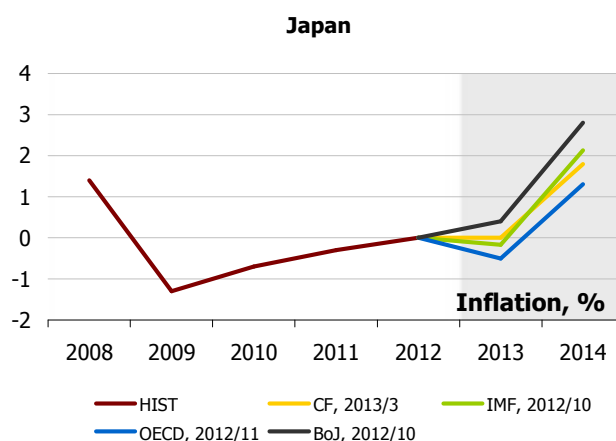
	CF	IMF	OECD	ECB
2013	1.7 ↘	1.6	1.6	1.6 →
2014	1.7 →	1.4	1.2	1.3 ↘



	CF	IMF	OECD	Fed
2013	1.8 →	1.8	1.8	1.5 ↘
2014	2.1 ↘	1.8 *	2.0	1.8 →



	CF	IMF	OECD	DBB
2013	1.8 ↘	1.9	1.9	1.5
2014	2.0 →	2.1	2.0	1.6



	CF	IMF	OECD	BoJ
2013	0.0 →	-0.2	-0.5	0.4
2014	1.8 →	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.

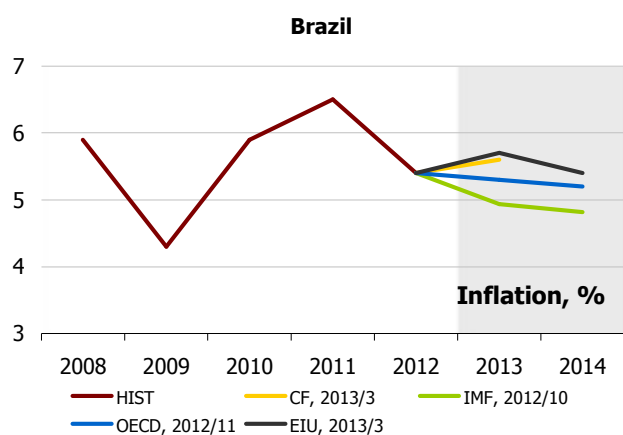
[Cut-off date for data: 20 March 2013]

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

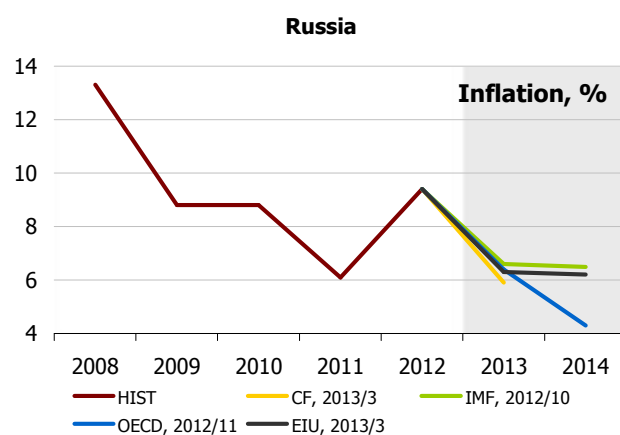
### II.4 Inflation outlook in BRIC countries

Inflation remains a significant problem for most of the BRIC countries, as all of them were surprised by faster price growth in early 2013. In Brazil, inflation increased despite tax cuts and lower electricity prices. For 2013, however, only the CF outlook for Brazil and the EIU outlook for India were increased. The other outlooks were unchanged. After having fallen gradually over the last four years, consumer price inflation will thus go up again in India (7.7%–9.6%) and Brazil (4.9%–5.7%). Inflation in Russia should keep falling slowly to 5.9%–6.6%. China will maintain the lowest inflation (1.5%–4.3%).

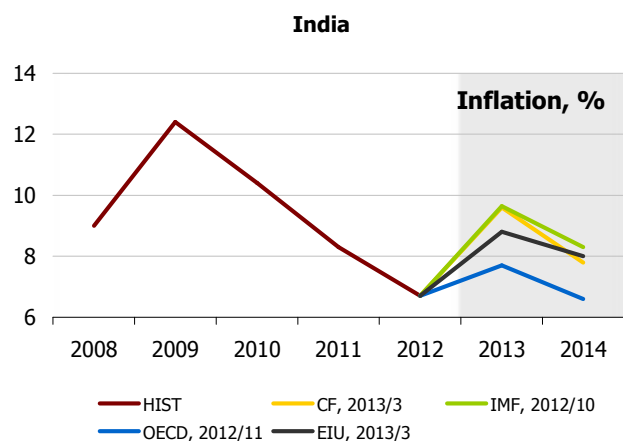
The EIU outlook for the BRIC countries for 2014 was unchanged. CF decreased its outlook for inflation in Brazil and increased its outlook for consumer price growth in India.



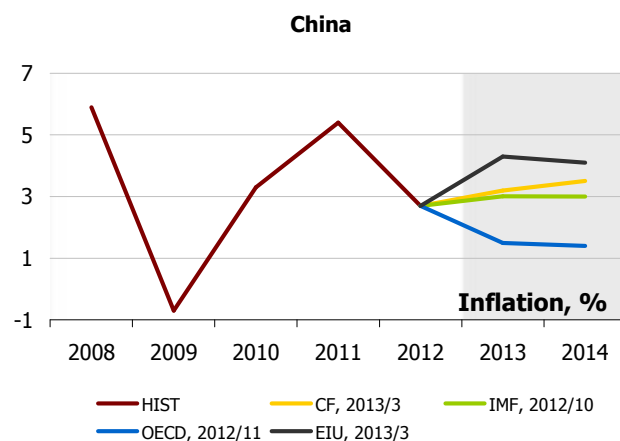
	CF	IMF	OECD	EIU
2013	5.6 ↗	4.9	5.3	5.7 →
2014	5.5 ↘	4.8	5.2	5.4 →



	CF	IMF	OECD	EIU
2013	5.9 →	6.6	6.4	6.3 →
2014	5.6 *	6.5	4.3	6.2 →



	CF	IMF	OECD	EIU
2013	9.6 →	9.6	7.7	8.8 ↗
2014	7.8 ↗	8.3	6.6	8.0 →



	CF	IMF	OECD	EIU
2013	3.2 →	3.0	1.5	4.3 →
2014	3.5 →	3.0	1.4	4.1 →

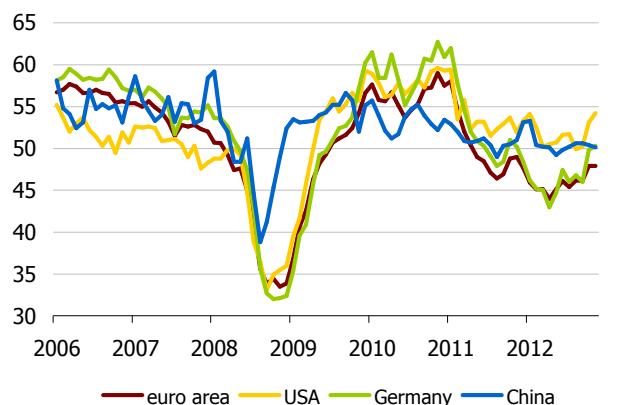
Note: Legend shows latest forecast data in format "Source, year/month" of forecast publication. HIST: historical values. Arrow indicates direction of revision of newly published forecast. If no arrow is shown, no new forecast was available in previous month or by cut-off date in current month. Asterisk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

