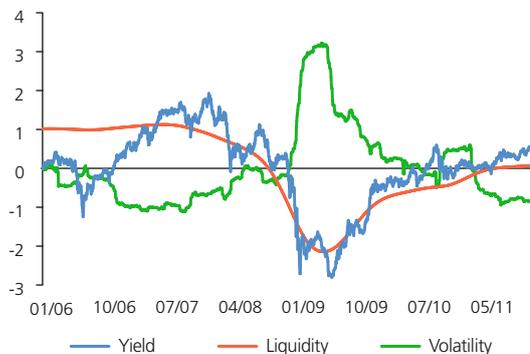


CHART III.1

## Volatility, liquidity and yield in the Czech financial market

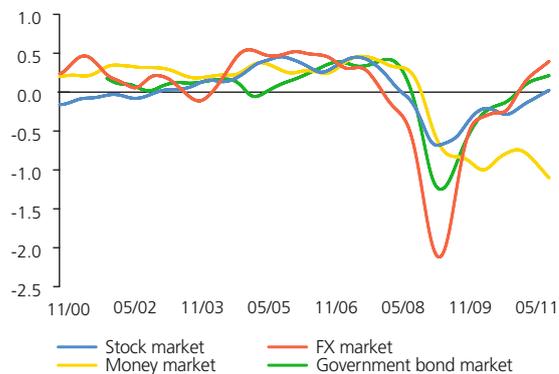


Source: Bloomberg LP, CNB, Thomson Reuters, CNB calculation

Note: The volatility index is the sum of the historical volatility of the PX index, the CZK/EUR rate, the 10Y government bond and the 3M PRIBOR. See FSR 2007, Box 4 for the calculation of the liquidity indicator. The yield index is calculated as the arithmetic mean of the yields from the EFFAS index for 3- to 5-year government bonds and the PX index. The indices are normalised over the entire period.

CHART III.2

## Market liquidity indicators for individual Czech markets

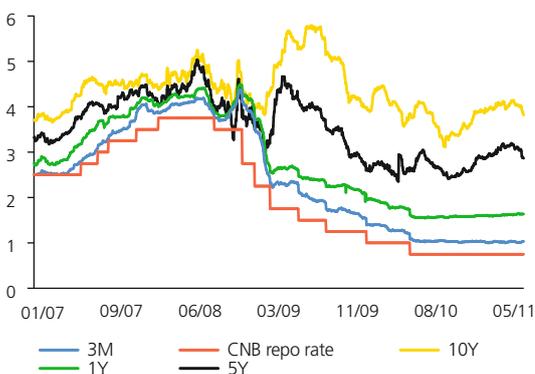


Source: Bloomberg LP, CNB, CNB calculation

Note: See FSR 2007, Box 4 for the calculation of the indicators.

CHART III.3

## Monetary policy rate and market rates in the Czech Republic (% p.a.)



Source: Thomson Reuters

Note: 3M and 1Y = 3-month and 1-year PRIBOR; 5Y and 10Y = 5-year and 10-year Czech benchmark government bond yield.

## 3 ASSET MARKETS

## 3.1 THE FINANCIAL MARKETS

International financial markets remain strongly affected by supportive economic policies and extraordinary measures. The global economic recovery and relaxed monetary policies in advanced countries have led to rising equity and commodity prices. Market volatility has decreased and corporate bond spreads have flattened out. Long-term yields are rising again owing to positive expectations regarding economic growth, inflation, and a deteriorating fiscal situation in some countries. The risk of substantial growth in financing costs for the real economy is thus becoming relevant, and the danger of fiscal risk transforming into liquidity and credit risk in the financial sector is also rising owing to the interconnectedness between fiscal developments and the situation of the banking sector. The Czech financial market is being affected by the external situation to a limited extent. The main risk to it remains an escalation of the debt crisis in the euro area and subsequent growth in risk premiums.

The scenario that played out in the Czech financial markets in 2010 and in the first few months of 2011 was similar to that in foreign markets. Market volatility decreased, while liquidity and yields increased slightly (see Chart III.1). Although these aggregate financial market indicators suggest an improvement compared to the highly negative situation observed in late 2008/early 2009, individual market indicators suggest persisting increased nervousness in the markets. An improvement is apparent in the equity and commodity markets, but the indicators for the credit (interbank and bond) markets remain in positions suggesting caution, uncertainty and a lack of confidence in counterparties.

## The foreign interbank market is under the influence of adopted measures...

Ever-present concerns about sovereign risk and counterparty risk are significantly hindering any improvement in the redistribution of liquidity through the money markets, especially European ones.<sup>32</sup> The overall turnover of the euro money market decreased for the third consecutive year, amid a continuing partial redirection of liquidity from the unsecured to the secured market, especially at longer maturities. The difference between lending rates on these two money markets remains high, and the share of transactions backed by collateral issued in the same country of origin as the counterparty providing the collateral is declining. This suggests a high level of caution, a persisting lack of confidence in counterparties, and segmentation of countries by sovereign risk level. The ability of some euro area banks to finance themselves in the term money market is very limited, which means they are more or less dependent on the ECB's supportive liquidity

32 ECB, *Financial Stability Review*, Box 6, December 2010.

measures.<sup>33</sup> Consequently, a return to the natural situation in the euro money market with no negative impact on the stability of the financial system is still not entirely possible.

### ...and the domestic market situation is little changed

The situation in the Czech money market was little changed from the previous year, which had been characterised by high volatility and lower liquidity (see Chart III.2). The bid-offer spread remains at around 30 b.p. at all maturities, while the spreads between the monetary policy rate and individual market rates are not narrowing and at longer maturities are even widening (see Chart III.3). Total trading turnover currently remains low compared to 2008 and before, especially at longer maturities (see Chart III.4). Since mid-2010 it has increased slightly but only at the shortest maturities (overnight and one-week). Overnight transactions traditionally strongly dominate the unsecured Czech money market, and at the moment there is clearly no incentive for change and for a shift in activity to longer maturities. In the case of the secured koruna money market, transactions with maturities of one week to three months dominate (see Chart III.5). The increased activity in the secured koruna market relative to the pre-crisis period is eye-catching. Before the crisis this type of market was hardly used at all. The shift towards longer-maturity operations in the secured market and the stagnation of such operations in the unsecured market is probably due to the aforementioned credit risk (see Chart III.6), which, as in other countries, is being driven by growing counterparty credit risk caused by increased banking portfolio credit risk (see Box 3).

#### Box 3:

#### PRIBOR QUOTATIONS AND THE INTERBANK MARKET RISK PREMIUM

The financial crisis had a negative effect on interbank markets in many countries and led to growth in the risk premium contained in interbank rates on unsecured deposits (see Chart III.6).<sup>34</sup> As a result, identification of the components of this premium and of how they changed during the crisis has been the subject of numerous research projects.<sup>35</sup> The risk premium is usually explained by two factors, namely counterparty risk (a counterparty may not be able to pay its debts in the future)

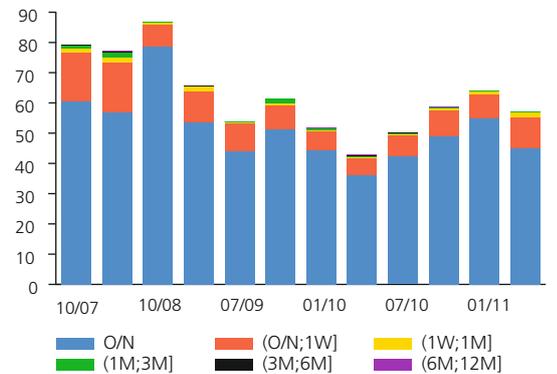
33 For these reasons the ECB is continuing to conduct certain extraordinary operations, such as three-month longer-term refinancing operations with a fixed rate tender procedure with full allotment. The ECB also discontinued its longer-maturity (6M and 1Y) operations, which led to a fall in the use of the deposit facility.

34 There was also parallel growth in other risk premiums, for example in client rates, including in the Czech Republic (see the thematic article *Retail Credit Premiums and Macroeconomic Developments* in this Report).

35 Acharya, V., Merrouche, O. (2010): *Precautionary Hoarding of Liquidity and Inter-Bank Markets: Evidence from the Sub-prime Crisis*, NBER WP No. 16395; Nobili, S. (2009): *Liquidity Risk in Money Market Spreads*, ECB Workshop on "Challenges to Monetary Policy Implementation Beyond the Financial Market Turbulence", November 2009; Taylor, J. B., Williams, J. C. (2008): *A Black Swan in the Money Market?* NBER WP No. 13943; Michaud, F. L., Upper, C. (2008): *What Drives Interbank Rates? Evidence from the Libor Panel*, BIS Quarterly Review, March 2008.

CHART III.4

**Koruna deposit transactions in the interbank market**  
(CZK billions; average daily turnovers)

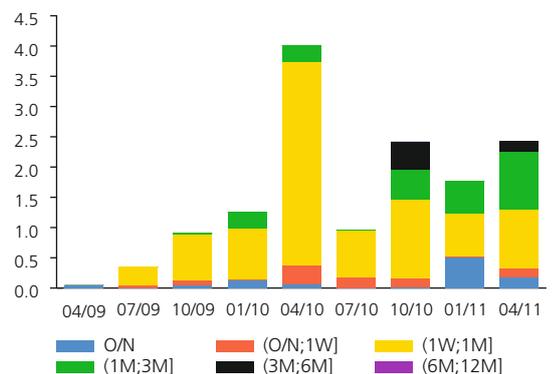


Source: CNB

Note: O/N = overnight, 1W = 1-week, 1M = 1-month, 3M = 3-month, 6M = 6-month, 12M = 12-month.

CHART III.5

**Koruna repo operations in the interbank market**  
(CZK billions; average daily turnovers)

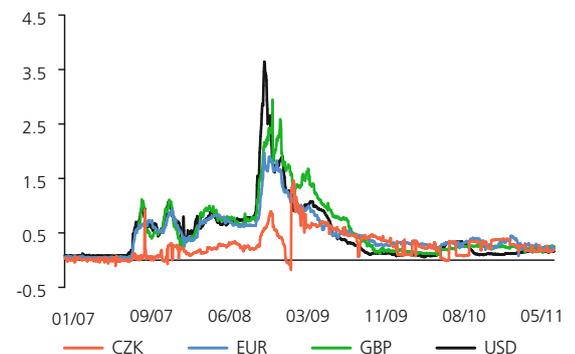


Source: CNB

Note: O/N = overnight, 1W = 1-week, 1M = 1-month, 3M = 3-month, 6M = 6-month, 12M = 12-month.

CHART III.6

**Risk premiums in the interbank market**  
(%)

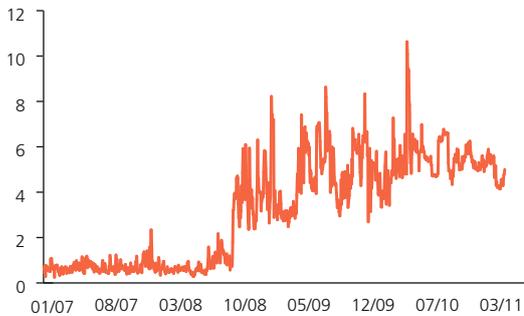


Source: Thomson Reuters, CNB calculation

Note: Difference between the 3M interbank rate and the 3M OIS of the relevant currency.

