## 2 THE MACROECONOMIC ENVIRONMENT AND THE FINANCIAL MARKETS

### 2.1 THE EXTERNAL MACROECONOMIC ENVIRONMENT

The external macroeconomic environment is a significant factor affecting financial stability in the Czech Republic. The Czech economy is very open from the point of view of international trade. This increases the dependence of domestic economic activity on the economic performance of partner countries and exposes the economy to potential external shocks. The high financial openness of the Czech economy, resulting from strong inflows of foreign direct investment to the financial and non-financial sectors, is another important channel through which the external environment affects the economy. Major economic events abroad influence – via global financial markets – the financial conditions in the Czech economy. Developments in the Central European region as a whole, which global investors take into account when investing in Czech markets, also have some effect on the domestic financial conditions.

As regards global macroeconomic developments, three main trends became apparent in 2005: rising oil prices, widening global imbalances due to the high current account deficit in the USA, and further monetary policy tightening in the USA and partly also in the euro area. These trends were very similar to those witnessed in 2004, but the degree of their relevance as a source of potential risks is somewhat different.

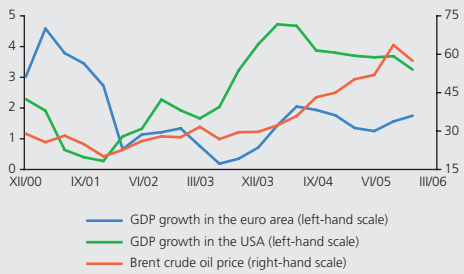
The oil price growth raised concerns about the impact of this development on economic growth in the major world economies. High oil prices are a typical supply shock leading to higher inflation and weaker GDP growth. However, the analyses conducted to date suggest that world economic growth has been little affected so far, nor has any major increase in inflation been recorded. Oil prices reached an all-time high in nominal terms in April 2006. In real terms, they neared the levels recorded during the second oil shock in 1980–1981.

In 2005, the US current account deficit widened to 6.4% of GDP. The deficit was driven mainly by rising household and government sector debt. Conversely, non-financial corporations, as in previous years, showed a financial surplus. The deficit has so far been financed smoothly by capital inflows, most notably in the form of purchases of US securities by Asian central banks, institutional investors and oil-exporting countries.[1]

In 2005, the US central bank continued tightening monetary policy, raising its key rate incrementally from 2.25% in January 2005 to 4.75% at the end of March 2006. The main reason for this monetary policy tightening was an effort to return interest rates to a neutral level, from the extremely low levels which had supported the economic recovery following the cooling back in 2001–2002. Another cause for concern was the potential effect of rising energy prices – generated by the growth in oil prices – on inflation expectations in the medium run. This gradual tightening had been fully expected by the financial markets and hence was not a source of great shocks either for them or for the real economy.

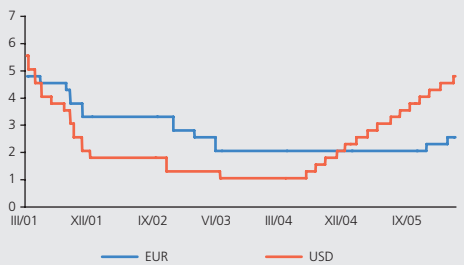
Monetary policy was tightened in the euro area towards the end of 2005, when, after more than two years of flat rates, the ECB raised its key interest rate by 25 basis points to 2.25%. Another modest tightening of 25 basis points followed in March 2006. In both cases the rate increases were motivated primarily by the potential second-round effects of the oil price growth on inflation.

CHART II. 1
The oil price and GDP growth in the euro area and the USA
(quarterly data; year-on-year real GDP growth in %; oil price in USD/barrel)




Source: Bloomberg, IMF International Financial Statistics

CHART II. 2
Selected monetary policy rates
(%)




Source: Federal Reserve Board, ECB

1 The structure of financing of the US current account deficit is discussed for example in ECB Financial Stability Review, December 2005.

Tab. II. 1

**Macroeconomic indicators for Central European countries**
(estimates for 2006 and 2007)

| | | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|
| Hungary | GDP growth (%) | 4.6 | 4.1 | 4.3 | 3.9 |
| | Inflation (%) | 6.8 | 3.6 | 1.9 | 2.9 |
| | Fiscal deficit/GDP (%) | -5.4 | -6.8 | -7.2 | -6.0 |
| | Current account deficit (USD bn) | -8.9 | -8.7 | -9.2 | -8.9 |
| Poland | GDP growth (%) | 5.3 | 3.5 | 4.5 | 4.6 |
| | Inflation (%) | 3.5 | 2.1 | 1.3 | 2.2 |
| | Fiscal deficit/GDP (%) | -4.7 | -3 | -3.2 | -3.0 |
| | Current account deficit (USD bn) | -10.4 | -4.8 | -5.3 | -7.5 |
| Slovakia | GDP growth (%) | 5.5 | 6 | 6.1 | 6.3 |
| | Inflation (%) | 7.5 | 2.7 | 3.7 | 2.3 |
| | Fiscal deficit/GDP (%) | -3.1 | -4.1 | -3 | -2.5 |
| | Current account deficit (USD bn) | -1.4 | -3.3 | -2.5 | -1.8 |

Source: **Eastern Europe Consensus Forecast March 2006, European Commission**

Tab. II. 2

**Key macroeconomic indicators – reality and expectations**
(year-on-year changes in %; estimates for 2006 and 2007)

| | | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|
| USA | GDP | 4.2 | 3,5 | 3.3 | 3.0 |
| | Household consumption | 3.9 | 3.6 | 3.2 | 2.8 |
| | Investment | 9.4 | 8.7 | 8.3 | 6.8 |
| | Industrial production | 4.1 | 3.2 | 3.9 | 3.6 |
| Germany | GDP | 1.6 | 0.9 | 1.7 | 1.0 |
| | Domestic consumption | 0.6 | 0 | 0.6 | 0.1 |
| | Investment | 2.6 | 4 | 5.5 | 4 |
| | Industrial production | 2.4 | 2.9 | 3.4 | 2.2 |
| Euro area | GDP | 1.8 | 1.4 | 2.1 | 1.8 |
| | Domestic consumption | 1.4 | 1.4 | 1.5 | 1.5 |
| | Investment | 1.8 | 2.2 | 3.5 | 2.9 |
| | Industrial production | 1.9 | 1.2 | 2.4 | 2 |
| | Exports | 5.9 | 3.9 | 6.1 | 4.5 |
| | Imports | 6.2 | 4.7 | 6 | 4.6 |

Source: **Consensus Forecast (March 2006)**

Tab. II. 3

**The ten most important countries in the exports and financial openness of the Czech Republic**
(stock of foreign direct investment as of end-2004; exports for 2005)

| Share in exports (%) | | Share in stock of foreign direct investment (%) | |
|---|---|---|---|
| Germany | 33.2 | Netherlands | 32.6 |
| Slovakia | 8.7 | Germany | 20.6 |
| Poland | 5.5 | Austria | 11.2 |
| Austria | 5.5 | France | 6.6 |
| France | 5.4 | USA | 5.2 |
| United Kingdom | 4.6 | Belgium | 3.8 |
| Italy | 4.2 | United Kingdom | 3.7 |
| Netherlands | 4.0 | Switzerland | 2.6 |
| Belgium | 2.7 | Luxembourg | 2.5 |
| Hungary | 2.7 | Japan | 1.5 |
| Top-10 total | 76.5 | Top-10 total | 90.3 |
| EU-15 | 66.3 | EU-15 | 84.9 |
| EU-25 except CZ | 84.2 | EU-25 except CZ | 87.5 |

Source: **CNB, CZSO**

The central European countries continued to show mixed macroeconomic developments. In 2005, Hungary and Poland recorded some slowdown in economic growth compared to 2004, whereas in Slovakia real GDP growth increased further. The inflation rate decreased in all countries. Public finances remained a problem in these three economies in 2005, albeit to varying extents. Poland succeeded in reducing its fiscal deficit in 2005 and is expected to maintain it at around 3% of GDP. In Slovakia the fiscal deficit widened to 4.1% of GDP, with a consolidation not expected until 2006 and 2007. The biggest public finance deficit was recorded by Hungary with almost 7% of GDP, and a further widening is expected in 2006. As regards external imbalances, the current account deficit improved in Poland and also slightly in Hungary, where, however, it remains very high at around 9% of GDP.