[Cut-off date for data: 20 March 2013]

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

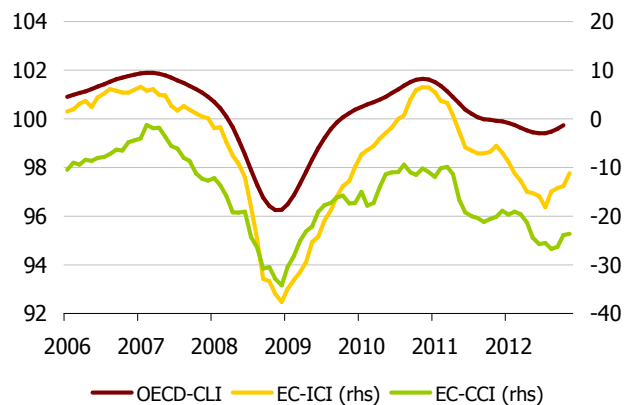
The economic outlooks for the USA and for the euro area as a whole in March 2013 were broadly unchanged from the previous month from the perspective of leading indicators. Some leading indicators increased and some decreased, but most remained the same or changed insignificantly. The same goes for the Chinese PMI (Purchasing Managers' Index) in industry, which, despite falling slightly, remains just above the 50-point level. The situation in Germany is rather different: the PMI in industry increased, returning above the 50-point level (50.3) for the first time in a year. All the other monitored leading indicators improved as well. This signals a substantial improvement in the economic outlook for 2013 H1.

**PMI IN MANUFACTURING**



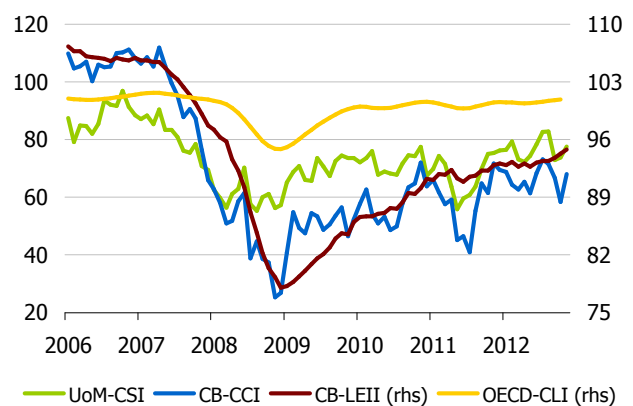
	EA	US	DE	CN
12/12	46.1	50.2	46.0	50.6
1/13	47.9	53.1	49.8	50.4
2/13	47.9	54.2	50.3	50.1

**EURO AREA**



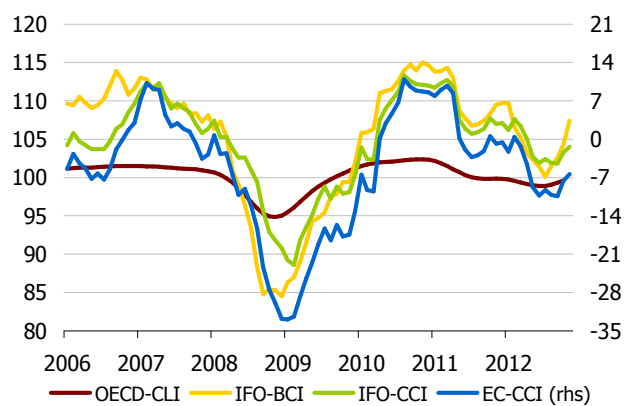
	OECD-CLI	EC-ICI	EC-CCI
12/12	99.6	-14.2	-26.3
1/13	99.7	-13.8	-23.9
2/13		-11.2	-23.6

**USA**



	CB-LEII	OECD-CLI	UoM-CSI	CB-CCI
12/12	93.8	100.8	72.9	66.7
1/13	94.3	100.8	73.8	58.4
2/13	94.8		77.6	68.0

**GERMANY**



	OECD-CLI	IFO-BCI	IFO-CCI	EC-CCI
12/12	99.3	102.5	101.8	-10.4
1/13	99.6	104.3	103.3	-7.6
2/13		107.4	104.0	-6.4

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: 21 March 2013]

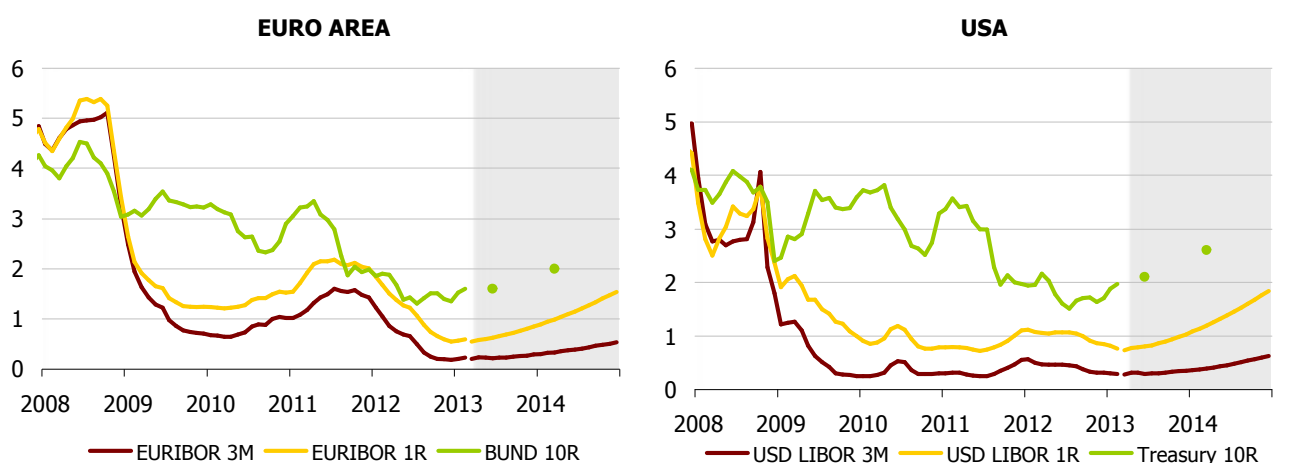
Source: OECD, EC, IFO, Conference Board, University of Michigan, CNB calculations.



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

The 3M and 1Y EURIBOR fell to their January levels in early March. The new outlook based on implied rates also has a lower path up to the end of 2014. The liquidity excess in the euro area decreased in February owing to the start of the period when banks can repay the first three-year ECB loans in advance. However, the announced repayment amounts were around half the expected values. In addition, the ECB is discussing further possible monetary policy easing, and this is acting against a stronger rise in rates. The March CF expects German 10Y government bond yields to rise gradually to 2% at the one-year horizon.

Dollar LIBOR rates fell only slightly in the same period, with only the one-year rate recording a more marked decrease. The outlook based on implied rates continues to expect a stronger rise in rates in 2014. The US monetary policy stance has not changed yet, but given the recovery expected in 2013 H2 it may be tightened earlier than in other advanced economies.