CHART III.1 BOX

**Coefficient of variation of the 3M PRIBOR quotes**  
(%; standard deviation of quotations weighted by mean)

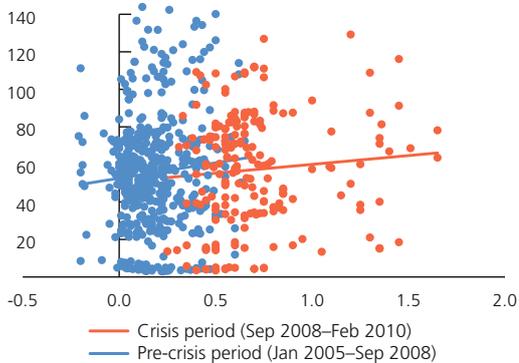


Source: Thomson Reuters, CNB calculation

CHART III.2 BOX

**Relationship between banking liquidity and the risk premium in the interbank market**

(%; x-axis: difference between 3M PRIBOR quotations and CNB 2W repo rate; y-axis: loans/deposits)



Source: CNB, Thomson Reuters, CNB calculation

and the balance-sheet liquidity of banks acting as creditors in the interbank market (liquidity hoarding in a situation of increased uncertainty). The balance-sheet liquidity of banks is additionally influenced by market liquidity in relevant financial markets.<sup>36</sup> Numerous empirical studies have shown that while counterparty risk was relevant at the start of the crisis in the US, the problems in the interbank market in Europe manifested themselves more as liquidity problems linked with liquidity hoarding in banks' balance sheets.

As the PRIBOR is a reference rate calculated from the quotations of 11 reference banks,<sup>37</sup> a microeconomic analysis drawing on the quotations of the individual banks can help to explain movements in the risk premium in those rates. The PRIBOR represents the rate of interest at which banks, "on average", are willing to lend to their counterparties, i.e. to other reference banks. The evolution of the coefficient of variation of the individual quotations reveals the different behaviour of reference banks before and after the collapse of Lehman Brothers (see Chart III.1 Box). Until mid-September 2008, the banks behaved more or less the same and the quoted rates did not differ significantly from each other. The collapse of Lehman Brothers represents a milestone for change in banks' behaviour. Not only did PRIBOR quotations by reference banks increase as a result of the crisis, they also started to show greater dispersion across the reference banks.

Preliminary analyses making use of the unique links between the reference banks' individual quotations and their individual balance-sheet indicators (NPL ratios, ratios of quick assets in balance sheets, loan-to-deposit ratios, etc.) and other variables describing developments abroad (including in parent companies) and in relevant financial markets (the evolution of market liquidity and long-term bond yields) reveal that liquidity factors played a role in the Czech Republic as well, especially at the start of the crisis. As a result of the increased uncertainty and fall in liquidity in the financial markets, with the "real" liquidity of assets in banks' balance sheets falling, there was an increase in domestic banks' unwillingness to lend to the unsecured interbank market (see Chart III.4). This was reflected in higher interest

36 The bilateral effect between balance-sheet and market liquidity in the Czech financial system is analysed, for example, by Geršl, A., Komárková, Z. (2009): *Liquidity Risk and Banks' Bidding Behavior: Evidence from the Global Financial Crisis*, Czech Journal of Economics and Finance, Vol. 59, No. 6, pp. 577–592.

37 The list of quoting banks is public and contains the following institutions: all four large banks (Česká spořitelna, Československá obchodní banka, Komerční banka and UniCredit Bank ČR), representatives of medium-sized and small banks (Raiffeisenbank and LBBW Bank CZ) and significant branches of foreign banks (Crédit Agricole, Citibank Europe, Deutsche Bank, ING Bank and The Royal Bank of Scotland). These banks account for around 70% of the assets of the banking sector as a whole.

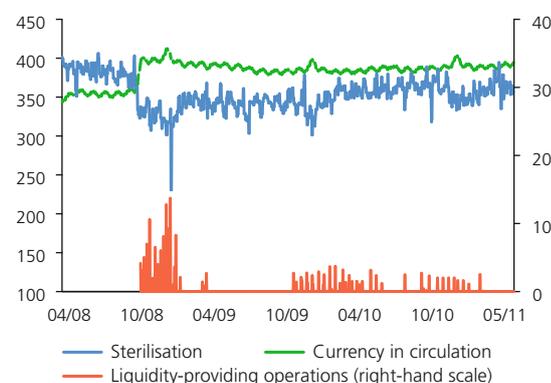
rate quotations (see Chart III.2 Box).<sup>38</sup> Since the liquid assets of domestic banks consist mostly of domestic bonds, the fall in liquidity in the bond market at the end of 2008 (see Chart III.2) may have been related to a large extent to the increase in the risk premium in the unsecured interbank deposit market. During 2009 and 2010, when the risk premium in the unsecured interbank market fell sharply but remained high (see Chart III.6), counterparty risk was more prevalent than liquidity factors in a context of rising credit risk in banks' balance sheets (see section 4.1).

The generally low activity in the Czech money market is probably due to the still low incentive for Czech banks to finance this market. By international comparison, the banking sector remains sufficiently liquid with the use of conservative sources of financing (see section 4.1) and makes hardly any use of the CNB's temporary liquidity-providing repo operations despite the increased tension in this market (see Chart III.7).<sup>39</sup> On the other hand, the behaviour of banks in liquidity-absorbing operations has remained unchanged since the start of the crisis. In the pre-crisis period, banks often bid in the repo tenders to deposit liquidity with the CNB at rates below the repo rate,<sup>40</sup> whereas since the start of 2009 virtually all banks have been bidding only at the highest possible rate (i.e. the repo rate). This may signal expectations of growth in the relatively low nominal short-term rates.

The money market will be significantly affected by the currently planned and much debated introduction of two new liquidity standards for the financial sector (the LCR and the NSFR; more details in Box 7 in section 4.1). In simple terms, these liquidity standards are targeted on the one hand at encouraging the holding of risk-free deposits with the central bank or government bonds (the LCR) and on the other hand at promoting stable sources of financing (NSFR). Both standards could to some extent affect market liquidity and activity in the unsecured money market and probably shift both of them to secured markets. Although the standards are not planned to be introduced in several years, they could have an impact on the markets much earlier.

CHART III.7

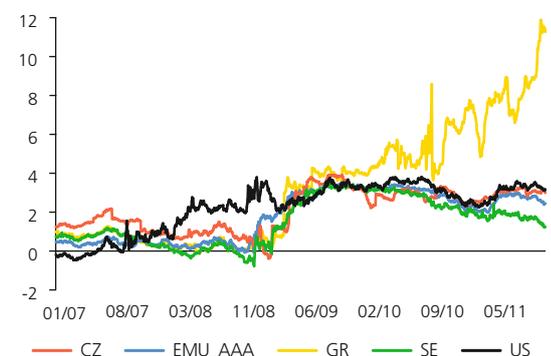
#### Open market operations and volume of currency in circulation (CZK billions)



Source: CNB

CHART III.8

#### Term spreads for selected economies (%)



Source: Thomson Reuters, CNB calculation

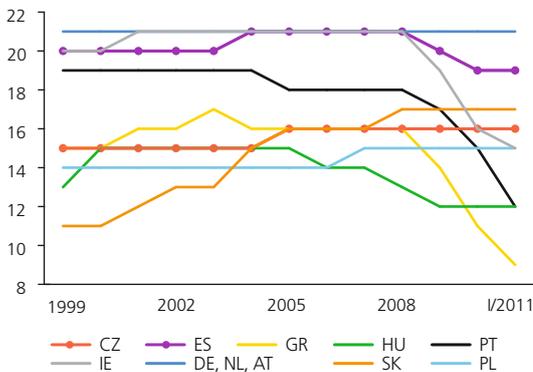
Note: The term spread is the difference between the 10Y government bond yield and the 3M T-bill yield. AAA = rating of relevant debt instrument.

<sup>38</sup> The spread between the 3M PRIBOR and the CNB's 2W monetary policy repo rate was used as the proxy for the risk premium for the analysis in this box. There were two reasons for this choice: (1) the same spread is used in the monetary policy modelling framework (see CNB *Inflation Report II/2011*), and (2) the premium is easier to communicate, even though in this case and with regard to various maturities it also contains expectations about changes in the CNB's monetary policy rates and a general term premium. However, the effects of the last-mentioned factors were taken into consideration in the analysis.

<sup>39</sup> In January 2011 the CNB modified the extraordinary liquidity-providing monetary measures it had introduced in October 2008 to support the domestic financial market during the global financial crisis. The changes, introduced to reflect current market conditions, involved the discontinuation of the 3M liquidity-providing repo operations at the end of 2010 and the extension of the 2W liquidity-providing repo operations at least until the end of 2011.

<sup>40</sup> Geršl, A., Komárková, Z. (2009): *Liquidity Risk and Banks' Bidding Behavior: Evidence from the Global Financial Crisis*, Finance a úvěr – Czech Journal of Economics and Finance, Vol. 59, No. 6.

CHART III.9

**Sovereign ratings of selected countries**  
 (long-term foreign currency rating; Standard&Poor's)


Source: Standard &amp; Poor's

Note: Long-term S&amp;P rating conversion scale: 21 = AAA, 16 = A, 11 = BB+, 6 = B-, 0 = D.

CHART III.10

**Ten-year government bond yields of selected countries**  
 (1 January 2010 = 100)


Source: Thomson Reuters, CNB calculation

Note: Arithmetic means for country groups.

**Yield curves remain upward sloping and relatively steep...**

Yield curves on the interbank market and also on the government bond market are still rather steep (see Chart III.8). A flattening of these curves is currently being prevented by deferral of the monetary policy tightening cycle by central banks and by concerns regarding the future evolution of sovereign risk, accompanied by several sovereign rating downgrades (see Chart III.9) and consequent growth in long-term rates since the middle of last year (see Chart III.12). The rise in long-term rates was due to a more positive outlook for economic growth, which started to push long-term real interest rates upwards (especially in the US), as well as to increased inflation expectations (especially in the euro area). The exception is Sweden, where the bond yield curve is flattening out slightly (see Chart III.8), mainly because of a rise in short-term rates. The monetary policy rate also increased in the euro area in April this year, although the transmission almost halted at the one-month maturity level. At longer maturities there was almost no effect and the euro area government bond yield curves remain steeper.

**...because of the continuing sovereign debt crisis**

The return to rising long-term rates was triggered by the events of last spring regarding the threat of default on the Greek government debt. These events spilled over to other countries in public finance difficulties, even though the euro area member states together with the IMF provided Greece with a conditional loan of EUR 110 billion. Owing to the "flight to security" effect, decoupling of government bond yields started to occur (see Chart III.10). While government bond yields in fiscally more stable countries (such as France, Germany, the Netherlands and the US) fell, yields in more risky countries (such as Ireland, Portugal and Greece) rose sharply, and their upward trend – driven primarily by a rising credit premium (see Chart III.11) – was not reversed even by the EU's rescue mechanisms (see Box 4).

**Box 4:**
**EURO AREA RESCUE PROGRAMMES**

In a situation of rising volatility in the euro market and the euro area government bond market, EU representatives in May 2010 unveiled a plan to create a potential financial assistance mechanism for euro area governments unable to refinance themselves on the market under satisfactory conditions. This support mechanism is based on the potential provision of credit to the countries concerned from three sources.