Developments in the external macroeconomic environment imply potential risks for the immediate future which may have an unfavourable effect on the Czech economy and its financial sector.

Unlike in previous years, the possibility of a sudden correction of global imbalances, associated with a radical weakening of the dollar against the euro and potential turbulence on the bond market, is viewed as not very likely. The available indicators do not suggest any fall in demand for dollar instruments and thereby also any difficulties with the financing of the US current account. Moreover, the tightening of monetary policy by the Fed and the shift towards neutral rates, as well as a gradual weakening of the dollar, may help gradually decrease the US current account deficit.

The major economies' resilience so far to the increased oil prices may have been based to some extent on a decrease in the profit margins of the corporate sector, which, in a situation of competitive markets, has not reflected the higher costs in its prices. The impact of any further oil price increases on inflation and economic performance, driven either by growing demand from China or possibly by unstable supply caused by natural disasters or adverse geopolitical factors, remains a significant issue.

The available indicators suggest that despite the monetary policy tightening investment and industrial activity in the USA will remain strong. Investment activity and export performance in the euro area are also assessed as solid and are expected to outpace domestic consumption, which will remain quite weak. A depreciation of the dollar vis-à-vis the euro, which would affect export performance and thereby growth in Europe, could pose a risk.

The Czech economy's export orientation is being bolstered by foreign investment inflows in the process of relocation of production from advanced countries to countries with lower costs. The newly built or purchased production facilities export most of their products either back to their parent company's home country, where they are used for final or intermediate consumption, or to third countries. On the one hand, foreign direct investment brings necessary expertise and increases the efficiency of the corporate sector, but on the other hand creates another potential channel for transmission of any external shocks to the Czech economy.

Czech exports go mainly to Germany, with the Czech Republic's other neighbours (Slovakia, Poland and Austria) trailing well behind. By contrast, the main investor in the existing FDI is the Netherlands, followed by Germany, Austria and France. In both areas of openness of the Czech economy, EU countries thus play the key role. In the case of exports, some of the new member states are also significant. This is why analysis of the evolution and outlook for growth in European economies is so important for identifying risk factors for macroeconomic development and subsequently for financial stability.

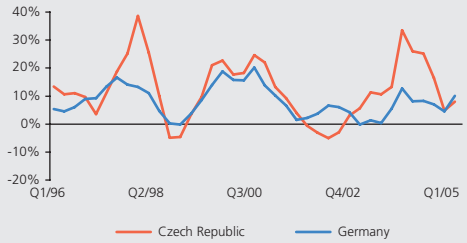
Economic activity in major regions outside Europe such as the USA or China can affect the domestic macroeconomic environment indirectly. Preliminary data indicate that only around 20% of exports from the Czech Republic are destined for final consumption in recipient countries, whereas 55% are for investment and 25% for intermediate consumption. This means that the bulk of exports will depend on corporate sector performance in the recipient country, which – in the case of an export-oriented country such as Germany – will in turn also partly depend on economic activity in third countries.[2] This relationship is illustrated by the relatively significant correlation of the export activities of Germany and the Czech Republic.

The development of some economies in the Central European region, Hungary in particular, remains a risk. The growing internal and external imbalances in Hungary may affect the risk premium demanded by investors for investment in all Central European countries, since macroeconomic imbalances in one country can be interpreted as a negative signal about the entire region. This could foster an outflow of foreign investment and increased uncertainty among domestic economic agents. Moreover, the effect could be reinforced in a situation of rising global yields and capital outflows from developing economies.[3]

CHART II. 3

Correlation of export activity of the Czech Republic and Germany

(year-on-year export growth; quarterly data)




Source: IMF International Financial Statistics

## 2.2 THE DOMESTIC MACROECONOMIC ENVIRONMENT

A key factor for financial system stability is sustainable economic output close to the potential output level, which does not create inflationary pressures or cause imbalances in the economy. A monetary policy contributing to the maintenance of price stability is equally important.

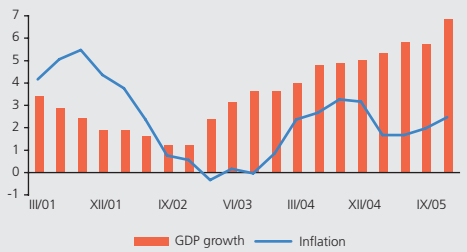
The domestic macroeconomic developments in 2005 and in 2006 Q1 posed no immediate risks to financial stability. Real GDP growth picked up significantly, taking the output of the economy to the potential, non-accelerating inflation level of output at the end of 2005 by the CNB's estimation. Inflation remained low, however, fluctuating below the 3% target. The higher oil prices resulted in an only moderate rise in inflation at the end of 2005.

Turning to the CNB's monetary policy, interest rates were lowered three times in early 2005, largely because of a stronger exchange rate and very low inflation pressures. In 2005 Q2 and Q3, the key monetary-policy rate remained at 1.75%, as the risks to inflation were assessed as balanced. In October 2005, rates were raised by 25 basis points, primarily due to cost-push inflation pressures generated by higher oil prices. However, the effect of the higher energy prices on inflation in late 2005 and early 2006 was counteracted by faster appreciation of the exchange rate, hence there was no further tightening of monetary policy. The overall real monetary conditions in cumulative terms were assessed as easy in both components (interest rate and exchange rate) in 2005, and they will continue to positively affect economic activity in the immediate future.[4]

CHART II. 4

GDP growth and inflation in the Czech Republic

(quarterly data; year-on-year changes in %)

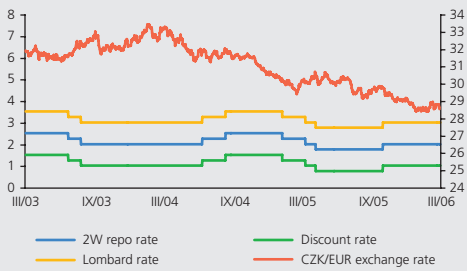



Source: CNB

CHART II. 5

CNB monetary policy rates and the koruna-euro exchange rate

(interest rates in %; exchange rate in korunas to the euro)




Source: CNB, Bloomberg

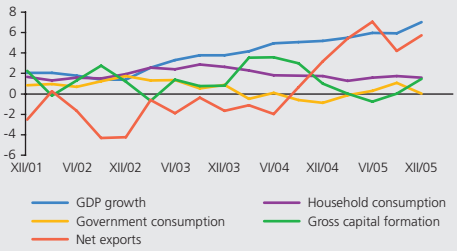
2 The USA is the second largest target country for German exports (behind France). In 2005, almost 10% of German exports were channelled to the USA.