	02/13	03/13	06/13	12/13	06/14	12/14		02/13	03/13	06/13	12/13	06/14	12/14
<b>3M EURIBOR</b>	0.22	0.20	0.22	0.29	0.39	0.53	<b>3M USD LIBOR</b>	0.29	0.28	0.29	0.35	0.46	0.63
<b>1Y EURIBOR</b>	0.59	0.54	0.62	0.85	1.15	1.54	<b>1Y USD LIBOR</b>	0.76	0.74	0.80	1.03	1.39	1.84
	02/13	03/13	06/13	03/14				02/13	03/13	06/13	03/14		
<b>10Y Bund</b>	1.60		1.6	2.0			<b>10Y Treasury</b>	1.97		2.1	2.6		

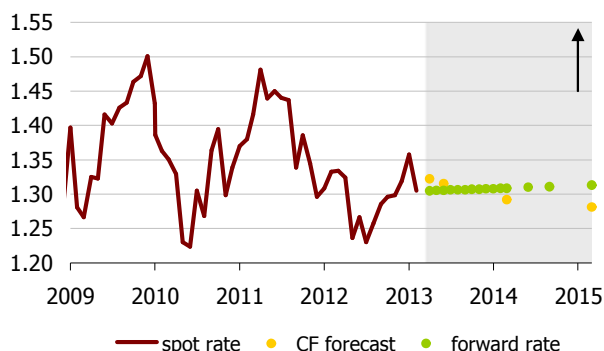
Note: Forecasts for EURIBOR and LIBOR rates are based on implied rates from interbank market yield curve (FRA rates are used from 4M to 15M and adjusted IRS rates for longer horizons). Forecasts for German and US government bond yields (10Y Bund and 10Y Treasury) are taken from CF. [Cut-off date for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

### IV.2 Outlook for selected exchange rates

The euro's appreciation against the dollar halted at USD 1.36/EUR in late January on concerns about the euro area economy and the political uncertainty in Italy. ECB President Mario Draghi also played a role, mentioning the exchange rate as a downside risk to inflation for the first time. On the other hand, the indicators for the USA are generally good. Consumer demand seems to have recovered partially despite tax hikes and fiscal policy uncertainty. The publication of the conditions of the rescue programme for Cyprus in mid-March led to further depreciation of the euro. The March CF forecast expects the exchange rate to be stable close to USD 1.30/EUR. The new Japanese fiscal and monetary policy stance pushed the yen down to a 2.5-year low, but no further significant depreciation can be expected given the continuing criticism in the region. The new CF forecast also expects the yen to weaken by only 2.4% against the dollar at the one-year horizon. The British pound has been depreciating against the dollar since the start of the year after weak growth outlooks led to a downgrading of the UK's rating. The outlook up to the end of 2013, however, is stable, as in the case of the Swiss franc.

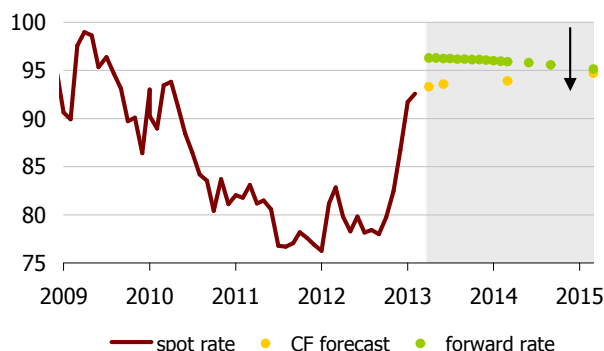
The Brazilian real firmed to a 10-month high against the dollar in early March on a better economic outlook and growing speculation about Brazilian monetary policy, but the central bank intervened against the sharp appreciation by selling reverse FX swaps. However, no change in trend can be expected, as confirmed by the new CF outlook. The Russian rouble has been depreciating slightly since early February due to the government's failure to sell all the long-term bonds on offer. Similarly, the Indian rupee depreciated against the dollar on growing concerns about the Indian trade deficit and a possible outflow of capital following the rating downgrade. By contrast, expectations of a monetary policy easing supported the Indian currency in early March. The Chinese renminbi remained stable last month and, according to the central bank, is currently close to its equilibrium level. However, CF still expects it to appreciate against the dollar.

**US\$ per Euro**



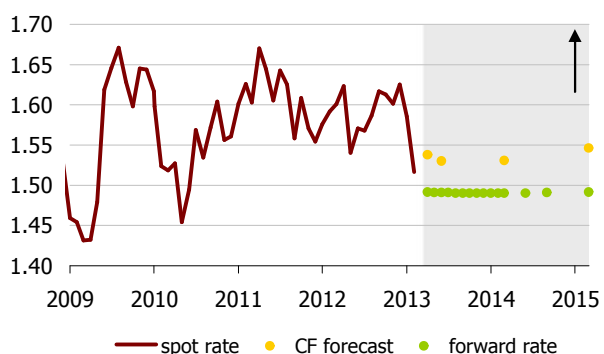
	11/03/13	04/13	06/13	03/14	03/15
<b>spot rate</b>	1.305				
<b>CF forecast</b>		1.322	1.315	1.292	1.281
<b>forward rate</b>		1.305	1.305	1.308	1.313

**Yen per US\$**



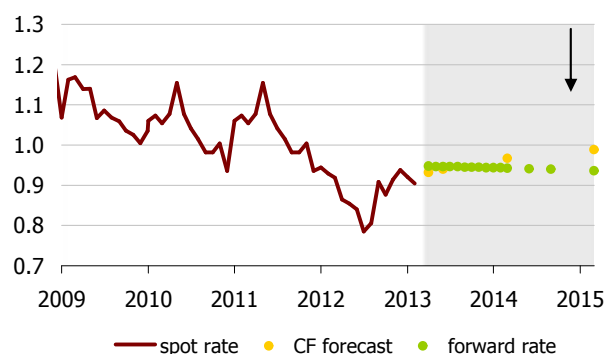
	11/03/13	04/13	06/13	03/14	03/15
<b>spot rate</b>	96.28				
<b>CF forecast</b>		93.29	93.58	93.86	94.68
<b>forward rate</b>		96.26	96.22	95.91	95.14

**US\$ per UK£**



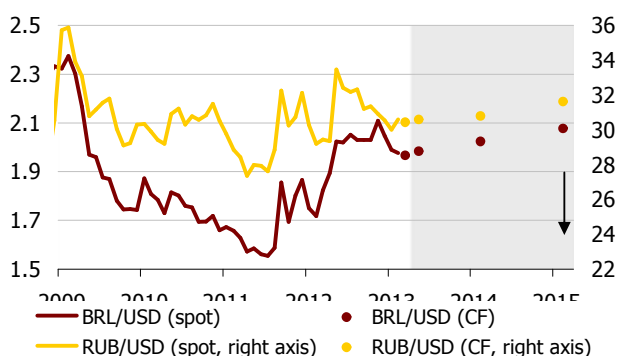
	11/03/13	04/13	06/13	03/14	03/15
<b>spot rate</b>	1.492				
<b>CF forecast</b>		1.538	1.530	1.531	1.546
<b>forward rate</b>		1.491	1.491	1.490	1.492