First, an European Financial Stabilisation Mechanism (EFSM) was set up for this purpose. The EFSM enables the European Commission to borrow up to EUR 60 billion in the financial markets and to use this money to lend to EU Member States. The EFSM was put in place for as long as it will be needed. On 5 January 2011, an inaugural EUR 5 billion issue of bonds took place successfully as part of the financial support package

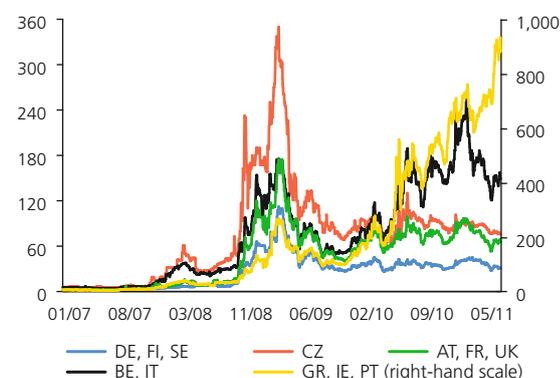
agreed for Ireland. Bonds issued under the EFSM are guaranteed by the Commission, which uses the EU budget as collateral. The second source is the European Financial Stabilisation Facility (EFSF), whose founding members and potential users are euro area countries and whose effective capacity is EUR 440 billion.<sup>41</sup> The EFSF was officially established on 7 June 2010 and successfully placed its inaugural bonds for an amount of EUR 5 billion on 25 January 2011. As the EFSF was established for a limited tenure only, the European Council this year approved the establishment of a European Stability Mechanism (ESM) as its permanent successor. The ESM is due to become operational in July 2013 with total subscribed capital of EUR 700 billion (EUR 80 billion, of which will be paid up gradually and the remaining EUR 620 billion will be callable capital and guarantees of the euro area member countries). The effective lending capacity will be EUR 500 billion and the rates on loans provided will be 200–300 basis points above the financing costs. The third source is IMF loans totalling up to EUR 250 billion.

The May 2010 crisis package also included a Securities Market Programme launched by the ECB. This allows the ECB to buy government bonds of euro area countries for a limited period of time. Government bonds totalling EUR 77 billion have so far been purchased under this programme.

The only country to have obtained credit from the EFSM and EFSF so far is Ireland,<sup>42</sup> which has borrowed a total of EUR 85 billion (EUR 22.5 billion from the EFSM and EUR 17.7 billion from the EFSF). Portugal has also requested financial assistance. The Czech Republic will provide guarantees only to the EFSM. Its contribution equals its share in the EU budget, which is around 1.23%, i.e. approximately EUR 738 million in the event of full use of the EFSM's capacity. However, financial payment would only be made if a state defaulted on its loan from the EFSM. In specific cases of default, the Czech Republic would have to contribute CZK 6.7 billion to the EU budget under the financial assistance package approved for Ireland in November 2010 and CZK 7.7 billion under the financial assistance package approved for Portugal in May 2011. The Czech Republic could also potentially incur a financial obligation due to defaults on loans provided by the IMF (the quota for the Czech Republic is 0.42%).

CHART III.11

#### Five-year sovereign CDS spreads of European governments (b.p.)



Source: Bloomberg LP, CNB calculation  
Note: Arithmetic means for country groups.

CHART III.3 BOX

#### Exchange rates of the koruna and the euro against the dollar

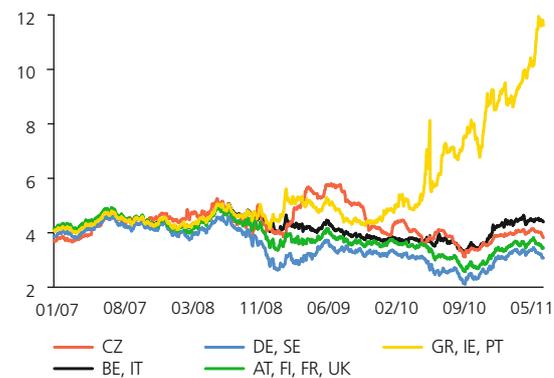


Source: Thomson Reuters

41 The original effective capacity was considerably lower owing to the creation of cash reserves, cash buffers and a 120% guarantee on each loan, and was therefore increased in March of this year.

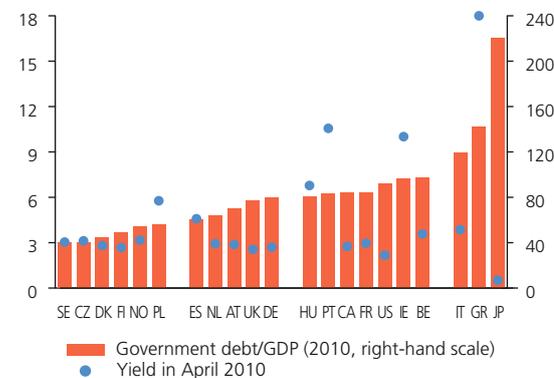
42 Greece's total borrowing of EUR 110 billion was provided by the euro area member states (EUR 80 billion) and the IMF (EUR 30 billion) before the establishment of the EFSM and the EFSF and so is not a part thereof.

CHART III.12

**Ten-year government bond yields of selected countries**  
(%)


Source: Thomson Reuters, CNB calculation  
 Note: Arithmetic means for country groups.

CHART III.13

**Comparison of the ratio of gross government debt to GDP and the yield for selected countries**  
(%)


Source: IMF, Thomson Reuters, CNB calculation  
 Note: The yield is the arithmetic mean of the yield on the 5Y government bond of the relevant country for April.

The plans to introduce, and the actual introduction of, the aforementioned institutions and mechanisms helped to reduce the tensions in bond markets last spring (see Chart III.10 and Chart III.3 Box). In an attempt to help reduce the risk of a further escalation of the sovereign debt crisis, the EFSF and the ESM have this year been allowed to buy government bonds in the primary market in exceptional cases, and the capacity of the EFSF has been increased.

However, the introduction of these rescue systems has not led to a significant reduction in credit premiums for European sovereign debt (see Chart III.11). Uncertainty persists in the markets in the sense of spillover of the government crises to other euro area countries with strained public finance situations, such as Spain and Italy, and also to fiscally more stable countries with high exposures to the problem countries. Concerns are therefore arising mainly because the capacity of the rescue systems may not be sufficient in the event of such spillover. It is also necessary to take into account the fact that the assistance from rescue systems has to be supported by euro area member states. Consequently, the growing unwillingness of some stable and fiscally responsible countries to contribute constantly to the bailout of partners who have been fiscally less responsible in the past cannot be ignored.

**In the course of the sovereign debt crisis, investors have gradually ranked Czech bonds in the safe country category...**

The developments in the Czech government bond market suggest that investor perceptions have changed since the start of the crisis (see Chart III.11). At the onset of the sovereign debt crisis, investors added Czech bonds to the category of risky countries and the risk premium as measured by CDS spreads therefore increased significantly. As the crisis progressed, however, investors started to differentiate between countries in more detail, and given that the current situation and outlook for Czech public finance were among the more moderate in the European context (see section 2.1), they ranked the Czech Republic among the countries with stable outlooks (see Box 5). The crises in Greece, Ireland and Portugal revealed something that had been identified as a risk for the Czech Republic in FSR 2009/2010, namely that the financial markets are asymmetrically far less tolerant of smaller countries showing public finance deficits than of larger ones doing the same (see Chart III.13), even though their structural primary deficits are not on the same scale as those of large states (see Chart II.21). This asymmetric phenomenon can be explained partly by the greater appeal of the much more liquid markets of large countries (the US, the UK) and by the effect whereby the sovereign debt refinancing need in large countries, which are regarded as too powerful to fail, crowds out demand for small countries' bonds. In small countries these effects may exert upward pressure on sovereign debt financing costs and therefore make their fiscal problems more difficult to solve (see Box 5).

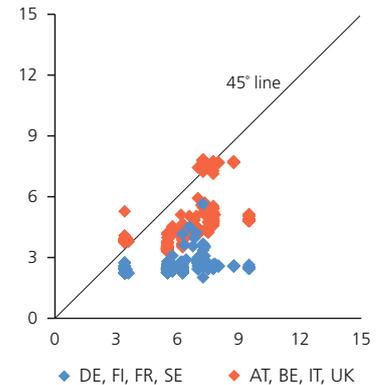
**Box 5:****QUANTILE ANALYSIS OF CROSS-COUNTRY CONTAGION EFFECTS BASED ON CDS SOVEREIGN SPREADS**

The continuing debt crisis in the euro area reopened the debate about the role played by rating agencies during the crisis and the interdependencies between various financial markets as regards the transmission of shocks. During the crisis, the ratings of several states were downgraded repeatedly (see Chart III.9), yield and CDS sovereign spreads widened (see Charts III.11 and III.12) and stock markets came under increased pressure (see Chart III.15). Although only some sovereign ratings were downgraded, virtually all financial markets came under pressure. Owing mainly to psychological contagion, the correlation between European sovereign CDS premiums increased sharply after the collapse of Lehman Brothers,<sup>43</sup> when negative sovereign risk perceptions spread even to countries whose financial systems had been until then affected by the crisis either not at all, or – as in the case of the Czech Republic – only marginally.<sup>44</sup> Consequently, independence can be observed for a time between the market and economic fundamentals of certain – often structurally different – countries. The evolution of sovereign CDS spreads raises the question of to what extent the pricing of such spreads is affected by concerns about default of individual countries and to what extent it is governed by common time-varying factors. The high CDS premium seen in many countries during the financial crisis may indeed have been due to common factors (growing risk aversion on the part of investors, drying up of market liquidity, global recession and concerns about possible rating downgrades) rather than to actual default losses.<sup>45</sup>

In the integrated financial world there are several potential channels through which sovereign risk shocks can be transmitted from one country to another. These channels include the “mere” negative impact of changes in sovereign ratings.<sup>46</sup> The purpose of this box is to demonstrate how much the fiscal problems in peripheral parts of the euro area have transmitted to the Czech

**CHART III.4 BOX****Pre-crisis relationship of sovereign CDS spreads between selected country groups and the Czech Republic**

(b.p.; x-axis: CZ; y-axis: selected country groups; May 2006–August 2007)

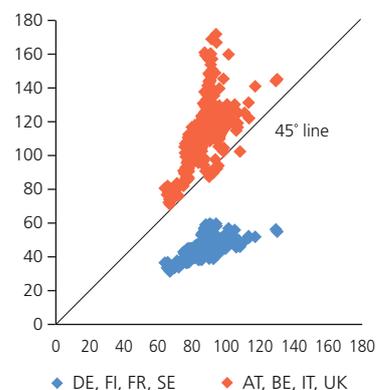


Source: Bloomberg LP, CNB calculation

Note: Arithmetic means for country groups. 5Y CDS spreads were used for the comparison.

**CHART III.5 BOX****Relationship of sovereign CDS spreads between selected country groups and the Czech Republic during the debt crisis**

(b.p.; x-axis: CZ; y-axis: selected country groups; March 2010–May 2011)



Source: Bloomberg LP, CNB calculation

Note: Arithmetic means for country groups. 5Y CDS spreads were used for the comparison.