3 The dependence of capital inflows to, or outflows from, the Czech economy on regional sentiment would be reflected in correlation of prices of financial assets in Central European economies and in particular their exchange rates against the euro or the dollar. This effect is analysed in section 2.3 *Developments on the Financial Markets*.

4 A more detailed discussion of monetary policy and the impact of the monetary conditions on real activity can be found in the CNB's January and April 2006 Inflation Reports (www.cnb.cz).

Chart II. 6

Contributions to GDP growth
(%)




Source: CZSO

Tab. II. 4

Selected macroeconomic indicators for the Czech Republic
(% of GDP)

| | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|
| Public budgets | | | | |
| Public budget deficit | -6.8 | -6.6 | -2.8 | -2.6 |
| Public debt | 28.8 | 30.0 | 30.6 | 30.5 |
| Balance of payments | | | | |
| Current account balance | -5.6 | -6.3 | -6.0 | -2.1 |
| Balance of trade and balance of services | -2.0 | -2.2 | -0.5 | 2.0 |
| Balance of income | -4.8 | -4.7 | -5.7 | -4.9 |
| Balance of current transfers | 1.2 | 0.6 | 0.2 | 0.7 |
| Foreign direct investment (FDI) in CZ | 11.5 | 2.3 | 4.6 | 9.0 |
| Returns on FDI in CZ | -4.3 | -4.6 | -5.7 | -5.1 |
| – reinvested earnings | -2.7 | -2.4 | -2.7 | -2.7 |
| – dividends | -1.4 | -2.0 | -2.7 | -2.2 |

Source: CNB, CZSO

The positive economic trend in 2005 was chiefly driven by net exports. For the first time since 1993, net exports at current prices were positive for the whole year, and the negative net exports at constant prices decreased further. The rise in export activity in 2005 was associated not only with an upswing in investment and export activity in the euro area, but also with the launching of production facilities built thanks to foreign direct investment. Household consumption also contributed to the GDP growth, as did gross capital formation in late 2005. The contribution of government consumption was neutral.

The public budgets again showed better-than-expected results in 2005. In year-on-year terms, the public finance deficit fell to 2.6% of GDP. The total public debt is around 30% of GDP, which is a relatively low figure in European comparison. The financial market indicators do not suggest that continuing deficit financing of public budgets would affect the risk premium demanded by investors in Czech government bonds.

The current account deficit narrowed significantly in 2005, to 2.1% of GDP. This was due primarily to a trade and services surplus of 2% of GDP. The income balance, which is being driven chiefly by income from foreign direct investment in the Czech Republic, remains negative. Roughly half of the FDI income is, however, consistently reinvested in the domestic economy. FDI continued to flow into the Czech Republic in 2005. This inflow, amounting to a relatively high 9% of GDP (CZK 263.2 billion), resulted from the sale of several large companies to non-residents. Privatisation accounted for about 40% of the inflow, and the remainder was due to increases in ownership interests, reinvested earnings and the establishment of new foreign owned corporations.

The domestic macroeconomic environment in 2005 can be assessed as very favourable, with no major imbalances. Expected macroeconomic development will, however, be of key importance for financial stability in the immediate future.

The CNB's April forecast predicts that the strong real GDP growth recorded in 2005 will continue in the following two years. Present economic output is assessed as being roughly at the potential, i.e. non-accelerating inflation level of output. The real monetary conditions, which affect future economic activity, can be assessed as slightly tight overall in 2006 Q1. The interest rate component is neutral to slightly easy, whereas the exchange rate component is tight. Higher growth will continue to be counteracted by weak external demand. Inflation will fluctuate around the inflation target in both coming years. Consistent with the forecast is interest rate stability initially and a gradual rise in rates thereafter, although this will depend to a large extent on the evolution of the exchange rate.

The Czech economy is characterised by specialisation in the manufacturing area, particularly manufacture of transport equipment and components, which has a very important position in the structure of the economy. The dependence of economic activity on the external environment due to the export-orientation of the Czech economy may thus be reinforced by dependence on global demand for a certain type of products, in this case automobiles and other products in the SITC 7 category.[5] For a small economy, however, a certain degree of specialisation within the international division of labour may be a necessary precondition for successful economic development.

5 At the end of 2005, exports of products in the SITC 7 category – Machinery and transport equipment – accounted for 54% of total exports. Manufacture of motor vehicles is the fourth most important industry with respect to the stock of FDI in the Czech Republic (accounting for about 8% of all existing FDI). Other firms are linked with this industry indirectly, as subcontractors and providers of services to manufacturing enterprises.

The structure of the Czech economy may become a potential risk. The Czech economy is dominated by large firms, which mostly have a foreign owner and belong to groups operating world-wide. Numerous other domestic businesses act as their suppliers. The economy is thus more dependent on strategic decisions made by several large agents. A potential outflow of investment due to cost optimisation would have substantial impacts on both the real and financial sectors.

Exchange rate developments may pose a risk to future economic growth and thereby also the financial stability of a very open economy. The existing evidence suggests that the exchange rate develops in certain waves. Any excessive appreciation of the exchange rate could thus have an adverse effect on exporters.[6]

## 2.3 DEVELOPMENTS ON THE FINANCIAL MARKETS[7]

Developments on domestic and foreign financial markets are a key factor for financial stability. Prices of financial assets affect the financial sector's stability both directly, since financial assets in principle form a large part of assets of financial institutions, and indirectly, through their impact on the real sector. Cross-border flows of financial assets determine the degree of dependence of the Czech economy on external financial conditions and indicate potential channels for cross-border transmission of shocks.

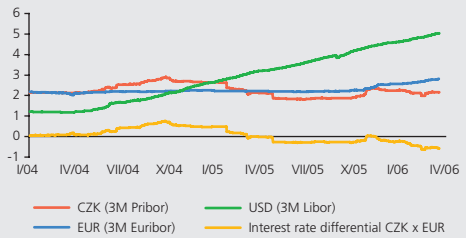
### 2.3.1 The Money Market

The interbank money market and short-term capital market with maturities of up to one year is one of the most important segments of the financial markets with regard to financial stability. Firstly, money market yields co-determine the financial conditions under which the real sector is financed. Many loans to non-financial corporations, the government and even some households have an interest rate fixed for only a short period (e.g. three months) and this rate is then regularly re-fixed according to existing yields on the money market.[8] Any sudden and large change in short-term interest rates can thus greatly affect borrowers' ability to repay their obligations. Secondly, increased volatility of short-term yields can negatively affect the middle and longer end of the yield curve, as it can change expectations of future yields and raise the risk premium demanded by investors. A shock to the entire yield curve can have an adverse effect on both the real and financial sectors. Thirdly, the money market is used by banks to redistribute free liquidity, so efficient operation of the money market contributes directly to the stability of the whole banking system. Finally, the money market is the area of the financial market where the central bank can, via its operations, intervene in the event of turbulence or a liquidity crisis and where it acts as lender of last resort.

Chart II. 7

Three-month interest rates

(%)




Source: Bloomberg

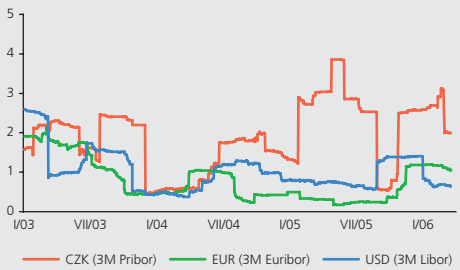
6 The article *Summary of the Results of Stress Tests in Banks* in the thematic part of this Report tests the impact of several alternative macroeconomic scenarios, based on the risks described here, on the Czech banking sector.