**Swfr per US\$**



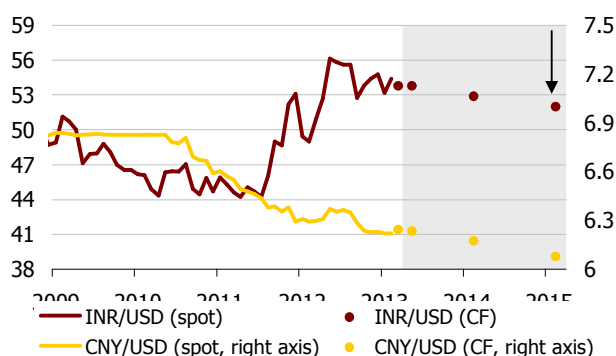
	11/03/13	04/13	06/13	03/14	03/15
<b>spot rate</b>	0.947				
<b>CF forecast</b>		0.932	0.939	0.966	0.988
<b>forward rate</b>		0.947	0.946	0.942	0.935

**BRAZILIAN REAL, RUSSIAN ROUBLE**



	31/03/14	03/13	05/13	02/14	02/15
<b>BRL/USD (spot)</b>	1.96				
<b>BRL/USD (CF)</b>		1.97	1.98	2.02	2.08
<b>RUB/USD (spot)</b>	30.74				
<b>RUB/USD (CF)</b>		30.42	30.57	30.80	31.62

**INDIAN RUPEE, CHINESE RENMINBI**



	31/03/14	03/13	05/13	02/14	02/15
<b>INR/USD (spot)</b>	54.41				
<b>INR/USD (CF)</b>		53.78	53.78	52.90	51.97
<b>CNY/USD (spot)</b>	6.22				
<b>CNY/USD (CF)</b>		6.24	6.23	6.17	6.08

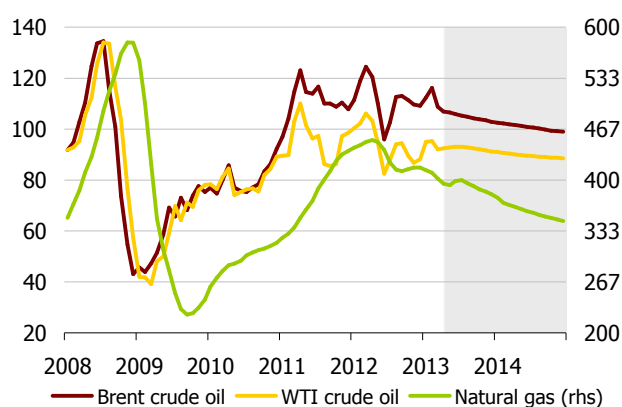
Note: Arrow indicates currency appreciation against US dollar. Exchange rates as of last day of month. Forward rate does not represent outlook; it is based on covered interest parity, i.e. currency of country with higher interest rate is depreciating. Forward rate represents current (as of cut-off date)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

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

## V.1 Oil and natural gas

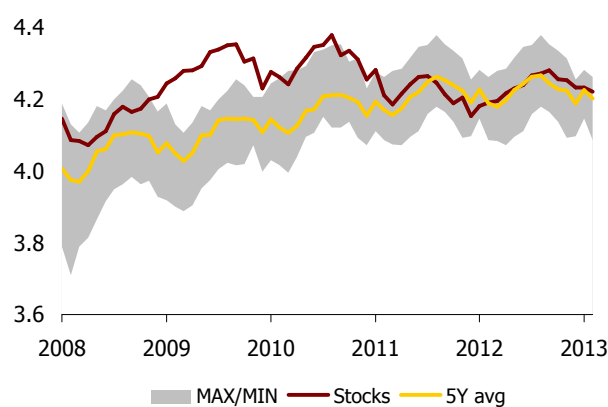
In mid-February, the upward trend in oil prices (which had lasted virtually since early December 2012) reversed and the Brent crude oil price fell very quickly from USD 119 a barrel back to USD 110, where it stayed for the entire first half of March (the price of WTI crude oil was just above USD 90 a barrel in this period). The price outlook based on futures contracts thus shifted strongly downwards, but remains declining, as does the EIA forecast. The March CF forecast expects the price of Brent oil to be flat close to USD 110 a barrel at the one-year horizon. The rapid price growth in early 2013 was supported by positive economic sentiment based on data from the US and Chinese economies. This was also reflected in expectations of higher global demand growth in 2013 and in rising net long positions of “managed money” funds, which almost reached last year’s high. In the second half of February, optimism started to ebb gradually on further concerns about the soundness of the global economy. The negative news resulted, as usual, in an appreciation of the US dollar, which pushed dollar commodity prices down further. Sales of speculative positions of commodity funds amplified this price swing.