43 For more details see *Financial Stability Report 2009/2010*, Box 4, or Banque de France (2009): *Financial Stability Review*, Box 1, September.

44 Between 2008 and 2009 several advanced countries provided government guarantees for banks' liabilities. This resulted in a fall in bank CDS spreads, because the default risk was transferred from banks' balance sheets to fiscal balance sheets. The sovereign CDS spreads of the governments providing such financial guarantees therefore logically increased.

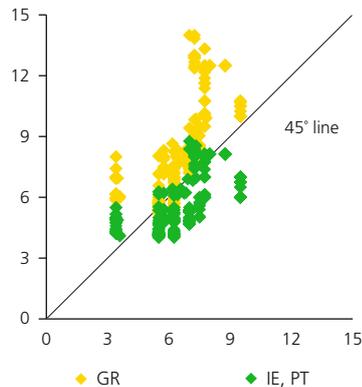
45 Fontana, A., Scheicher, M. (2010): *An Analysis of Euro Area Sovereign CDS and Their Relation with Government Bonds*, WP No. 1271, ECB.

46 Blundell-Wignall, A., Slovik, P. (2010): *The EU Stress Test and Sovereign Debt Exposures*, OECD WP on Finance, Insurance and Private Pensions, No. 4; Ehrmann, M., Fratzscher, M., Rigobon, R. (2009): *Stocks, Bonds, Money Markets and Exchange Rates: Measuring International Financial Transmission*, Journal of Applied Econometrics; Gande, A., Persey, D. C. (2005): *News Spillovers in the Sovereign Debt Market*, Journal of Financial Economics, Elsevier, Vol. 75(3), pp. 691–734, March.

CHART III.6 BOX

### Pre-crisis relationship of sovereign CDS spreads between selected country groups and the Czech Republic

(b.p.; x-axis: CZ; y-axis: selected country groups; May 2006–August 2007)



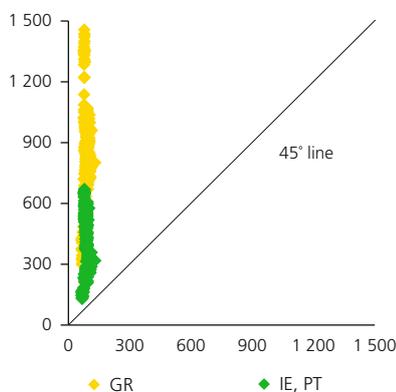
Source: Bloomberg LP, CNB calculation

Note: Arithmetic means for country groups. 5Y CDS spreads were used for the comparison.

CHART III.7 BOX

### Relationship of sovereign CDS spreads between selected country groups and the Czech Republic during the debt crisis

(b.p.; x-axis: CZ; y-axis: selected country groups; March 2010–May 2011)



Source: Bloomberg LP, CNB calculation

Note: Arithmetic means for country groups. 5Y CDS spreads were used for the comparison.

TABLE III.1 BOX

### Co-movement of default risks of various country groups and the Czech Republic

( $\beta_{\tau,j}$ )

COUNTRY ( <i>j</i> )	QUANTILE ( $\tau$ )				
	5th	25th	50th	75th	95th
DE, FI, FR, SE	0.85	0.78	0.73	0.64	0.54
AT, BE, IT, UK	0.76	0.71	0.66	0.63	0.75
IE, PT	0.56	0.41	0.38	0.34	0.37
GR	0.51	0.39	0.34	0.31	0.37

Source: Bloomberg LP, CNB calculation

Note: The results are significant at the 1% level.

government bond market, or more precisely to what extent the default risk of Czech sovereign debt is affected by the default risk of other sovereigns (in our case also groups of sovereigns)<sup>47</sup> and to what extent by common market factors.

Following IMF (2009),<sup>48</sup> quantile analysis was used to investigate the contagion effect. This was because the relationship between the individual sovereign default risks is non-linear (see Charts III.4–7 Box)<sup>49</sup> and this method is a suitable technique that can explain apparent non-linearities in the data. Standard regression only provides information about the mean relationship between the variables over the entire period of analysis and does not yield additional information on any change in the relationship within a non-standard time period such as a financial crisis. This situation manifests itself in an increased difference between the relationship obtained in the 1st–5th quantile relative to the 95th–100th quantile, or in a greater deviation from the mean of the distribution function.

Daily data on the five-year CDS spreads of the countries under review for the period of May 2006 to April 2011 were used to express the sovereign credit risk premium, and, like IMF (2009, p. 16), we used market indicators of liquidity, volatility, default risk and the business cycle to express the common aggregate risk factor. The contagion effect was measured using the following equation:

$$CDS_{CZ} = \alpha_{\tau} + \sum_{i=1}^k \beta_{\tau,i} R_i + \beta_{\tau,j} CDS_j,$$

where the credit premium for Czech sovereign debt ( $CDS_{CZ}$ ) is expressed as a function of the credit premium for sovereign debt of the other country under analysis ( $CDS_j$ ) after correcting for the effect of the common aggregate risk factor ( $R_i$ ) for different quantiles ( $\tau$ ). In other words, the estimated parameter  $\beta_{\tau,j}$  expresses how the sovereign debt default risk of sovereign  $j$  effects the Czech debt default risk (directly and indirectly) in different quantiles.

The analysis (see Table III.1 Box) revealed that in the period of calm (defined as the 5th quantile) the credit premium reacts to Czech sovereign debt in the same way as to the sovereign debt of Germany, Finland, France and Sweden, whereas in the period of

47 Three groups of European countries were created for the purposes of the analysis: (i) those with the lowest CDS spreads (DE, FI, FR, SE), (ii) those with similarly high CDS spreads as the Czech Republic (AT, BE, IT, UK), and (iii) those with high CDS spreads (IE and PT). The relationship between the Czech Republic and Greece was then analysed separately.

48 IMF (2009): *Global Financial Stability Report*, April.

49 It is clear from Charts III.4–III.7 Box that the co-movement of the risk premiums of the Czech Republic and the selected country (group of countries) is non-linear, because during the period of higher credit risk levels (see Charts III.5 and III.7, expertly characterised as a period of crisis) the credit premium of the Czech Republic reacts more or less than proportionately to movements in the credit premium of the other country (group of countries), unlike in the period when the credit risk level is lower (see Charts III.4 and III.6, expertly characterised as a period of calm).

market tension (defined as the 95th quantile) it reacts differently in relation to those countries. In other words the Czech premium shows different sensitivity to a negative market situation. The fact that the data sample covers “only” the present crisis makes the explanation considerably simpler. The onset of the crisis was accompanied by the market effects of flight to quality and liquidity by investors, and the government bond markets of fiscally stable countries were exposed to increased demand by comparison with other countries (see section 3.1). Another example is the co-movement of Czech and Greek sovereign risk, which also decreases with increasing quantile number. However, in the period of calm only around 50% of the effect transmits from Greece to the Czech Republic, and in the crisis period the figure is even lower (around 40%). The interpretation here differs from that of the relationship with the premium of stable countries. In the case of Greece, in contrast to the Czech Republic, there is a high probability of restructuring of sovereign debt. The most stable Czech CDS relationships can be seen with countries such as Belgium, Italy, Austria and the UK (almost identical values across quantiles). Although these countries are more indebted than the Czech Republic (see Chart III.13), their financial markets are larger, deeper and more liquid. These effects are also relevant to the determination of the risk premium. All this implies that the Czech sovereign credit premium is affected more by market conditions and effects than by concerns about potential debt restructuring.

### A further escalation of the sovereign debt crisis in the euro area cannot be ruled out

Although the debt crisis in the euro area is spreading across economies differently and is currently very subdued thanks to accommodative policies, the risk of contagion is still relevant. The combination of rising deficits, high refinancing volumes (see section 2.1) and unremitting market concern about banks exposures to countries mired in fiscal crisis (see Table III.1) will probably continue to put primary government bond markets under pressure. Moreover, if any of the peripheral euro area countries with fiscal problems is actually forced to restructure its debt, the crisis could spill over via losses in bank balance sheets to other and larger, currently stable, countries (such as Germany, France or Spain). From there the turbulence could spread through the financial markets to the entire global financial system (e.g. the USA or Japan), giving rise to pressure for a renewed energetic response by central banks. In addition, it is evident that although the advanced economies are still able to finance themselves in the markets, demand for sovereign debt remains very volatile (see Chart III.14).

### Stock markets recorded strong growth...

The continuing implementation of loose monetary policy and the introduction of rescue systems (see Box 4), accompanied by the improving macroeconomic outlook and consistently better-than-

TABLE III.1

#### Exposures of foreign banks to government debt of peripheral economies

(EUR billions; end of 2010 Q3)

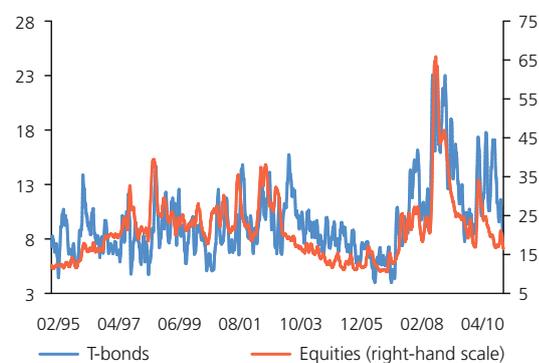
	GR	GR, IE, PT
TOTAL EXPOSURE	54	109
of which:		
German banks	19.7	28.4
French banks	14.8	31.8
Spanish banks	0.4	7.3
Italian banks	1.9	3.2
UK banks	2.4	9.3
Japanese banks	0.4	2.5
US banks	1.3	3.7
Other banks	12.8	23.2

Source: BIS, DB

CHART III.14

#### Volatility in the financial markets

(%; moving monthly average)



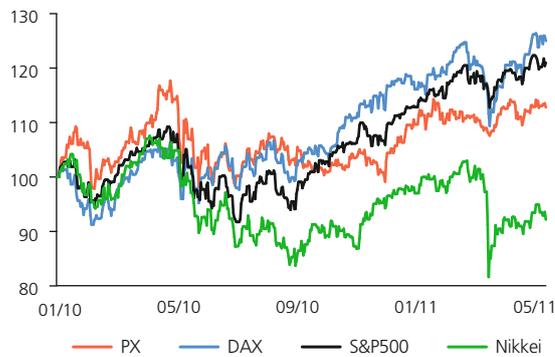
Source: Bloomberg LP, CNB calculation

Note: Equity volatility is measured by the VIX (Chicago Board Options Exchange Volatility Index), which reflects the market estimate of future volatility based on the weighted average of implied volatilities of pre-specified options. Bond volatility is calculated as the 10-day volatility of the index of prices of 10-or-more-year T-bonds in the USA.