7 In this section, in line with other central banks' financial stability reports, the term financial markets means domestic and international money, bond, stock and foreign exchange (and, where relevant, derivatives) markets on which market participants trade financial assets at agreed prices. Attention is therefore given to price indicators (interest and yields) and to quantitative indicators such as capital flows, cross-border in particular. These are financial markets in the narrower sense. In the wider sense, the term financial markets often – especially in legislative parlance – means the financial sector as a whole.

8 The available data show that in 2005 up to 90% of new credit to non-financial corporations was provided with a fixation of up to one year or with a variable rate (including bank overdrafts); see section 4.4.2 *Loans and Credit Risk*.

CHART II. 8

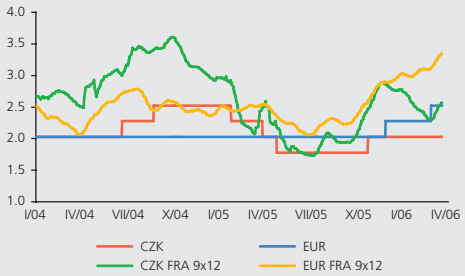
Historical volatility of short-term interest rates
(standard deviation of daily changes in past 90 days in basis points)




Source: **Bloomberg**

CHART II. 9

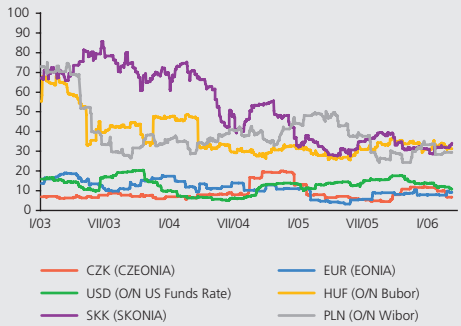
Expected path of monetary policy rates according to forward rate agreements
(%; forward rate agreement (FRA) rates as 15-day moving average)




Source: **CNB, Bloomberg**

CHART II. 10

Historical volatility of O/N interest rates for selected currencies
(standard deviation of daily changes in past 90 days in basis points)




Source: **Bloomberg**

Money market developments reflect the settings and manner of implementation of monetary policy. As regards the financial conditions, the main factors relevant to the Czech real and financial sectors are the money market yields for the Czech koruna, the euro and the dollar. The short-term interest rates of the koruna, euro and dollar continued to show different trends in 2005. Three-month dollar rates continued rising in line with the gradual tightening of US monetary policy, increasing from about 2.5% at the start of 2005 to 5% in March 2006. By contrast, three-month euro rates remained flat at about 2% in the first three quarters of 2005. These rates saw a modest rise only in October 2005, reflecting speculation on an increase in ECB policy rates in the context of the rising prices of oil. Three-month short-term rates continued rising following the actual monetary policy tightenings in the euro area in December 2005 and again in March 2006, reaching 2.7% in March 2006.

Three-month koruna rates (PRIBOR) were falling in 2005 H1, in line with the easing of monetary policy, and stabilised around 1.8%. They increased only in October, when the CNB raised its policy rates. Although the market expected further rate increases, a subsequent exchange rate appreciation dampened the inflationary pressures and there was no further increase in rates. The PRIBOR reacted by modestly declining to about 2% in March 2006. The different trends in short-term euro and koruna rates were reflected in a narrowing of the interest rate differential, which has been negative since 2005 Q2.

While the volatility of short-term dollar and euro rates was low in 2005, the volatility of koruna rates increased slightly, particularly at the time of the rate cuts in 2005 H1 and also at the time of the rate increase at the end of the year. This may reflect some uncertainty associated with the future development of the CNB's policy rates. From the perspective of the Central European region, however, the volatility of koruna money market rates is very low and corresponds to that in the advanced dollar and euro markets.

Money market developments should not be a source of shocks to the real and financial sectors in the period ahead. The financial markets expect euro area rates to rise somewhat further, but envisage no sudden and shock tightening of monetary policy which would increase volatility. Any further rise in euro rates could have some effect on Czech rates via the exchange rate. Forward rate agreements (FRAs), however, predict that koruna and euro rates will follow different paths.[9]

The risks arising from the functioning of the money market can be assessed as limited, primarily thanks to the excess liquidity in the banking sector. The CNB absorbs this by means of repos, thereby helping to stabilise the money market and fostering very low volatility of O/N rates.[10] The daily volume of liquidity absorbed fluctuated around CZK 45 billion in the last four months of 2005 (the total volume of banking sector liquidity absorbed by the central bank was roughly CZK 450 billion). Compared to money market turnovers (see the box *Structure and Liquidity of the Money and Foreign Exchange Markets*) free liquidity represents an important cushion protecting the banking sector to a large extent if a bank runs into liquidity difficulties.[11] Banks can also use the CNB's automatic marginal

9 An FRA is an agreement between two market participants to exchange, in the future, the difference between the contracted rate and the short-term interest rate on the settlement date. The FRA rates quoted in the market thus represent the best estimate of future money market rates, if we ignore the effect of the risk premium.

10 O/N money market rates are the rates at which banks borrow money from one another overnight. Some central banks calculate a weighted average of these rates as a reference value (e.g. the CZEONIA – Czech OverNight Index Average – in the Czech Republic and the EONIA in the euro area).

11 The risk of interbank contagion, although generally evaluated as small, is analysed in detail and tested in the article *Summary of the Results of Stress Tests in Banks* in the thematic part of this Report.

lending facility and obtain a collateralised loan to bridge any shortage of liquidity.[12] The collateral banks can use primarily includes T-bills, long-term government bonds and CNB bills, which the CNB provides to banks as collateral in repos. The data on bank assets suggest that banks hold quite large quantities of such securities. The CNB has not so far been forced to actively apply its role of lender of last resort beyond the limits of the automatic marginal lending facility.

### Box 1: Structure and Liquidity of the Money and Foreign Exchange Markets

A functional interbank money market with a corresponding structure and a full range of financial instruments reduces the probability of a liquidity crisis and helps stabilise financial intermediation. Effective functioning of the foreign exchange market is similarly important for financial stability, especially in the case of an economy that is open in terms of both trade and finance. The database for analysing both relevant markets is obtained from a regular survey of daily turnovers on the money and foreign exchange markets, conducted by the CNB twice a year.[13] The conclusions of the analysis are as follows.

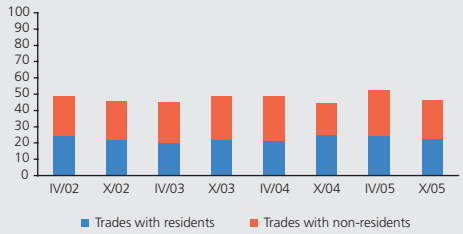
Average daily turnover on the money market has been stable over the last four years, moving around CZK 50 billion, with transactions with non-resident banks accounting for about 50% of the total. By contrast, the average daily turnover on the foreign exchange market has increased in the same period from about CZK 65 billion to the present roughly CZK 90 billion, i.e. by more than 30%.[14] This is due mainly to an increase in transactions with non-resident financial institutions, which account for most of the turnover (about 75%). These figures illustrate the relatively high international integration of the Czech banking sector in terms of ownership and in other respects. From the point of view of financial stability, this may represent another potential channel of shock transmission.