### OUTLOOK FOR PRICES OF OIL AND NATURAL GAS

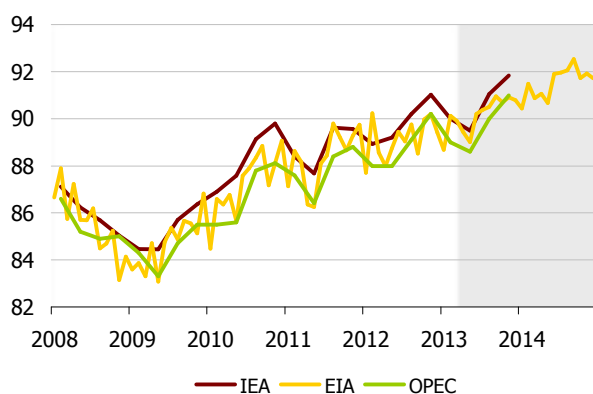


	Brent	WTI	Natural gas
2013	-4.41	-1.47	-8.11
2014	-5.69	-3.47	-9.34

### TOTAL STOCKS OF OIL AND OIL PRODUCTS IN OECD

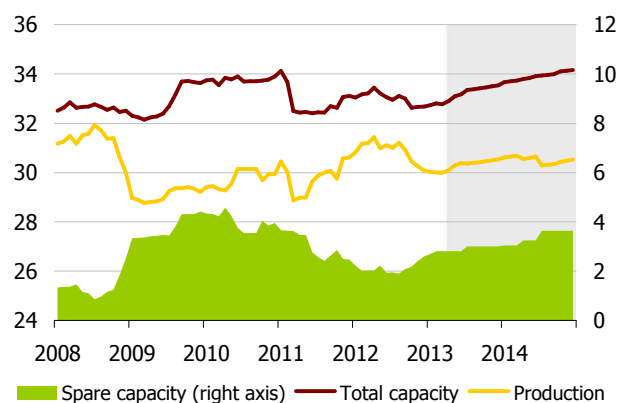


### GLOBAL CONSUMPTION OF OIL AND OIL PRODUCTS



	IEA	EIA	OPEC
2013	0.85	1.13	0.93
2014		1.55	

### PRODUCTION, TOTAL AND SPARE CAPACITY IN OPEC COUNTRIES



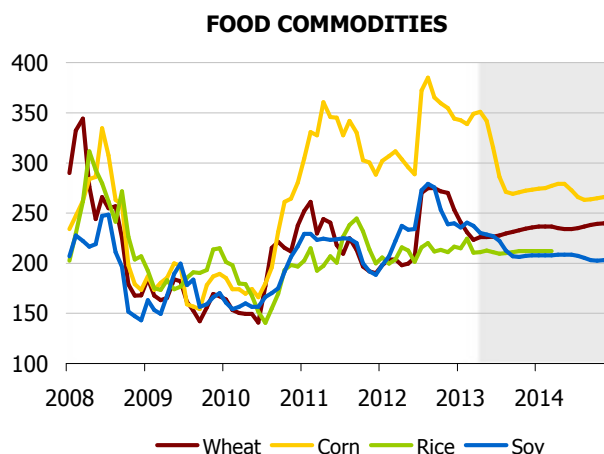
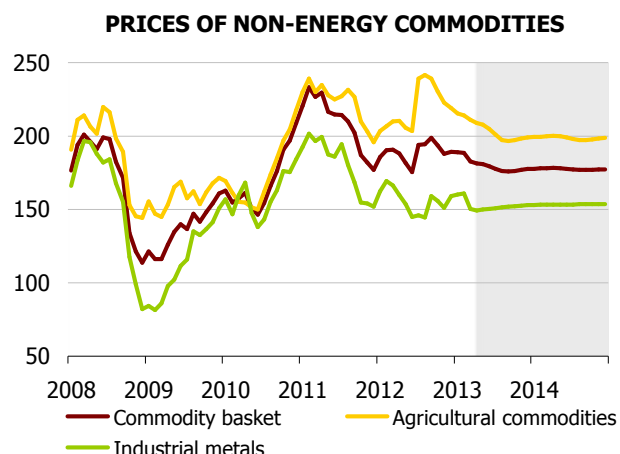
	Production	Total capacity	Spare capacity
2013	-1.95	0.49	35.87
2014	0.74	2.21	17.58

Note: Oil price in USD/barrel, price of Russian natural gas at German border in USD/1,000 m<sup>3</sup> (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: 19 March 2013]

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

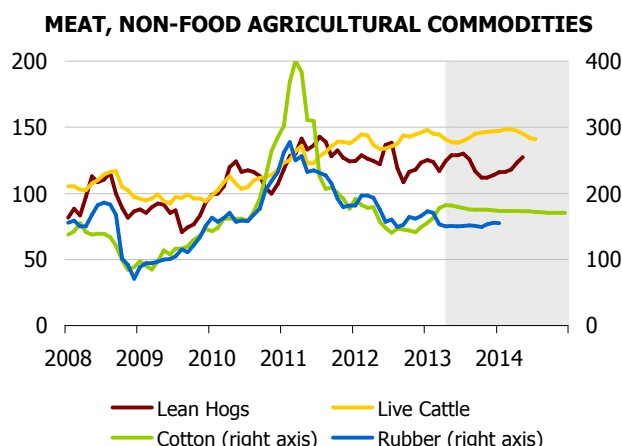
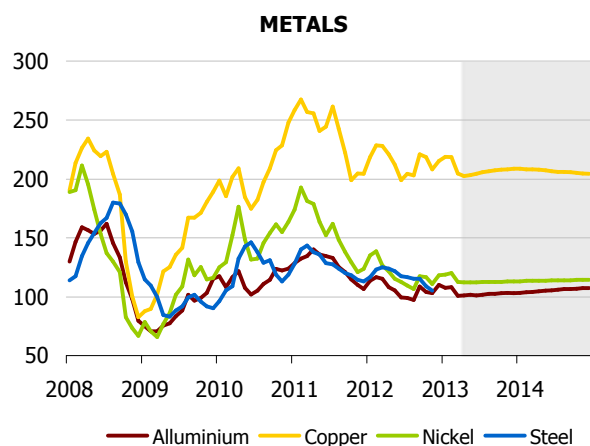
## V.2 Other commodities

The overall non-energy commodity price index edged down last month owing to falling food commodity prices and, in particular, to declining prices of industrial metals. Food commodities are expected to fall further overall until mid-2013, mainly because of an expected decline in prices of corn and soy (alternative energy crops). Industrial metal prices saw the largest decrease across all the index components in the second half of February. Prices were then broadly stable, as was the outlook, which is only slightly rising. Prices of technical crops showed mixed trends. The price of rubber fell strongly from mid-February onwards, while the price of cotton rose in the same period. Coal prices also declined slightly and are not expected to start rising until the end of this year. By contrast, electricity prices went up slightly last month.



	Overall comm. basket	Agricultural comm.	Industrial metals
2013	-4.7	-6.9	-2.1
2014	-1.5	-2.7	0.4

	Wheat	Corn	Rice	Soy
2013	-2.1	-7.7	1.0	-7.9
2014	2.8	-11.8	-0.1	-7.0



	Aluminium	Copper	Nickel
2013	-3.4	-3.2	-4.5
2014	2.5	-0.7	0.1

	Lean hogs	Live Cattle	Cotton	Rubber
2013	-1.8	2.2	9.9	-9.5
2014	-1.2	1.5	-1.3	

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: 19 March 2013].

Source: Bloomberg, CNB calculations.

## FINANCIAL STRESS IN ADVANCED ECONOMIES<sup>1</sup>

*As the global financial crisis has reminded us, uncertainty and risk aversion on financial markets can affect the real economy. An increasing number of central banks are therefore monitoring market conditions using financial stress indicators. From the financial stability perspective, the fact that some indicators can capture growth in systemic risk or predict financial crises is what matters. From the monetary policy perspective, the important thing is the effect of stress on the functioning of the transmission mechanism. The construction of financial stress indicators is hampered by an insufficient modelling framework, but these indicators can still provide information on current financial market developments. As our analysis shows, moreover, financial stress has to a large extent been a global phenomenon in recent years, especially when one considers advanced economies with strong financial links.*

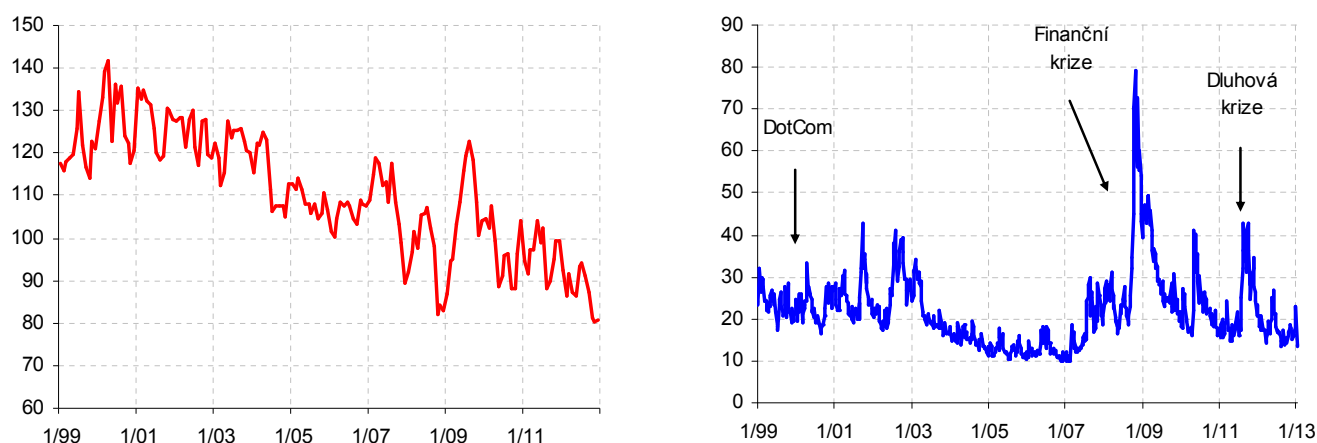
### 1. Risk aversion and the effect of market conditions on investor decisions

The importance of proper functioning of the banking sector for the whole economy was highlighted during the Great Depression in the USA in the 1930s, but it is only in recent years that a comprehensive view of all financial market segments and an effort to capture investors' behaviour and attitudes to risk using a single indicator have emerged.