CHART III.15

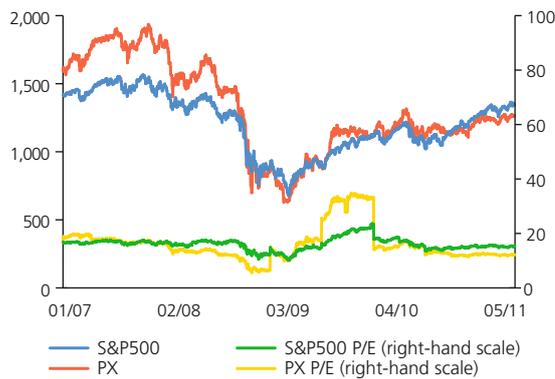
**Stock indices**

(1 January 2010 = 100)



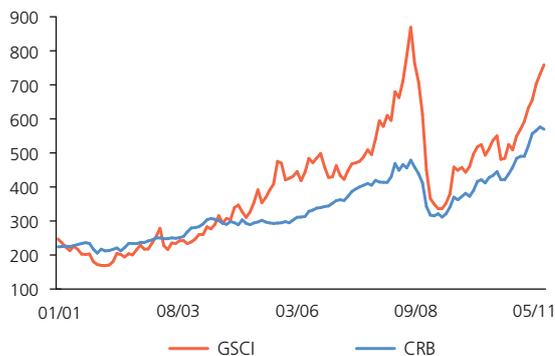
Source: Bloomberg LP, CNB calculation

CHART III.16

**Comparison of the S&P500 and PX stock indexes and their P/E ratios**

Source: Bloomberg LP, CNB calculation

CHART III.17

**Evolution of commodity indexes over the last ten years**  
(monthly data)

Source: Bloomberg LP, CNB calculation

Note: CRB and GSCI are commodity indexes (Reuters Commodity Research Bureau and S&amp;P Goldman Sachs Commodity Index).

expected corporate profits, is increasing the incentive for investors to switch from fixed-yield assets to equities in their search for yield. A significant growth trend has been observed in the stock market since last May (see Chart III.15). This growth is being accompanied by a renewed reduction in volatility, which increased significantly above its long-term average during May and June 2010 (see Chart III.14). The relative values of stock indices are also close to their long-term averages (see Chart III.16). The Czech stock market does not stray significantly from the trends in foreign equity markets and can be expected to continue copying them.

The persisting uncertainty about how events will unfold in the countries of North Africa and the Arabian Peninsula is currently creating a risk of flat or falling stock markets. If the conflicts were to spill over into Saudi Arabia, which together with Russia is the largest oil producer in the world, stock markets could come under more significant pressure. Other potential risks to the stock markets include the possibility of a "hard landing" in some Asian emerging markets, especially in China, where the local authorities are trying to tackle rising inflation (currently driven primarily by rising food prices), and in particular high and constantly rising property prices.

**...as did commodity prices**

An upward trend has also been visible in the commodity markets since the start of 2009 (see Charts III.17 and III.18, and Box 6). The price of gold, for example, has been rising sharply last year and this year (see Chart III.19), as have the prices of certain other precious metals. As a result, gold ETFs,<sup>50</sup> for example, have recorded an enormous inflow of funds, and this, in turn, has become one of the factors driving up the gold price. Last spring, after investors and economists began to get concerned about a possible major downturn in global economic growth (due to a debt crisis, a risk of a double-dip recession in the US or a risk of a sharp slowdown of the Chinese economy), the previous strong growth in prices in the commodity markets was replaced by a temporary decline. During the summer these concerns began to ease and prices of most commodities started to rise again. This rise continued until March of this year (see Chart III.18).

**Geopolitical tensions and the global recovery are driving up energy commodity prices**

The global economic recovery, the unrest and tension in some countries of North Africa and the Middle East and the nuclear disaster at Fukushima in Japan caused the prices of energy commodities, especially oil, to escalate in the first quarter of this year (see Chart III.20). Prices of most industrial commodities (in particular basic metals and iron ore) stabilised at high values, but saw no further escalation in the first quarter of this year (see Chart III.20).

50 Commodity ETFs (exchange-traded funds) are exchange-traded investment funds that hold commodities or commodity derivatives in their portfolios. These funds are usually traded very close to their net asset value. The first commodity ETF was created in 2003 and was based on gold.

Prices also surged in food commodity markets as it became increasingly clear during the second half of last year that some major world regions (for example Russia) would record poor harvests due to bad weather (see Chart III.20).

### Upside and downside risks for commodity prices

The main upside risk for further growth in energy commodity prices is the risk of unrest spreading from North Africa and the Arab Peninsular to other states. Whereas Libya accounts for 2% of global oil output, Iran and Saudi Arabia, for example, account for 5.3% and 12% respectively. A fall in production in either of these countries would therefore be difficult to replace with increased production in other countries and would have a huge impact on oil prices with potential knock-on effects on global (and Czech) economic growth. Commodity prices are also being pushed up by persisting growth in demand in emerging economies. However, the risks of the movements in commodity prices may be also on the downside. Some restrictive economic measures (e.g. the monetary policy measures introduced in China) could slow economic growth and thereby cause a sudden turnaround and fall in commodity prices. This, in turn, could be reflected in increased volatility and nervousness in other financial markets (see Box 6).

#### Box 6:

#### WHY HAVE COMMODITY PRICES SURGED OVER THE LAST DECADE AND WHY ARE THEY SO VOLATILE?

The debate about the sharp growth, and volatility, of commodity prices (see Chart III.17) has been going on for several years now. The fundamental and widely accepted explanation is the buoyant GDP growth in emerging economies.<sup>51</sup> The process of industrialisation and urbanisation in these countries is causing increased demand for commodities. Since per capita consumption of most commodities in these countries is still very low by comparison with the advanced nations, there is significant space for further structural growth in this demand. Empirical experience over at least the last decade has shown that mining companies cannot keep up with rising demand, as a result of which the balance between supply and demand in most commodity markets is a factor supporting further price growth. Expectations that new sources of supply can be found and exploited only at higher cost may be having a similar effect.

Another factor pushing up commodity prices is the low real interest rate environment<sup>52</sup> typical of the last decade. Hotelling's 1930s model predicted a negative correlation between real

51 According to the IMF database (World Economic Outlook Database, April 2001), for example, the share of the BRIC countries in global GDP (in purchasing power parity terms) rose from 16% to 25% between 2000 and 2010.

52 See, for example, Hošek, J., Komárek, L., Motl, M. (2011): *Měnová politika a cena ropy*, Politická ekonomie, No. 1.

CHART III.18

#### Evolution of commodity indexes since the collapse of Lehman Brothers

(monthly data)

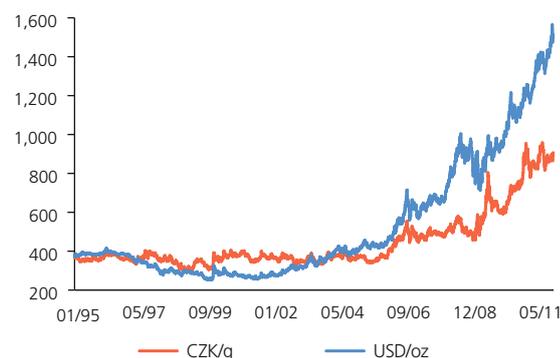


Source: Bloomberg LP, CNB calculation

Note: CRB and GSCI are commodity indexes (Reuters Commodity Research Bureau and S&P Goldman Sachs Commodity Index).

CHART III.19

#### Gold prices



Source: Bloomberg LP, CNB calculation

Note: Gold prices are given in US dollars per troy ounce and in Czech korunas per gram.

CHART III.20

#### Prices of selected commodities over the past 13 months

(15 April 2010 = 100)



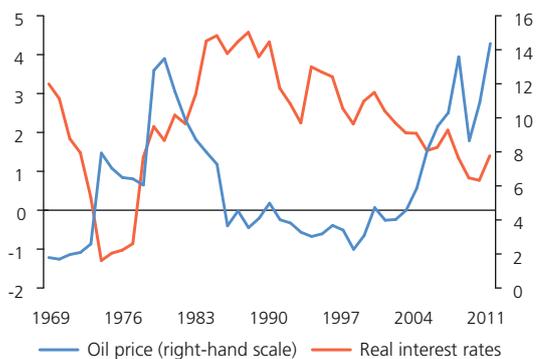
Source: Bloomberg LP, CNB calculation

Note: Commodity prices are obtained from the following exchanges: ICE (Brent crude oil), LME (London copper), CBT (Chicago wheat).

CHART III.8 BOX

**The real price of oil and real interest rates in industrially advanced countries**

(left-hand scale in %; right-hand scale in USD/barrel)



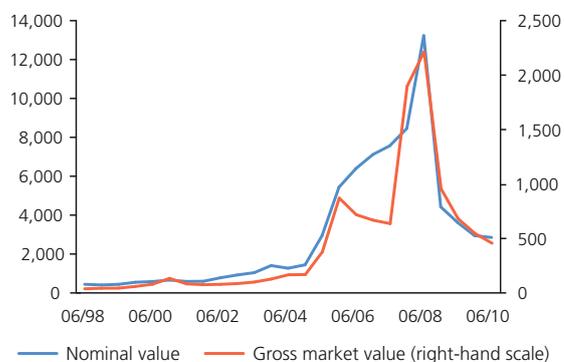
Source: IMF, Thomson Reuters, CNB calculation

Note: The real price of oil is the nominal price of oil (IMF) deflated by the CPI of advanced countries (1969 = 100); real interest rates are the 3-year moving average of long-term government bond yields (average for DE, UK, US, JP and CH) minus the 3-year moving average of CPI inflation in those countries; the figures for 2011 are as of the end of Q1.

CHART III.9 BOX

**Commodity derivative turnover in OTC markets**

(USD billions; half-yearly data)



Source: BIS, CNB calculation

interest rates and the oil price. It argues that if the current real interest rate is low (and so the money earned from selling the oil has a low rate of return), producers have little incentive to produce the oil now and prefer to leave it in the ground in the form of reserves for production in the future. At the same time, firms' interest in holding reserves (for example oil in tanks) can increase, since this strategy is cheap to finance when interest rates are low. Such constriction of supply will then push the current oil price upwards, but simultaneously increases future supply and thereby reduces the future price. The data over the last 40 years suggest that there is some truth in this hypothesis (see Chart III.8 Box).

Besides the ongoing process of industrialisation and urbanisation in emerging economies over the last decade, certain segments of the commodity markets have also been affected by a change in the behaviour of portfolio managers in the financial markets. In addition to traditional investment in equities and bonds, they have been shifting part of their investments towards derivatives, whose value is derived from the value of underlying assets such as property or commodities. There are various motives for the growing allocation of assets into commodity derivatives.<sup>53</sup> The first argument is the observed negative correlation between commodity prices and yields on other investment assets, thanks to which investment in commodity derivatives, in line with portfolio theory, provides a tool for reducing overall portfolio risk, a tool which, moreover, provides a hedge against inflation. Another factor is the search for yield associated with the low nominal yields on traditional assets. After the recession at the start of the millennium, investors faced a long period of low interest rates in the advanced economies. A similar situation arose after the crisis of 2008 and 2009. In an environment of low nominal rates (and in some cases even negative real rates) the incentive for individual and institutional investors to demand riskier and potentially higher-yielding assets increases at the expense of safe but low-yielding assets. Owing to the strong growth trend in commodity prices, this process has created increased demand for commodity derivatives over the past decade. Commodity derivatives also offer an easy way of indirectly acquiring exposure to the dynamically developing economies of China, India and other countries. The aforementioned factors have fostered exponential growth in the volume of assets managed in commodity funds. Logically enough, this has been accompanied by enormous growth in trades in commodity derivative markets (see Chart III.9 Box). Given this fact, it is possible that under certain circumstances growth in prices of commodity derivatives can contribute to growth in prices of

<sup>53</sup> See, for example, Basu, P., Gavin, W: *What Explains the Growth in Commodity Derivatives?* Federal Reserve Bank of St. Louis Review (January/February 2011).

commodities themselves, i.e. their spot prices. For example, rising prices in the commodity futures market can motivate commodity producers and traders to hoard their reserves for future sale, which would strengthen the aforementioned Hotelling effect.<sup>54</sup> However, the overall effect of this channel will be short-lived and quantitatively limited. The following relationship holds between the spot price of a physical commodity and the futures contract for that commodity:  $F(t) = (S(t)+U)*e^{r(T-t)}$ , where  $F(t)$  is the price of futures for the commodity at time  $t$ ,  $S(t)$  is the price of the commodity at time  $t$ ,  $(T-t)$  is the time to maturity of the futures contract,  $U$  is the present value of the costs of storing the commodity for time  $(T-t)$  and  $r$  is the risk-free interest rate. For consumer commodities, another determinant of the price of futures contracts is the so-called "convenience yield",  $C$ , or the benefit of holding a physical commodity. Such benefits include the ability to keep a production process running in the event of a shortage of a physical commodity used in that process, and the ability to profit from shortages in some other way. In such case, we can rewrite the previous equation as:  $F(t) = (S(t)+U - C)*e^{r(T-t)}$ . The existence of a convenience yield explains why some futures markets can be in a situation of backwardation, where prices of futures contracts are lower than spot prices.