The bulk (always more than 95%) of the trades are deposit transactions with maturities of up to three months. Repos are used very rarely between commercial banks and are not used at all in transactions with non-residents. From the financial stability point of view this increases the risk of interbank contagion, since deposit transactions are uncollateralised instruments.[15] Wider use of collateralised instruments is probably being prevented by the currently inadequate legal regulation of repos, which should, however, improve with the implementation of the European Master Agreement. Some role was also being played by the excess liquidity in the banking sector and the daily presence of the CNB on the market, which although on the one hand may be helping to stabilise the money market, on the other hand might be hindering the further development of interbank liquidity trading.

Additional information on the structure of the money market is provided by disaggregated data on unsecured O/N deposits reported for the purposes of calculating the CZEONIA. According to the data for the last four months of 2005, the average number of unsecured O/N deposits deposited by reference banks in the domestic interbank market fluctuated around CZK 17 billion, i.e. almost 80% of all unsecured deposits on the interbank market.

Chart II. 1 box

**Turnovers on the koruna money market by counterparty**
(CZK billions)




Source: CNB

Chart II. 2 box

**Turnovers on the foreign exchange market by counterparty**
(CZK billions)


Source: CNB

Tab. II. 1 box

**Concentration and liquidity of the koruna money market**
(amounts in CZK millions; concentrations in %)

| | Daily turnovers on money market | | | | Czeonia |
|---|---|---|---|---|---|
| | Deposit operations | | | Repos | |
| | Total | Residents | Non-residents | | |
| Amounts | 45,914 | 22,059 | 23,855 | 281 | 17,517 |
| Top-5 | 55.9% | 56.6% | 70.3% | 100.0% | 69.6% |

Note: Daily averages for October 2005; for CZEONIA for September-December 2005.

Source: CNB

12 Banks make minimal use of this possibility, usually doing so at the end of the reserve maintenance period. The average volume is in the tens to hundreds of millions of koruna only, i.e. a fraction of the free liquidity in the market.

13 The survey always takes place during one week in April and one week in October. Banks report average daily turnovers on the koruna money market and the foreign exchange market by counterparty and instrument. Transactions with the CNB are not included. Aggregated results are available on the CNB website (www.cnb.cz).

14 The data on the daily turnover on the foreign exchange market only cover transactions where one party is a bank or foreign bank branch in the Czech Republic. Koruna transactions between non-residents are not included.

15 Uncollateralised deposits are also a dominant money market instrument in other economies; in Hungary, for example, they account for about 75% of total turnover (see the article *Developments in the Structure of Financial Markets* in Report on Financial Stability, Magyar Nemzeti Bank, October 2005).

Tab. II. 2 box

**Concentration and liquidity of the foreign exchange market**
(amounts in CZK millions; concentrations in %)

| | Total | CZK/EUR | | CZK/USD | |
|---|---|---|---|---|---|
| | | Spot | Outright forward + FX swap | Spot | Outright forward + FX swap |
| Amounts | 87,875 | 11,037 | 10,643 | 1,119 | 34,355 |
| Top-5 | 67.5% | 69.3% | 75.5% | 83.6% | 79.0% |

Note: Daily averages for October 2005.

Source: **CNB**

Outright forwards and FX swaps are the most widely used instruments on the foreign exchange market, accounting for 73% of all transactions. The share of spot transactions is about 26% of total turnover. Options are used to only a small extent. Trading in the CZK/EUR currency pair[16] represents only about 25% of total daily turnover, while trades in the CZK/USD segment have a higher share (around 40%). On the spot market, however, the CZK/EUR segment is the most important, with a share of about 50%.

An analysis of the disaggregated data for 2005 H2 reveals the degree of concentration of the two financial markets. The five most active banks (i.e. those with the largest shares in turnover) accounted for about 55% of the total turnover in money market deposit instruments. The repo instruments market is basically used by just four banks. It is also interesting that the five most active banks accounted for 70% of the turnover of all money market trades with non-residents, but for roughly 56% of the turnover of all trades with residents. The concentration in the O/N deposit segment is around 70%. The foreign exchange market is slightly more concentrated: the five most active banks accounted for around 70% of total daily turnover. The level of concentration in the CZK/EUR segment is similar. The concentration in trading in the CZK/USD pair is even higher, at around 80%.

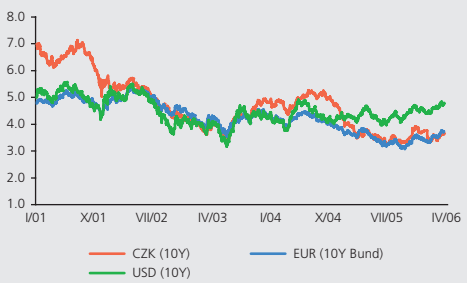
The important thing as regards price stability is the extent to which the most active banks overlap in individual segments. The analysis of the disaggregated data reveals that these banks overlap only partly in the individual segments of both markets. This reduces the risk of transmission of external shocks (trades with non-residents) to the domestic sector and also between individual markets or segments.

### 2.3.2 The Bond Market

Yields on the bond market not only determine the real sector's financing conditions, but also directly affect the financial sector's profitability, as bonds are one of the main investment instruments of banks and other financial institutions. A sharp increase in long-term yields may result not only in the real or government sector having difficulties servicing its debts, but also in a fall in prices of securities in banks' portfolios. The combined effect of these two channels could have a very adverse effect on the stability of the financial system.

Chart II. 11

**Yields on long-term government bonds**
(yields on 10-year government bonds in %)




Source: **CNB, Bloomberg**

The long-term financial conditions of the Czech economy are influenced to some extent by long-term yields on international markets, in particular yields on benchmark government bonds in the USA and the euro area. Unlike in 2004, when the long-term rates of the two major world currencies moved broadly together, 2005 was characterised by rather different trends for the two currencies. Dollar bond yields continued rising steadily, from about 4% at the start of 2005 to around 5% in March 2006, reflecting a change in the monetary-policy setting from very easy to more neutral. Nonetheless, despite this policy tightening, dollar yields are still very low by historical standards.[17] By contrast, euro yields continued declining, reaching low levels of around 3% in mid-2005.[18] They then rose very slightly to stand at still relatively low levels around 3.7% at the end of March 2006.

16 Transactions involving the two respective currencies.

17 In both nominal and real terms, these are very low values from the perspective of the last few decades.

18 These are the lowest values in both nominal and real terms since the introduction of the euro in 1999.

Yields on long-term government bonds in the Czech Republic kept on declining in 2005, moving in line with euro yields. The long-term interest rate differential of the koruna against the euro fell to zero at the start of 2005 and since then has been fluctuating in the range of +/- 10 basis points. The yield differentials of the Czech koruna are, together with the Slovak koruna, the lowest in the Central European region. Yields on other currencies (HUF, PLN) and their differentials against euro yields were also decreasing during 2005, probably in response to the lower-than-expected inflation.

The monetary policy tightenings in the USA and the euro area had yet to have much effect on long-term dollar and euro yields and led only to a flattening (and even a slight inversion in the case of the dollar) of the yield curve. This may have been due to some structural factors associated with the high demand for long-term instruments primarily on the part of institutional investors (pension and conservative investment funds, life-insurance companies), Asian central banks and also oil exporting countries.[19] The slope of the Czech yield curve declined slightly in 2005.