Risk perception is a psychological concept of human behaviour under uncertainty. Measuring risk perceptions is still a complicated issue. Initial attempts in the late 1990s aimed to estimate changing risk perceptions and risk appetite. Some risk appetite indicators lacked a theoretical derivation or foundation (JPMorgan LCVI, UBS Investor Sentiment Index).<sup>2</sup> Others were based on theory, e.g. Credit Suisse Global Risk Appetite Index (CS GRAI) and State Street Investor Confidence Index (SS ICI).

#### Figure VI-1: Examples of market indicators of investors' risk appetite

State Street Investor Confidence Index (ICI)      VIX



Source: Bloomberg, CNB calculations.

The GRAI is based on the idea that fluctuations in investor sentiment can be captured by the relative performance of safe versus risky assets. The ICI (on the left-hand side of

<sup>1</sup> Written by Tomáš Adam (tomas.adam@cnb.cz) and Soňa Benecká (sona.benecka@cnb.cz). The opinions expressed in this article are those of the authors and do not necessarily reflect the official position of the Czech National Bank.

<sup>2</sup> An overview and comparison of such indicators is given by Illing and Aaron (2005). Their conclusion also points out that the indicators react very differently and thus have relatively limited predictive power.

Figure VI-1) measures investor confidence or risk appetite using actual buy/sell schemes of institutional investors. The larger the percentage shift into shares, the higher the risk appetite.

Coudert and Gex (2006) showed, among other things, that these indicators are limited in their ability to predict financial crises, having predictive power only for stock market crises. As a result, the implied volatility of S&P 500 options (VIX) is a popular (and readily available) alternative. The VIX measures the market's expectation of stock index volatility over the next 30 days and thus also investor uncertainty. As the right-hand side of Figure VI-1 shows, it follows no trend, unlike the ICI, and correctly predicts surges in uncertainty in several periods (the bursting of the dot-com bubble and the onset of the financial and debt crises). However, it failed to capture the onset of financial instability ahead of the collapse of Lehman Brothers.

## 2. Measuring financial stress, and indicators for the USA and the euro area

Risk appetite indicators had lofty aims (to capture investors' attitude to risk and predict financial crises) but unconvincing results. Therefore, the focus of attention then shifted to a less difficult task – capturing market conditions that affect investors' attitude to risk. Smooth functioning of the financial markets is an important precondition for the process of price determination. A whole range of financial stress indicators were therefore created (one definition of financial stress is given in Box 1). They are constructed primarily using financial market data (e.g. stock index volatility) and are usually aggregated using a weighted average or by principal component analysis (PCA).

### Box 1: Definition and characteristics of financial stress

In general terms, financial stress is understood to mean an interruption to the normal functioning of financial markets. This variable is continuous and peaks as a crisis. The level of stress reflects the interaction between financial market vulnerability and the size of the shock. The more vulnerable markets are, the more likely they are to become stressed after a shock. Financial stress has many symptoms, which can appear separately or together (Hakkio and Keeton, 2009).

- *Increased uncertainty about the fundamental value of assets or whole asset classes*, usually in the form of greater volatility of market prices. The level of risk is uncertain and investors cannot assign probabilities to different economic outcomes. Therefore, any new information leads to a stronger reaction by investors and to larger price movements.
- *Increased uncertainty about the behaviour of other investors*. At a time of uncertainty, the behaviour of other investors becomes more important and the effects of herd behaviour and following a large investor emerge.
- *Increased information asymmetry*. Greater asymmetry of information between buyers and sellers or borrowers and lenders arises in periods of financial stress.
- *Flight to quality*. A decreased willingness to hold risky assets leads to a rise in the returns demanded on those assets.
- *Flight to liquidity*. Financial stress also generates more demand for liquid assets, as higher volatility increases the probability of investors having to liquidate their positions. A decrease in perceived asset liquidity may be another reason.

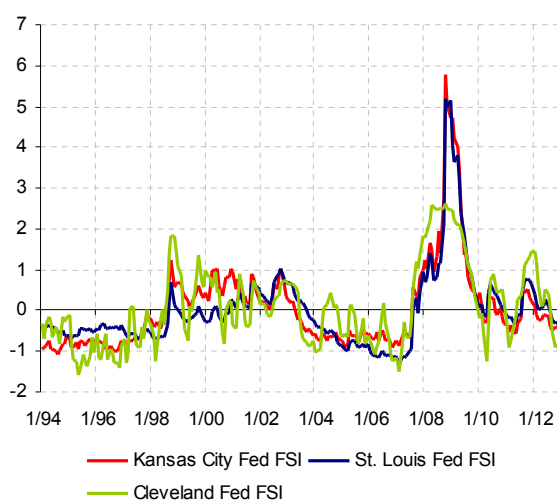
In a groundbreaking study, Illing and Liu (2006) presented a financial stress indicator for Canada. Based on experience in various areas, the authors selected stress indicators by crisis type, i.e. banking crisis, currency crisis, debt crisis and stock market crisis.<sup>3</sup>

The interest of central banks in monitoring conditions in the financial sector intensified following the outbreak of the global financial crisis. A whole range of indicators was created in the USA and the euro area. Figure VI-2 plots some important indicators for both economies. While the US indicators are from publicly available sources, the CISS (Composite Indicator of Systemic Stress) is calculated according to Hollo et al. (2012) and the FSI (Financial Stress Indicator) according to Grimaldi (2010). Higher indicator values in the charts represent an increase in financial stress.

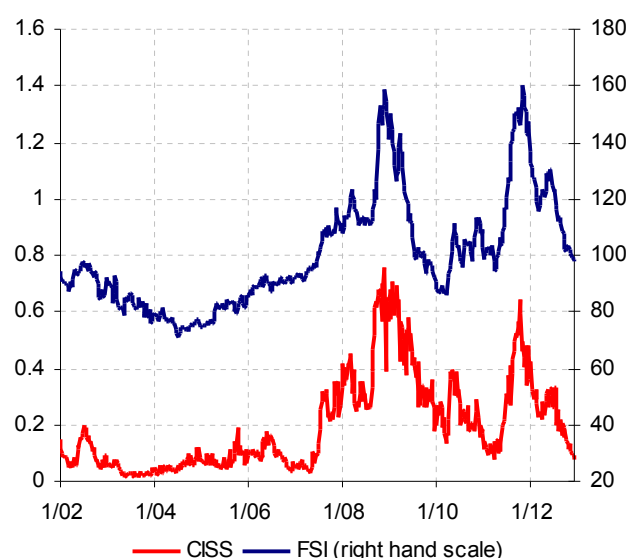
The indicators differ in both construction and data used, i.e. each has a different focus. Other (albeit much simpler) financial conditions indices are compiled for the USA by several renowned firms: Bloomberg, Citibank, Deutsche Bank and Goldman Sachs. One new development is an effort to adjust the construction of the indicator so that it reflects systemic risk on financial markets.<sup>4</sup> Examples include the Cleveland Fed financial stress indicator and the above-mentioned CISS for the euro area.