It is clear from the previous two relationships that there is a direct link between the spot and derivatives markets, and it is therefore evident that the spot market affects the derivatives market. When the derivatives market becomes sufficiently large (for example because trading in commodity derivatives is much less capital-intensive than trading in physical commodities) the opposite can of course hold, i.e. the derivatives markets can affect the spot market. The causality from the derivatives market to the spot market can be amplified by the frequent practice whereby purchases or sales of a physical commodity are based directly on the value of various futures contracts at a given moment in time. Futures contracts can therefore also act as a benchmark for determining the spot price of a commodity.

Is the potential interaction between the spot and derivatives markets a reason for increased regulation? The surge in commodity prices has become a political issue in recent years. We often hear the fashionable explanation that the high commodity prices and their high volatility are due to the enormous boom

<sup>54</sup> The mechanism of transmission of price movements from the futures market to the spot market may work as follows. Financial investors will drive up the price of near (and later also more distant) contracts, so that the futures curve switches from backwardation (where the spot price is the highest and the price decreases with increasing maturity) to contango (where the price of futures contracts is higher than the spot price up to a certain horizon). If a real oil processor sees this situation (and believes that the future price really will be higher), it will tend to hedge its future needs by buying more oil now. This will increase current real demand and therefore also the spot price.

CHART III.10 BOX

### Comparison of commodity prices and global GDP growth (%)

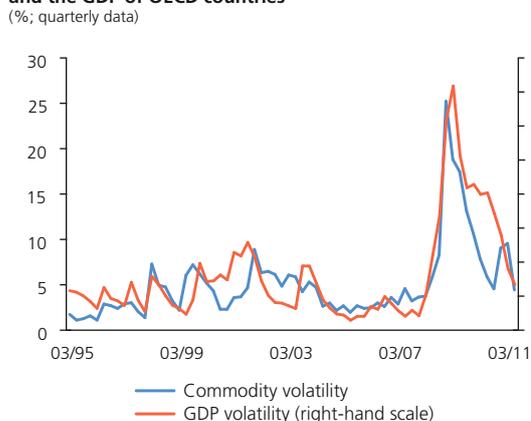


Source: IMF, Bloomberg LP, CNB calculation

Note: Annual commodity growth is calculated as the percentage change in the average value of the commodity indexes in the current year relative to the average value in the preceding year. The commodity index is the arithmetic mean of the CRB and GSCI indexes.

CHART III.11 BOX

### Comparison of the volatility of commodity prices and the GDP of OECD countries (%; quarterly data)



Source: IMF, OECD, Eurostat, FED, Bloomberg LP, CNB calculation

Note: Volatility is calculated as the rolling exponentially weighted volatility for the previous ten quarters from the quarter-on-quarter changes in the average prices of commodity indexes (CRB and GSCI) and from the quarter-on-quarter seasonally adjusted changes in GDP in OECD countries.

in derivatives markets and that instead of being used by commodity producers and users to manage risk, derivatives are being used by speculators and aggressive investors in the search for quick profits. This argument gives rise to the opinion that we need to start regulating these markets much more and try to reduce the undesirable volatility (and potentially also the high prices) in the commodity markets. Further to the conclusions of the most recent G20 summits in Pittsburgh and Seoul,<sup>55</sup> there has been series of initiatives in the EU to regulate derivatives markets. They include the European Commission's proposals to regulate OTC derivatives trading, a revision of the Market Abuse Directive to cover commodity markets, a proposal for a Directive on Alternative Investment Fund Managers and a revision of the Markets in Financial Instruments Directive. The US administration is also issuing legislative proposals to make OTC trading more transparent (e.g. the Dodd-Frank Wall Street Reform and Consumer Protection Act).

The fundamental problem with these proposals, however, is the mistaken idea that derivatives markets are one of the main factors underlying the growth in spot prices, or that the growth in spot prices over the last decade has been due to speculative rather than fundamental factors. Chart III.10 Box, however, reveals a very close link between global economic growth and (spot) prices of commodities. This supports not only the fundamental explanation of the surge in prices, but also the significant volatility of those prices over the last few years (see Chart III.11 Box). As global economic growth accelerated in the pre-crisis years, growth in commodity prices also increased rapidly. The onset of the financial crisis saw a considerable rise in concerns about the future evolution of the world economy, to which commodity prices responded by falling sharply. It soon turned out, however, that many emerging economies would not be hit as hard by the crisis as initially expected. In reality, the global economic recovery has been V-shaped, albeit strongly asymmetric in emerging and developed economies. The commodity markets have shown the same pattern. As economies have recovered, demand for oil has surged and many producers have gradually reached full capacity. The opinion that derivatives do not rank among the major sources of growth in spot prices is supported by other arguments as well. Although commodity derivatives trading turnover has increased by many orders of magnitude over recent decade (see Chart III.9 Box), the amounts being invested in commodity funds are still small relative to the total annual turnover in the spot commodity markets. Financial investors

<sup>55</sup> The Pittsburgh summit conclusions contained a declaration to try to improve the regulation, functioning and transparency of financial markets to address excessive commodity price volatility. This commitment was bolstered by the Seoul G20 summit declaration, in which the parties undertook to address food market volatility and excessive fossil fuel price volatility.

operate almost exclusively in derivatives markets and rarely influence market supply by trying to obtain physical supplies of a commodity. And as far as volatility is concerned, various types of commodities are historically price volatile regardless of whether or not they are traded in the derivatives markets.

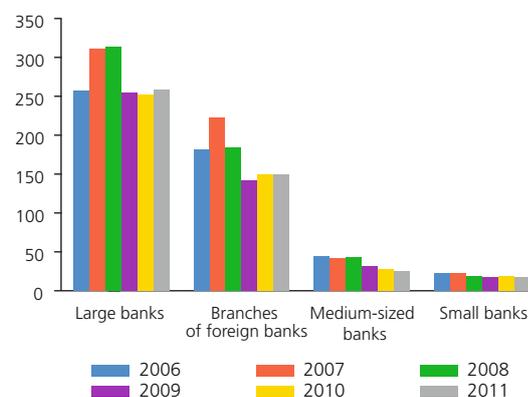
In this context, it is logical for investors allocating part of their assets in commodity derivatives to make their decisions on the basis of the expected evolution of commodity prices based on the expected path of relevant economic fundamentals. When global economic growth slows significantly they will tend to sell their commodity assets, and when global economic growth accelerates they will buy commodity assets. This investment element may be fostering greater and faster movements in the commodity markets. Regardless of this, however, it is clear from Chart III.10 Box that the commodity market situation is governed primarily by economic fundamentals and that prices of commodity derivatives therefore tend to react to expected growth in spot prices (financial investors are trend-followers rather than trend-setters). In this situation, the introduction of restrictive and broad regulation of commodity derivatives markets does not seem justified. These arguments do not mean, however, that speculative purchases cannot drive a price significantly away from its fundamental level. On the contrary, trend-following and a lack of interest in fundamentals on the part of financial investors is what leads to large speculative bubbles in asset markets. Owing to limited competition, asymmetric information and a high degree of uncertainty, the formation of strong trend fluctuations in the commodity market is highly likely. In the case of commodities, however, bubbles are not likely to last long. In sum, we can say that the value added of the aforementioned regulatory initiatives is in all probability very low. Supervisory authorities must nevertheless analyse whether rising investment in commodity derivatives is contributing to growth in systemic risk and must be prepared, where necessary, to react when financial institutions take on excessive risk.

### Financial infrastructure systems are not signalling any risks

In 2010 and the first few months of 2011, activity in the CERTIS payment system remained at a lower level than in 2007–2008. This reflected the lower economic activity and the lower trading volume in the financial markets (see Chart III.21). The turnovers broken down by bank category reveal that in addition to large banks, branches of foreign banks are relatively active in the payment system. As regards the risks to financial stability associated with potential contagion through financial infrastructure systems, therefore, it is vital to take their relatively significant role into consideration. Generally, however, the risks of transmission of problems through CERTIS are minimal, not least because it is an RTGS (real time gross settlement) system.

CHART III.21

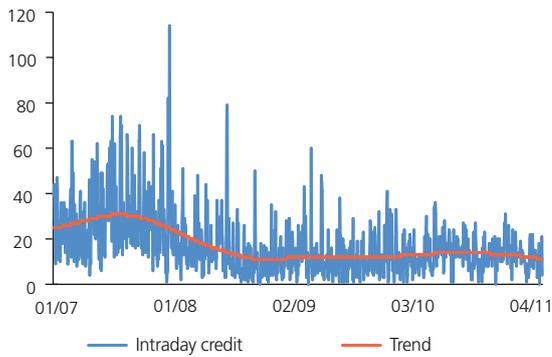
#### Average daily turnovers in CERTIS (CZK billions)



Source: CNB

Note: The turnovers in the case of building societies are negligible. 2011 comprises the period January-March.

CHART III.22

**Use of intraday credit**  
(CZK billions)

Source: CNB, CNB calculation

Note: The trend estimated by the HP filter.

As in previous years, the use of interest-free intraday credit with the CNB, which is available to banks in CERTIS against collateral provided in the form of short-term bonds in SKD, stayed at a relatively low level (see Chart III.22). This reflects not only the lower interbank payment activity, but also comparatively cautious intraday liquidity management at individual bank level. Intraday credit does not usually spill over into the CNB's marginal lending facility at the Lombard rate.

### 3.2 THE PROPERTY MARKET

The Czech residential property market recorded a continuing decline in apartment prices in 2010 and the first few months of 2011. However, the rate of decline slowed. In parallel with the price decline, there was also a fall in the number of transactions and a deterioration in progress with the sale of new apartments in residential developments. Towards the end of the year, however, activity in the market began to recover gradually, thanks mainly to renewed growth in mortgages. Next year, apartment prices can be expected to fall slightly initially and then flatten out owing to labour market developments. The downside risks are due mainly to the possibility of foreclosures linked with an increased NPL ratio in the property development sector and with rent deregulation. In the commercial property area, the industrial property sector recorded an improvement in demand. However, new demand remains subdued, as does the situation in the office property sector.