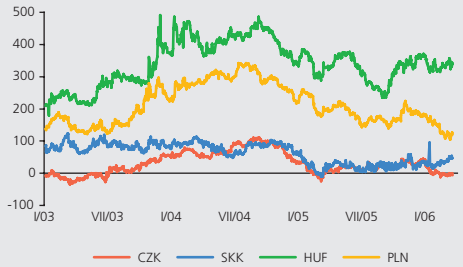
In recent years, the low government bond yields in the USA and the euro area countries have resulted in "search for yield", reducing the risk aversion of market participants. This has triggered strong demand for riskier instruments, including emerging market bonds and speculative-grade corporate bonds and stocks. The increased demand is attributable not only to traditional institutional investors, but also to some unregulated financial institutions of the hedge fund type. The "search for yield" has led to a fall in the yield differentials between risky instruments and risk-free government bonds to historical lows, as illustrated by the EMBI Global and Euro EMBI Global indices of market sentiment.[20] Part of the decline in Czech long-term yields during 2005 may be due to the increased global demand for emerging market instruments.

The current developments on the bond markets may indicate the following areas of risks to the financial stability of the Czech economy.

Firstly, although the very low interest rates (particularly in real terms) facilitate the financing of the real sector and enhance economic growth, at the same time they may lead to a build-up of risks in both the financial and real sectors. The low yields are supporting the rise in household and corporate indebtedness and may result in lending to riskier borrowers and riskier projects in an effort to maintain profitability. This may become a problem when rates return to the neutral level. Low interest rates can also strongly stimulate consumption and financial and real investment and theoretically generate inflationary pressures and bubbles on asset markets, including the real estate market (for an analysis of the real estate market see section 3.3 *Property Prices*). On the other hand, the low interest rate differential of the koruna against the euro reduces the motivation of households and corporations to borrow in foreign currency. This decreases foreign exchange risk and its potential pass-through into credit risk. The problem of the rapid growth in real sector debt denominated in foreign currency is most apparent in those Central European economies where the yield differential is relatively high and shows no apparent downward trend (e.g. Hungary).

CHART II. 12

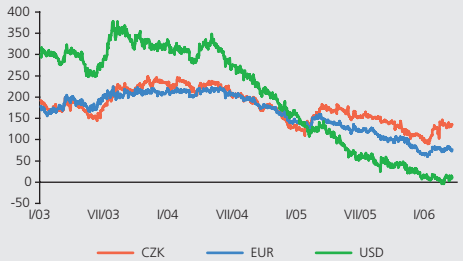
**Long-term interest rate differentials of selected currencies vis-à-vis the euro (10Y Bund)**
(basis points)




Source: **Bloomberg**

CHART II. 13

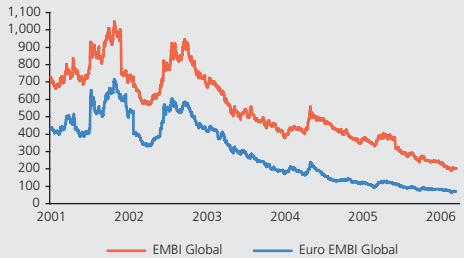
**Yield curve slopes of selected currencies**
(10Y swap rate minus 1Y money rate in basis points)




Source: **Bloomberg**

CHART II. 14

**Yield differentials of risky government bonds**
(EMBI Global – weighted spread of yields on emerging-market bonds denominated in dollars; Euro EMBI Global – weighted spread of yields on emerging-market bonds denominated in euros; in basis points)




Source: **JP Morgan**

19 In the case of Asian central banks, this is a "forced" demand generated by the need to sterilise the inflow of dollars through interventions on the foreign exchange market. For a discussion of factors which in 2005 contributed to the high demand for long-term dollar investment instruments, see, for example, *ECB Financial Stability Review December 2005*.

20 These are at historical lows for at least the period since 1993, when the EMBI Index was calculated for the first time.

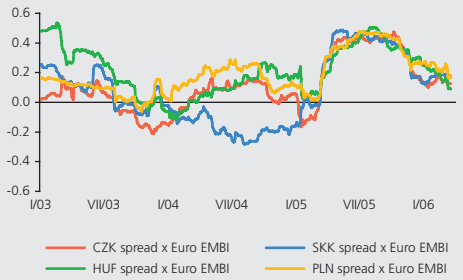
Secondly, a sudden reversal in market sentiment on global markets might be a significant factor affecting financial stability. Market sentiment is affected by the outlook for yields on secure or low-risk government bonds with high rating. In the past market sentiment typically displayed some cyclicality. Since about 2003, however, the fluctuations in the yield differentials of riskier instruments have been subdued, which raises concerns about whether investors are correctly assessing the risks. Any change in market sentiment could result in a substantial upward correction and some overshooting of yield differentials with a negative impact on borrowers' financial conditions.[21]

The gradual tightening of monetary policy in the USA and the euro area may help to change market sentiment about the emerging markets. However, the EMBI Global yield spread index reacted to this tightening to a minimal extent and for only a short time, roughly in mid-2004, and then continued on its downward trend. Underlying this persistence of positive market sentiment we can also find some structural factors, including the effort of institutional investors to hold a higher proportion of riskier assets than before and a growing volume of funds managed by hedge funds, which invest in riskier instruments.

Chart II. 15

**Correlation of Central European long-term spreads with the Euro EMBI**

(moving correlation of weekly changes in differentials in 180-day window)



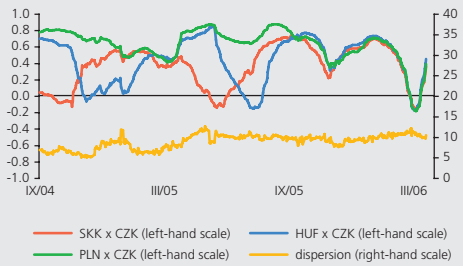

Source: JP Morgan, Bloomberg

Thirdly, the stronger dependence of domestic yields on global sentiment may pose a potential risk to the domestic financial and real sectors, especially in the event of a reversal in global risk aversion. An analysis of the correlation between the Euro EMBI Global market sentiment index and the spreads of Central European government bonds denominated in domestic currency reveals two interesting aspects of the developments over the past three years or so.[22] The correlation of yield differentials with the Euro EMBI is similar for all four Central European economies. This suggests that investors assess these countries in a very similar manner and that their yields are similarly sensitive to changes in the market sentiment. The increase in correlation observed in 2005 can be interpreted as a prevalence of global trends amid an absence of signals from the domestic environment. The decrease in correlation observed in late 2005 and early 2006 would then indicate a weakening of the dependence on global sentiment. The fluctuating dependence on global sentiment does not guarantee, however, that any global shock will not affect Czech yields. The degree of dependence may in fact increase in a situation of global turbulence.

Chart II. 16

**Correlation of spreads of euro-denominated bonds and their dispersion**

(moving correlation of daily changes in spreads in 90-day window; dispersion as standard deviation of spreads)




Source: JP Morgan, Bloomberg

Fourthly, the strong correlation of changes in yields in Central European countries may be another factor affecting Czech bond yields. Investors may not differentiate sufficiently between individual countries in the region. Any local turbulence generated by another country could affect Czech yields via a higher risk premium. The relatively high correlation of the differentials of Czech eurobond yields vis-à-vis German yields with the differentials of eurobond yields in Slovakia, Hungary and Poland vis-à-vis German yields in some periods suggests that investors really do view the countries of the Central European region in a similar way. Their interest may thus be driven by local market sentiment.[23] Counteracting this hypothesis, however, is the fact that the dispersion of the differentials of the individual

21 De Allessi Gracio et al. (2005) estimate that only about 20% of the decline in the EMBI Global can be explained by improved fundamentals of developing economies. The remainder reflects the current excess liquidity on international markets and a high risk tolerance (see Cristiana De Allessi Gracio et al., Capital Flows to Emerging Markets: Recent Trends and Potential Financial Stability Implications, Bank of England, Financial Stability Review, December 2005).