### Figure VI-2: Indicators of financial stress in the USA and the euro area

USA (monthly data)



Euro area (weekly data)



Source: Kansas City Fed, St. Louis Fed, Cleveland Fed, Bloomberg, Datastream, CNB calculations.

As is clear from the charts, the indicators show similar patterns. This is confirmed by the running correlations on the left-hand side of Figure VI-3. The differences are greater when stress levels are lower and are smaller during the crisis. Looking at the US indicators, the Kansas City Fed FSI and St. Louis Fed FSI are very similar, whereas the Cleveland Fed FSI differs to a greater extent. This may be due to the construction of the Cleveland Fed FSI, which takes into account systemic risk, i.e. the situation where stress affects more than one market. The two euro area indicators differ for a similar reason.

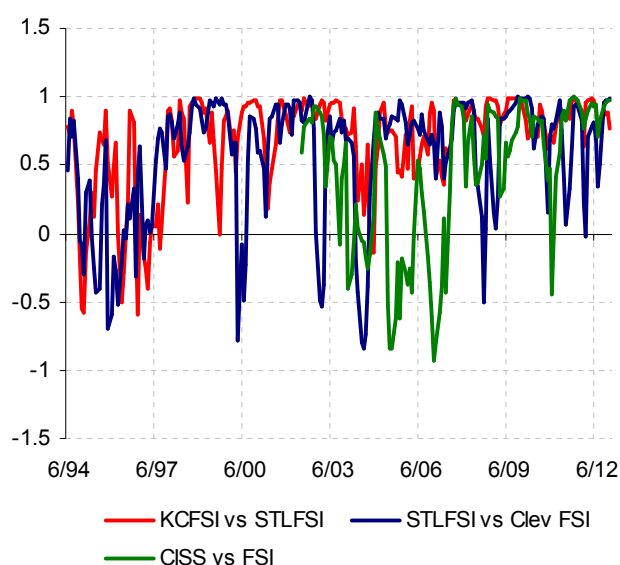
<sup>3</sup> The stress indicator used by the IMF is constructed similarly. For a comparison and overview of indicators, see Kliesen et al. (2012).

<sup>4</sup> Systemic risk means the risk of instability of the financial system as a whole, whereas this text focuses solely on financial markets. Therefore, the indicators lack detailed information on the banking sector and the economy.

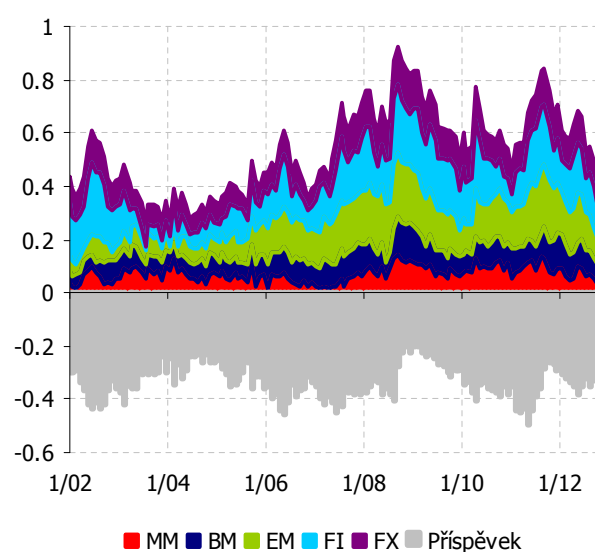
One of the big advantages of these indicators is that they allow us to analyse the sources of stress and how it spreads across markets (see the right-hand side of Figure VI-3). A closer look reveals that stress on equity and bond markets, as well as on the financial intermediaries market, has been recording stable growth since 2006. The money market and the forex market saw a one-off increase in summer 2007. The escalation of the euro area debt crisis at the end of 2011 then led, for example, to a broad-based increase in stress, particularly in the segment of financial intermediaries. The ECB's long-term operations in late 2011 and the first quarter of 2012 then reduced the stress markedly. The tensions took longer to ease on bond markets, with the indicator approaching its pre-crisis levels only at the end of 2012.

**Figure VI-3: Running correlations between indicators and contributions to CISS**

Running correlations (6M)



CISS decomposition



Note: Running correlations – 6-month window based on monthly data. CISS decomposition: MM – money market, BM – bond market, EM – equity market, FI – financial sector, FX – forex market, systemic risk contribution, i.e. effect of correlations between markets.

Source: CNB calculations.

The evolution of financial stress in the euro area has reflected not only domestic factors (i.e. the debt crisis), but also uncertainty on US financial markets. There is thus a clear financial stress spillover effect between countries, especially when they are financially highly interconnected. Many research papers have studied the channels of stress transmission and its impacts on other economies and their growth. Major financial centres play key role in financial stress transmission on the global scale, and the extent to which a country is affected depends mainly on the interconnectedness of banking sectors. On the other hand, not all shocks in the financial system are propagated and the strength of transmission depends on the degree of financial stress, i.e. shock transmission is stronger at times of increased stress.<sup>5</sup>

The effect of financial stress on the functioning of the monetary policy and its transmission mechanism has also been studied.<sup>6</sup> According to some authors, the effectiveness of conventional monetary instruments is limited at times of heightened stress. By contrast, a Canadian study (Li and St-Amant, 2010) showed that monetary

<sup>5</sup> Balakrishnan et al. (2009), Garratt et al. (2011), Fink and Schuler (2013), Adam and Benecká (2013).

<sup>6</sup> Baxa et al. (2011), Hubrich a Tetlow (2012).



policy has the biggest impact at times of increased stress. The macroeconomic effects of financial shocks are also important.<sup>7</sup> An increase in financial stress has a negative effect on economic growth, commodity prices and inflation. Foreign financial shocks seem to have been more significant than foreign trade shocks in the last ten years. Recessions following periods of financial stress are usually longer and deeper than other recessions.

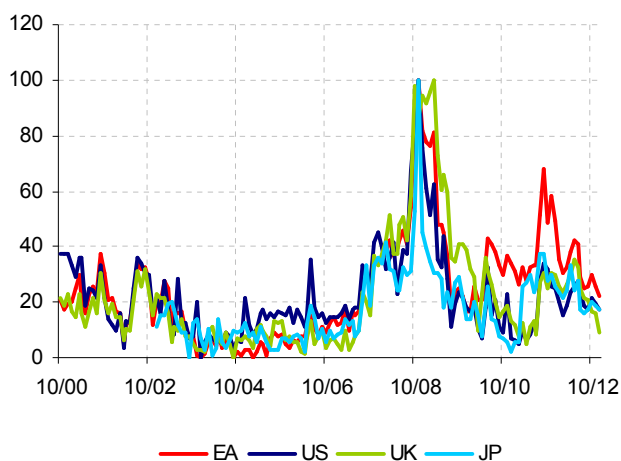
### 3. The global dimension of financial stress