#### RESIDENTIAL PROPERTY PRICES

##### Property prices continued to fall in 2010...

After dropping quite significantly in 2009, property prices continued to fall in 2010 and early 2011 (see Chart III.23). Transfer prices of apartments fell by 3.6% compared to the end of 2009 and were down by 20.7% from their peak in 2008 Q3. Prices of family houses fell by 2% year on year (end-2010 Q1 figure) and were 4.6% below their peak. Prices of building plots and apartment blocks rose (building plots by 5.3% in 2010 and apartment blocks by 0.7% in 2009), but their shares in the total property index are relatively small (14.3% and 9.1% respectively). Moreover, a large proportion of the building plot price index (84.4%) reflects the sale of land as part of other type of real estate, so the representativeness of such prices is debatable. Likewise, for apartment blocks the number of transfers from which the index is calculated is relatively low (around 13 times lower compared to family houses and 19 times lower compared to apartments).

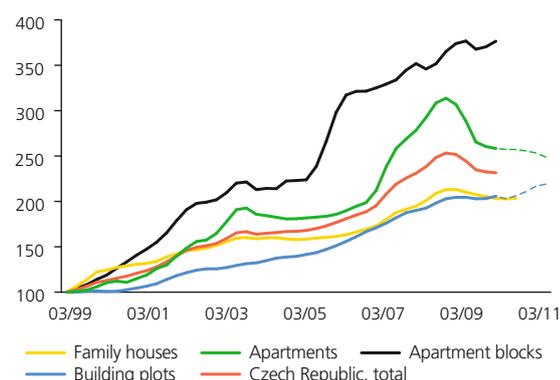
##### ...but the year-on-year declines in transfer and supply prices were more moderate

Apartment prices, whose evolution can be compared across various alternative data sources, recorded slower year-on-year declines, mainly because of a lower base. In 2009, transfer prices had fallen much faster than supply prices, reflecting a widening of spreads<sup>56</sup> and a related reduction in the number of transactions in the property market (see below). By mid-2010, however, the dynamics of supply and transaction prices were similar (see Chart III.24). A comparison of the dynamics of supply prices for Prague and the rest of the Czech Republic reveals larger price declines in Prague.

56 The average difference between transfer prices and supply prices is around 7.5%.

CHART III.23

Property prices – transfer prices  
(absolute index; 1999 Q1 = 100)

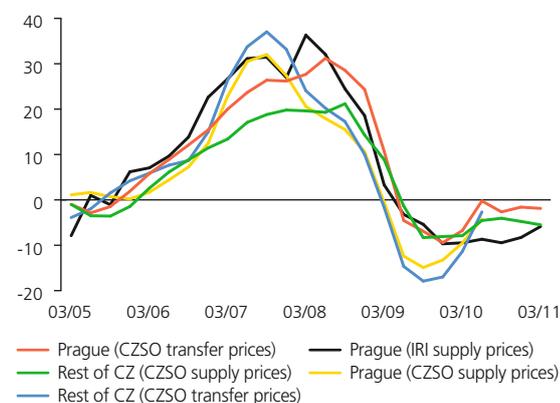


Source: CZSO, CNB calculation

Note: 2010 data preliminary or calculated from supply prices.

CHART III.24

Property prices – transfer prices and supply prices  
(y-o-y indices)

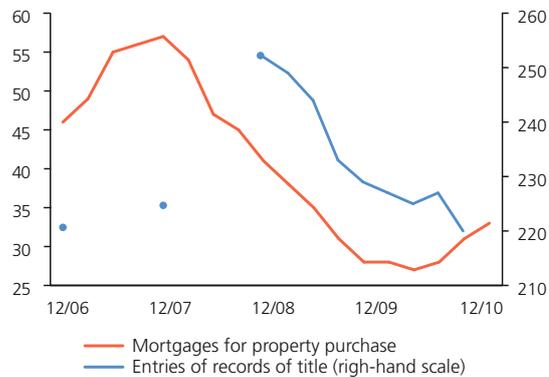


Source: CZSO, IRI

CHART III.25

### Numbers of transactions in the property market

(thousands of transactions, moving sums for the past year)

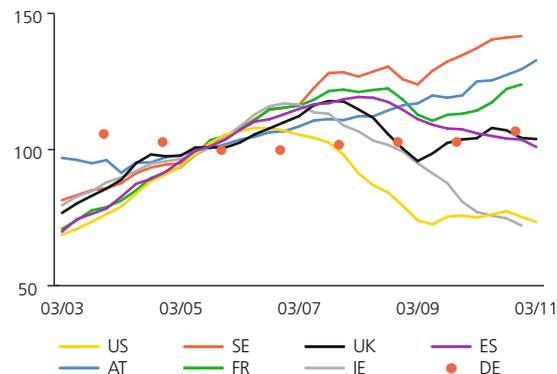


Source: CSCO, FINCENTRUM HYPOINDEX  
 Note: Entries of records of title to buildings and apartments only.

CHART III.26

### Property prices – international comparison, advanced countries

(absolute index; 2005 average = 100)

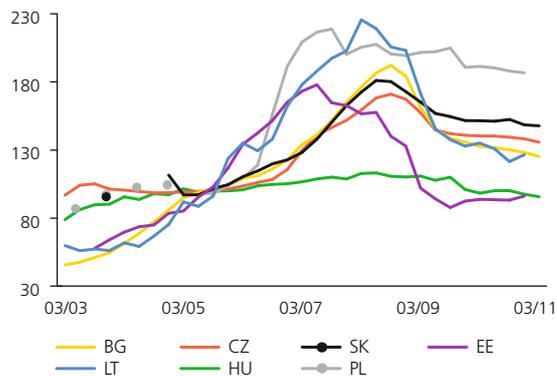


Source: BIS, Case-Shiller (US), Nationwide (UK)

CHART III.27

### Property prices – international comparison, selected converging EU countries

(absolute index; 2005 average = 100)



Source: BIS, national statistical offices and central banks

### The decline in prices was accompanied by a fall in transactions

The continuing none-too-good situation in the property market can also be illustrated by a fall in the number of transactions in this market (see Chart III.25). The number of entries of records of title to buildings and apartments fell by 3.8% in 2010 compared to the previous year and by 12.5% from their 2008 peak.<sup>57</sup> The decline in the number of property market transactions is also linked with a fall in the number of mortgages for property purchase (such loans accounted for 62.3% of the total number of new mortgages provided in 2010; Fincentrum Hypoindex data). This decline had started to emerge back in 2008, when property prices were still rising. In mid-2010, the moving sum of the number of mortgages was still at one-half the level of the peak recorded at the end of 2007. In the second half of 2010, however, activity in the mortgage market recovered thanks on the one hand to a reduction in mortgage interest rates (year-on-year declines in interest rates on new house purchase loans of 1.0 percentage point and on mortgages of 1.3 percentage points) and on the other hand to substitution between mortgages and building savings loans (new mortgages rose by 28.4% year on year in 2010 H2, whereas new building savings loans fell by 24.6% year on year in the same period). In reaction to the fall in property prices, the average mortgage amount also decreased (by 7.1% from its mid-2008 high), although its decline was significantly smaller than the fall in property prices.

### Property prices abroad were very mixed

The decline in property prices in the Czech Republic in 2010 also reflected the evolution of such prices abroad. Unlike in previous years, property prices were very mixed across countries (see Charts III.26 and III.27). It holds generally that the fall in property prices in 2008–2009 was more pronounced in countries that had conversely recorded the fastest price growth in previous years. In countries where the financial crisis had given rise to a public finance crisis in 2009, these falls continued in 2010 (10.8% in Ireland, 5.7% in Greece and 3.5% in Spain). However, other countries that had recorded declining prices in 2008–2009 enjoyed a recovery (with prices rebounding by 3.8% in the USA, 8.5% in the UK and a sizeable 12.1% in France). Likewise, prices started going up in countries where they had previously shown relatively modest growth (8% in Austria and 6.7% in Sweden year on year). The question is whether this upswing in prices, which may be closely linked with the easier monetary conditions in most of the countries mentioned, is a sign of renewed property market bubbles. For example, the IMF's April *Global Financial Stability Report* mentions the risk of a fall in property prices in the USA connected with mortgage defaults. The risk of a drop in prices in Sweden and the UK is also discussed. Turning to the converging countries of the EU, similar property price developments as in the Czech Republic were recorded in the past year, for example, in Slovakia (a year-on-year decline of 2.1% in 2010 and a fall of 18%

<sup>57</sup> Data from the Czech Surveying and Cadastral Office. In addition to transactions based on purchase agreements the entry records contain gratuitous transfers based, for example, on donation agreements. As such transfers are relatively stable over time, the decline in standard market transfers may have been even larger.

from their peak), Bulgaria (5.6% and 33.3% respectively), Poland (2.2% and 14.7% respectively) and Hungary (3.5% and 13.9% respectively). In the Baltic States, the price declines were more sizeable (to roughly one-half of their peak values).

### Property prices in the Czech Republic were affected above all by the labour market situation

Turning to the determinants of property prices, the decline in these prices was due above all to the persisting none-too-good situation in the labour market (see section 2.3) – historically low growth in nominal wages (of 0.9% year on year in 2010 Q4) and declining real wages, year-on-year declines in employment (a fall of 2.3% for 2010 as a whole) and a related rise in unemployment (of 0.4 percentage points year on year). The demographic determinants of property prices also deteriorated by comparison with previous years. Natural population growth fell by 5.3% and net migration by 44.8% year on year (net migration is at less than one-fifth of the record level achieved in 2007). Given the labour market outlook, a modest decline in property prices is forecasted for the remainder of 2011 in the *Baseline Scenario*. This will turn into stagnation and modest growth in 2012. In the less likely but conceivable *Asymmetric Developments* and *Renewed Recession* scenarios, property prices could fall by a cumulative total of 15% and 30% respectively (see Chart III.28). Besides the risk of macroeconomic deterioration, the downside risks to prices include risks associated with rent deregulation, which could lead to a higher supply of rental apartments in the open-market segment of the market (see below), and risks linked with the foreclosure of properties used as collateral either for mortgages provided to households or for loans granted to property developers.<sup>58</sup> The upside risks to prices include a planned increase in the rate of VAT on newly completed apartments. However, significant uncertainty surrounds the VAT increase, which, moreover, will probably mainly affect progress with the sale of new apartments and have a relatively limited impact on prices of older apartments. Its effect on the property market recovery will be only temporary.

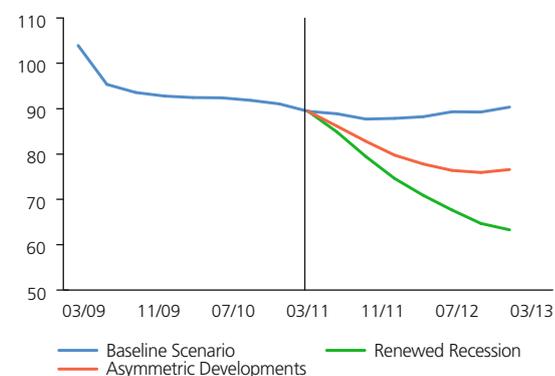
### Property price sustainability indicators improved

The standard indicators of property price sustainability improved further in response to the decline in prices and currently indicate no need for a major price correction. The price-to-income ratio fell by 4% on average over the course of the year and was down by 25.2% from the peak recorded in mid-2008. It is now only slightly above the levels observed prior to the rise in prices (see Chart III.29).