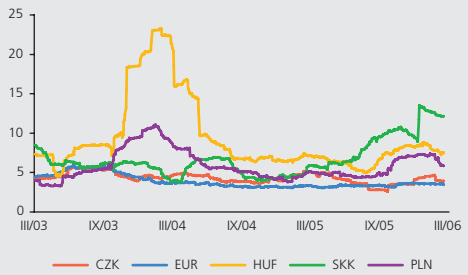
22 Using the EMBI Global, which captures the evolution of spreads of bonds denominated in dollars, the conclusions are very similar.

23 The yield differentials of Central European government bonds denominated in the euro vis-à-vis German yields show – in addition to liquidity differences – only country risk, as these yields do not directly incorporate the risk of future inflation, economic growth and exchange rate changes as perceived by investors.

countries measured by the standard deviation is virtually unchanged over time. The changes in spreads may move together, but their levels are still different and reflect the diverse development of fundamentals in the individual countries.[24]

Strong dependence of Czech long-term yields on market sentiment on global markets is prevented not only by the credibility of the CNB, which pursues monetary policy under an inflation targeting regime and stabilises inflation expectations, but also by euro adoption as expected by investors, which stabilises the longer end of the Czech yield curve. The volatility of long-term rates has stayed relatively low in recent years and is the lowest in the Central European region. Moreover, it is showing signs of declining to the level of volatility of euro yields.

CHART II. 17
Historical volatility of long-term yields
(standard deviation of daily changes in past 90 days in basis points)



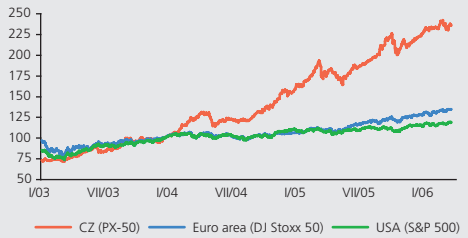

Source: CNB, Bloomberg

### 2.3.3 The Stock Market

The relevance of the stock market to financial stability is limited in the Czech economy.[25] Turbulence on domestic or foreign stock markets should not have any marked direct effect on the portfolios of domestic banks and other financial institutions or on households' assets. That said, any turbulence on the stock market could have some indirect effect on the stability of the Czech financial system. Firstly, problems on foreign stock markets could be reflected in a change in market sentiment to which the entire domestic financial market could react. Secondly, owing to the high involvement of foreign investors, turbulence on the domestic stock market could have major effects on the stability of the currency and consequently indirectly on the stability of short-term or long-term interest rates. Thirdly, any fall in the shares of European banks operating on the Czech banking market could also have some effect on the Czech financial sector.

Compared to 2004, the European stock market developed very positively in 2005. An increase in expected profitability was fostered by good export results for German firms in particular. Companies operating in the oil production and processing segment benefited from the higher oil prices. Overall, however, the impact of the higher energy prices on stock markets was negative. Besides corporate results, data on the economic recovery in Europe were an important stimulus. The DJ Stoxx 50 index, which tracks the prices of 50 major European stocks, grew by about 20% in 2005. By contrast, stock market growth in the USA was rather subdued in 2005, mainly because of the Fed's monetary policy rate increases and temporarily also due to natural disasters and concerns about the impact of higher oil prices on the profitability of US corporations. All this was reflected in only 4% growth in the S&P 500 index in 2005.

CHART II. 18
Developments on stock markets in the Czech Republic, the euro area and the USA
(index; 1 January 2004 = 100)




Source: Bloomberg

The Czech stock market, like the other stock markets in the Central European region, benefited from stronger foreign investor demand in 2005. The PX-50 index rose by about 40% year on year. This was due to low interest rates and excess liquidity on international markets and the relatively positive outlook for the profitability of corporations listed on the Czech market.

Primary issuing activity on the Prague Stock Exchange was again fairly subdued in 2005. There were only two new issues on the public market (only one in 2004). Moreover, these were again double listings, as the stocks had already been traded on some foreign markets.

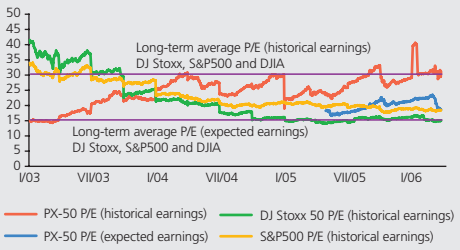
24 In 2005, the average spread of Czech eurobonds against German Bunds was 7 basis points, whereas that of Slovak, Hungarian and Polish eurobonds was 13, 20 and 27 basis points respectively (in the case of SK, HU and PL these are weighted averages of all eurobonds issued).

25 The Czech stock market is relatively small by international comparison (market capitalisation was 45% at the end of 2005, compared to 80%-100% in advanced European countries) and its relevance as a source of finance for the development of the real economy remains limited. Only 39 share issues are listed on the Prague Stock Exchange (PSE). More issues are listed on the off-exchange RM System, but this is aimed more at retail investors.

CHART II. 19

P/E ratios

(P/E ratio = price-to-earnings ratio; historical and expected earnings)

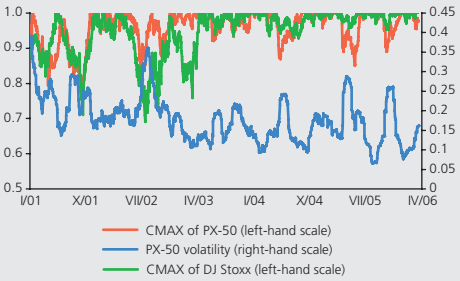



Source: **Bloomberg**

CHART II. 20

CMAX index and stock market volatility

(CMAX: ratio of current index level to maximum level in past 60 days; historical volatility: annualised monthly standard deviation of logarithm of daily yields)

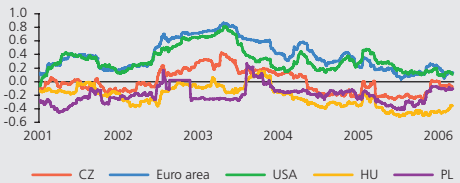



Source: **Bloomberg**

CHART II. 21

Correlation of bond and equity yields for selected countries

(moving correlation of weekly changes in yields and index in 180-day window)




Source: **Bloomberg**

CHART II. 22

Nominal exchange rate of the koruna against the euro and the dollar

(in CZK per unit of foreign currency; return as ratio of current level to level 90 days ago)


Source: **Bloomberg**

The potential risks arising from developments on the stock markets can be concentrated in three areas: the potential emergence of a bubble on the market, the dependence of the domestic market on foreign markets and the potential interdependence of several financial market segments.