It would seem from the above analysis that financial stress is highly global in nature, i.e. it manifests as synchronisation of advanced markets and has a major impact on emerging markets. We tried to estimate the hypothetical level of global stress. Based on Cardarelli et al. (2009), we constructed indicators for the four largest and most significant financial centres (the USA, the euro area, Japan and the UK). Our aim was to produce indicators that are comparable and easy to interpret.<sup>8</sup>

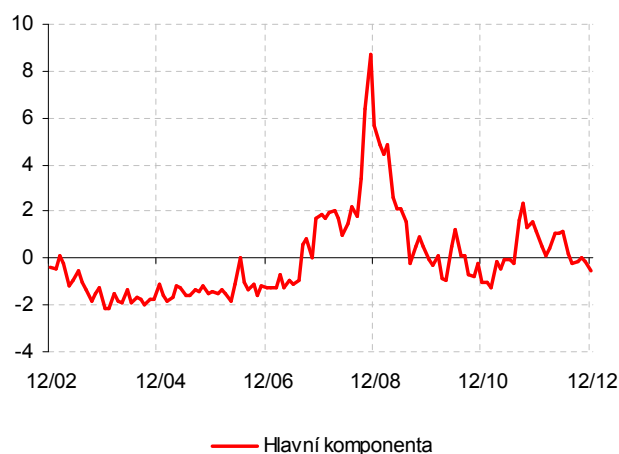
We estimated the global factor using principal component analysis (PCA), which extracts factors capturing co-movements in a set of variables. We thus assume that the global factor is the main reason for the co-movement of financial stress indicators. Figure VI-4b shows that global stress was relatively low before 2007, but the peak of the financial crisis in 2008 hit all countries to a large extent. The euro area debt crisis has affected the global factor much less in the last two years. It also seems that financial stress spills over to other countries very symmetrically, i.e. the deviations from the principal component are roughly equal (see Figure VI-4). This conclusion applies to interlinked and relatively equally important financial centres.

**Figure VI-4: Global financial stress**

a) Financial stress indicator



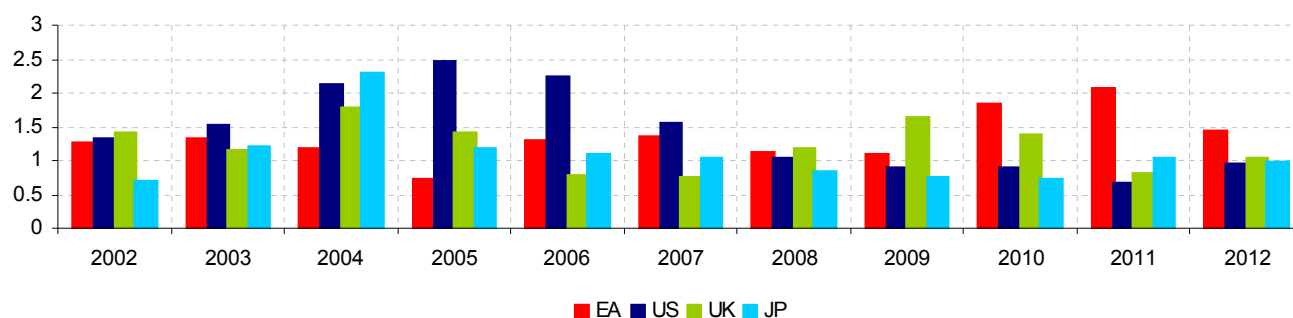
b) Principal component



<sup>7</sup> Claessens, Köse and Terrones (2008), Mallick and Sousa (2011).

<sup>8</sup> Despite its relative simplicity and the relatively small number of countries used, the construction of the indices is sufficient for illustration. A rigorous analysis would require, among other things, a larger number of countries.

### c) Percentage deviations from the scaled principal component<sup>9</sup> (annual averages)



Note: The indicators and the principal component are at monthly frequency. The percentage deviations from the scaled principal component take the form of annual averages of monthly values.

Source: Datastream, Bloomberg, CNB calculations.

To sum up, global financial links cannot be ignored and monitoring of financial stress indicators in advanced economies can signal potential transmission of financial shocks to other countries in timely fashion. Financial stress spillover between economies represents a challenge from the perspective of financial system stability. Knowledge of the vulnerability of the system in combination with the size of the shock is vital for assessing the level of stress. And it is the size of the shock which can be underestimated if we fail to properly understand financial linkages on the global scale.

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<sup>9</sup> The principal component does not have the same dimension as the indices and so the comparison is illustrative, based on a shift of the scale.

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**A1. Change in GDP predictions for 2013**

	CF		IMF		OECD		CB / EIU	
<b>EA</b>	-0.1	2013/3 2013/2	-0.4	2013/1 2012/10	-0.3	2012/11 2012/5	-0.2	2013/3 2012/12
<b>US</b>	-0.1	2013/3 2013/2	-0.1	2013/1 2012/10	-0.1	2012/11 2012/5	-0.1	2013/3 2012/12
<b>DE</b>	0.0	2013/3 2013/2	-0.3	2013/1 2012/10	0.1	2012/11 2012/5	-1.2	2012/12 2012/6
<b>JP</b>	0.0	2013/3 2013/2	0.0	2013/1 2012/10	-0.6	2012/11 2012/5	0.0	2012/10 2012/7
<b>BR</b>	-0.1	2013/3 2013/2	-0.5	2013/1 2012/10	-1.7	2012/11 2012/5	0.0	2013/3 2013/2
<b>RU</b>	-0.1	2013/3 2013/2	-0.1	2013/1 2012/10	-1.1	2012/11 2012/5	0.0	2013/3 2013/2
<b>IN</b>	-0.1	2013/3 2013/2	-0.1	2013/1 2012/10	-2.7	2012/11 2012/5	0.0	2013/3 2013/2
<b>CN</b>	0.0	2013/3 2013/2	0.0	2013/1 2012/10	-0.7	2012/11 2012/5	-0.2	2013/3 2013/2

**A2. Change in inflation predictions for 2013**

	CF		IMF		OECD		CB/EIU	
<b>EA</b>	-0.1	2013/3 2013/2	0.0	2012/10 2012/4	-0.3	2012/11 2012/5	0.0	2013/3 2012/12
<b>US</b>	0.0	2013/3 2013/2	-0.1	2012/10 2012/4	-0.1	2012/11 2012/5	-0.2	2013/3 2012/12
<b>DE</b>	-0.1	2013/3 2013/2	0.1	2012/10 2012/4	-0.1	2012/11 2012/5	-0.1	2012/12 2012/6
<b>JP</b>	0.1	2013/3 2013/2	-0.2	2012/10 2012/4	-0.3	2012/11 2012/5	-0.2	2012/10 2012/7
<b>BR</b>	0.1	2013/3 2013/2	-0.1	2012/10 2012/4	0.0	2012/11 2012/5	0.0	2013/3 2013/2
<b>RU</b>	0.0	2013/3 2013/2	0.2	2012/10 2012/4	0.6	2012/11 2012/5	0.0	2013/3 2013/2
<b>IN</b>	0.0	2013/3 2013/2	2.3	2012/10 2012/4	0.6	2012/11 2012/5	0.6	2013/3 2013/2
<b>CN</b>	0.0	2013/3 2013/2	0.0	2012/10 2012/4	-1.3	2012/11 2012/5	0.0	2013/3 2013/2

**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

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