The rental return (see Chart III.30) increased slightly in all the monitored regions (by 0.2 percentage points on average in 2010), despite a fall in the returns on alternative assets (the ten-year government bond yield

CHART III.28

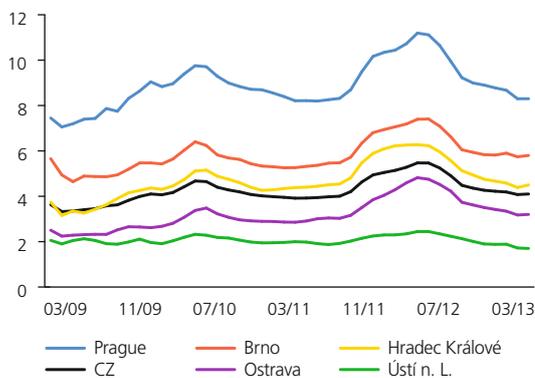
Property price index according to different scenarios  
(2007 Q4 = 100)



Source: CNB

<sup>58</sup> In 2009 and 2010 there was a significant deterioration in progress with the sale of apartments in residential developments (see the thematic article *An Analysis of Progress with the Sale of Residential Developments* in this Report) and a rise in the number of completed unsold apartments in such developments. The latest figures from Ekospol reveal that the number of completed unsold apartments in Prague decreased from 2,519 in 2010 Q3 to 2,034 at the start of 2011.

CHART III.29

**Price-to-income ratios**(ratio of price of 68 m<sup>2</sup> apartment to moving sum of wage for last four quarters)

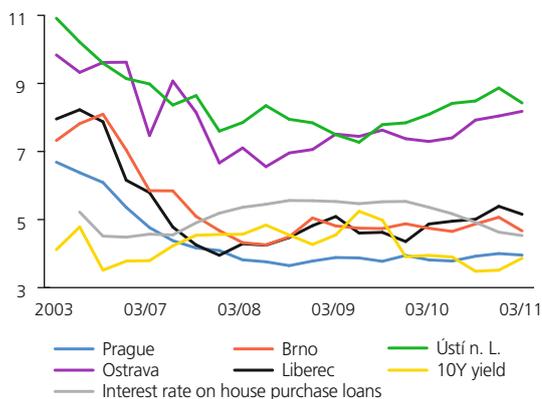
Source: CZSO, CNB calculation

Note: 2010 data preliminary or calculated from supply prices

CHART III.30

**Rental returns**

(averages for period in %; 2003–2006 yearly data, then quarterly; comparison with yields on 10Y government bond and house purchase loan rates)

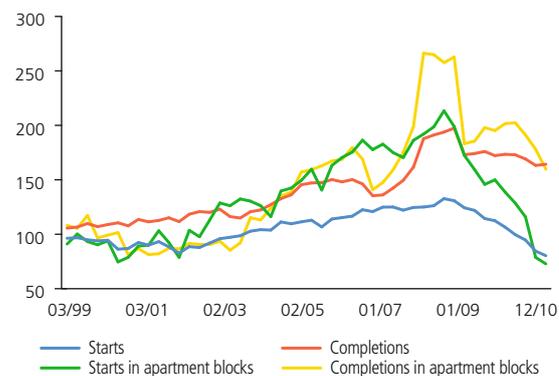


Source: IRI, CNB

CHART III.31

**Numbers of starts and completions**

(1998 = 100; moving sum for four quarters)



Source: CZSO

decreased by 0.4 percentage points in the same period) and a decline in interest rates on house purchase loans (of 1 percentage point). In all regions, therefore, the rental return is higher than the yield on long-term government bonds and, with the exception of Prague, higher than interest rates on house purchase loans. For the first time in around three years, this opens up the possibility of speculative property purchases financed by mortgages. There are also rent deregulation risks linked with the rental return going forward.<sup>59</sup> As this deregulation will concern approximately 700,000 of the total of around 900,000 rental apartments over the next two years, an increase in supply in the open-market segment of the rental market, related downward pressure on market rents and a reduction in the rental return cannot be ruled out. On the other hand, the full deregulation of almost 60% of apartments with deregulated rents as from 1 January 2011 has so far had a pretty limited impact on both regulated and market rents in these regions. In regional capitals, where the deregulation process will be spread over the next two years, the difference between open-market and regulated rents has already narrowed significantly in recent years.

### The risks associated with residential development projects are significant

In the context of falling property prices, the sharp reduction in housing construction continued into 2010 (see Chart III.31). There were year-on-year decreases in both the number of apartment completions and the number of apartment starts (of 5.3% and 24.6% respectively). The decline in new construction projects chiefly concerned apartment blocks (a 20.8% fall in completions and a sizeable 47.5% decrease in starts), reflecting a reduction in the activity of developers. This is linked, in turn, with a sharp fall in demand for new housing and a related increase in the time to sell apartments in property developments. In 2007 almost 95% of all the apartments in a typical development were sold prior to completion, whereas in 2010 the figure was 60%.<sup>60</sup> The fall in property prices has led to a relatively rapid rise in the NPL ratio in this area to above that for the non-financial corporations sector as a whole (the NPL ratio for the set of selected developers has risen to a sizeable 12.7% and that for real estate firms and developers in NACE 68 and 411<sup>61</sup> to 9.2%; see Chart III.32).

59 On 1 January 2011, around 400,000 apartments with previously regulated rents ceased to be subject to regulation and the rents on them were put on a contractual basis at "normal local levels". The cessation of regulation does not concern the regional capitals (with the exceptions of Ústí nad Labem and Ostrava) and large municipalities in the Central Bohemia Region. For the remaining approximately 300,000 apartments, regulation will end in 2012.

60 See the thematic article *An Analysis of Progress with the Sale of Residential Developments* in this Report.

61 The NPL ratio for developers in Chart III.31 is calculated in two ways; both use the CNB's Central Credit Register as the source of data. The first method is based on selected (the largest) developers and related companies (about 1,000 entities). The second series shows loans granted to all corporations in the categories "real estate activities" (NACE 68) and "development of building projects" (NACE 411). Owners' associations and housing cooperatives were excluded. The set of NACE 68 firms recorded very buoyant credit growth in the past (a six-fold increase since the end of 2002, with a rise in share in the total volume of loans from 4.5% to 11.5%). Housing cooperatives and owners' associations, whose risk is comparable with housing loans provided to households, accounted for 38.6% of this growth. Of the rest, real estate management and rental firms accounted for 44.6%, real estate agencies for 7.5% and firms engaged in buying and selling their own real estate for 1.7%.

## COMMERCIAL PROPERTY PRICES

### The commercial property market saw a partial recovery, especially in the industrial sector

During 2010 the commercial property sector saw a gradual recovery in market demand following the sizeable fall recorded in 2009. The recovery pertained primarily to the industrial property segment, where net absorption increased by 45% year on year in 2010 (King Sturge data). This positive trend chiefly reflects a recovery in industrial production (production companies account for 31% of the total rental stock) as well as the fact that demand in the industrial property sector is increasing from a very low base (this sector recorded the biggest contraction in demand in 2009). The industrial property segment is also recording a falling vacancy rate, which decreased year on year by a full 7.2 percentage points to 10.4%. Despite the relatively strong recovery in demand, new supply remains low. It declined by a sizeable 66% year on year, mainly because of an almost complete halt in new construction in the first half of 2010. In the second half of 2010, however, new supply rebounded. The recovery in market demand was reflected in a decline in yields on commercial property across the entire market (see Chart III.33; given that rents have long been relatively flat, this is a sign of rising prices), although this was also linked with the parallel fall in the yield on government bonds.

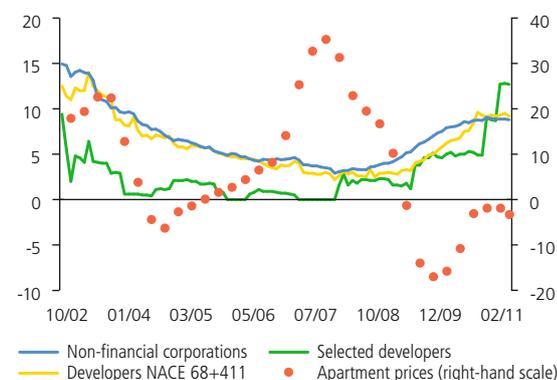
### Demand in the office property sector, however, continues to fall

In contrast to the industrial property segment, demand in the office property sector continues to fall (gross take-up went down by 12% in 2010). What is more, renegotiation of old contracts is contributing increasingly to this gross take-up (their share was 44%, i.e. 8 percentage points higher than last year). Consequently, net absorption (i.e. gross take-up net of renegotiations) was negative (-2,500 m<sup>2</sup>), mainly because of the situation in the first half of the year (-23,800 m<sup>2</sup>). The supply of new office buildings remained very low in 2010 (the lowest since 1995, a decline of almost 75% compared to 2009). This was reflected in stagnation of total office space (see Chart III.34). The office vacancy rate fell slightly to 13.2% in the second half of the year, but remains relatively high by international comparison (according to King Sturge the vacancy rate at the end of 2010 Q2 was 8% in Warsaw, 11.5% in Bratislava, 8.4% in Berlin and 5.9% in Vienna; Budapest and Frankfurt – at 25% and 17% respectively – had higher vacancy rates than Prague).

CHART III.32

### NPL ratios in the property development sector

(%; year-on-year growth for apartment prices)

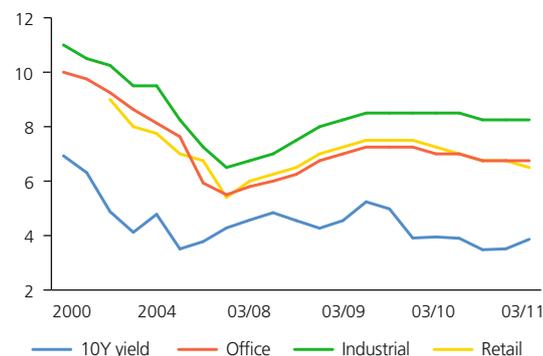


Source: CZSO, CNB

CHART III.33

### Yields on commercial property

(%; 2000–2007 yearly data, subsequently quarterly)



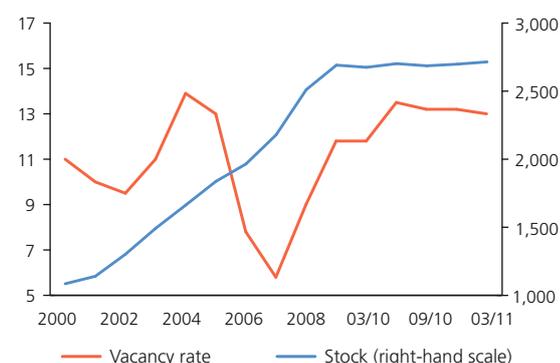
Source: King Sturge, CNB

Note: 10Y yield is 10-year government bond yield.

CHART III.34

### Situation in the office property market

(vacancy rate in %; stock in thousands of m<sup>2</sup>)



Source: King Sturge, Prague Research Forum