Firstly, one of the prerequisites for a sound stock market is that prices should realistically reflect future revenues and should not be driven by excessive expectations. If a price bubble is created on the market, its subsequent bursting can adversely affect market volatility, investor confidence and financial stability. The P/E ratio[26] is somewhat higher for Czech equities than for the average on European stock exchanges (DJ Stoxx) or on US stock exchanges (S&P 500, DJ Industrial Average). The P/E ratios of around 30 based on historical earnings and around 20 for expected earnings do not, however, indicate the formation of a bubble. This is confirmed by the fact that while the PX-50 has more than doubled since the start of 2004, the P/E ratio has remained almost unchanged.

Secondly, owing to the substantial participation of foreign investors the Czech stock market may be sensitive to changes on other stock markets. Volatility abroad may spill over to turbulence on the domestic market. Volatility tends to be asymmetric, being higher when the stock index falls than when it grows.

A similar path of the CMAX index, which measures the degree of asymmetry of stock movements, for the European and Czech markets illustrates the dependence of domestic developments on those abroad. Fluctuations in volatility are associated with a decline in the market index. This is consistent with the existing evidence about developments on stock markets. The sensitivity of the domestic stock index to index movements abroad is interesting. Up to 2003 the Czech stock market reacted to changes in the DJ Stoxx Index with lower elasticity, whereas since 2004 its reaction to fluctuations on the European market has shown higher elasticity. This may be linked with the rise in trading activity on the Czech stock market following the Czech Republic's accession to the EU and the inflow of foreign portfolio investment.[27]

Thirdly, the effect of transmission of turbulence abroad to the domestic stock market could further strengthen if the turbulence spreads to other segments of the domestic financial market, e.g. the bond market. An analysis of the correlation of changes in bond yields and changes in yields on stock markets reveals that the countries of the Central European region are characterised, particularly in the period since 2004, by negative yield correlation, i.e. share prices and bond prices rise or fall together. This may be caused by the participation of foreign investors, who may consider the two instruments as similarly risky assets and buy or sell them together. On the euro area and US markets, by contrast, the yield correlation is positive, as investors move their assets from risky securities to safe securities and vice versa. Any turbulence on the domestic stock market could therefore truly foster an outflow of foreign investors with a negative effect on other segments of the financial market.

### 2.3.4 The Foreign Exchange Market

The exchange rate is one of the most important variables for an open and internationally highly integrated economy, influencing both the real and financial sectors. Excessive fluctuations in the exchange rate can present a risk to financial stability. A strong and sudden appreciation of the domestic currency can increase the credit risk of exporters. Conversely, a strong depreciation of the currency has an adverse effect on debtors who are indebted in foreign currency, as it increases loan servicing costs. Moreover, a strong exchange rate fluctuation or a long period of excessive misalignment can have an unfavourable effect on expectations of economic agents, thus amplifying the economic cycle.

26 The P/E ratio is the ratio of share price to past or expected earnings per share.

27 The volume of share trades executed by non-residents increased by 30% year on year in 2004 and by another 50% in 2005.

The koruna-euro exchange rate saw a slight appreciation of the koruna in the first half of 2005, relative stability in the summer months and a further appreciation at the end of 2005. The koruna-euro rate showed a year-on-year appreciation from around CZK/EUR 30.30 in January 2005 to around CZK/EUR 28.70 in January 2006. The prevalence of periods of koruna appreciation in the past two years is illustrated in the 90-day return curve. Most of the fluctuations are below the exchange rate stability axis. The koruna-dollar rate also continued to appreciate, although it was indirectly determined by the koruna-euro rate through the euro-dollar cross rate. The appreciation of the koruna in recent years has been due to the improving economic performance of the Czech Republic, increased interest in investment in the Czech Republic and positive expectations regarding the Czech economy.

Three areas of potential risks to financial stability can be identified in the area of the foreign exchange market and the exchange rate: strong fluctuations in the exchange rate or exchange rate developments not supported by fundamentals; potential dependence of movements in the koruna exchange rate on market sentiment about Central European economies; and interdependence with other segments of the domestic financial market.

Indicators of the historical volatility of returns on the foreign exchange market and the implied volatility derived from currency option prices show that the volatility of the koruna's exchange rate against the euro (historical as well as implied) is lower than on advanced markets (EUR/USD) or on other Central European markets (HUF/EUR).[28] Implied volatility reflects the opinion of market agents on future volatility and thus is a useful indicator of expected development on the market. The correlation between implied and historical exchange rate volatility, particularly from 2004 H2 onwards, suggests that market agents basically capture future volatility well in their predictions, although they are rather conservative, expecting higher levels than those recorded later.

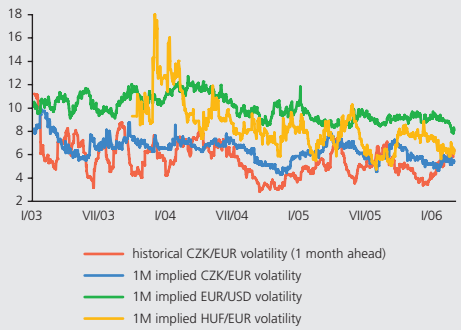
The effect of a slight increase or decrease in exchange rate volatility on financial stability is not entirely clear cut. Higher volatility can force economic agents to hedge against exchange rate changes, thus increasing the economy's resilience to shocks stemming from the foreign exchange market.[29] On the other hand, on a highly volatile market there is a greater probability of an extreme shock.

Data on implied volatility from currency option contracts also allow us to estimate what probability the market attaches to large and sudden changes in the exchange rate. In the early months of 2005 the market attached a higher probability to an extreme depreciation (greater than 3%) compared to an extreme appreciation (greater than 3%) at the one-month horizon, but at the beginning of 2006 the situation reversed, with the market attaching a higher probability to an extreme appreciation of the koruna than an extreme depreciation. In both cases, however, the probability of an extreme movement is assessed as very small (less than 5%).[30]

Second, the dependence of the koruna-euro exchange rate on market sentiment towards all the Central European markets might pose some risk to the foreign exchange market. Any problems in neighbouring countries in the region, should they generate a change in market sentiment, might have an adverse effect on the Czech koruna's exchange rate. An analysis of the correlation of the koruna exchange rate and the exchange rates of the Central European currencies against the euro does indeed suggest that the degree of correlation of the Central European exchange rates increased quite significantly in 2005.

Chart II. 23

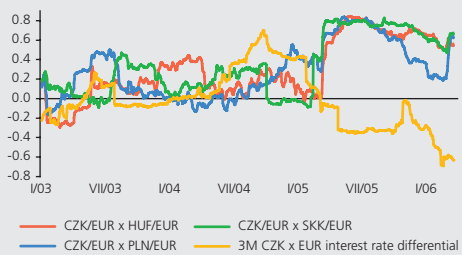
**Historical and implied exchange rate volatilities**
(annualised monthly standard deviation of logarithm of daily returns in %)




Source: Bloomberg

Chart II. 24

**Correlation of exchange rates in the Central European region**
(moving correlation of weekly changes in 90-day window)




Source: Bloomberg

28 CZK/USD volatility is likewise low.

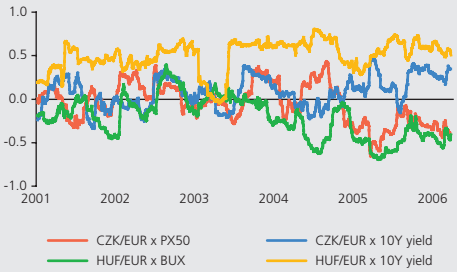
29 There are no official statistics on the extent of non-financial corporations' hedging against exchange rate risk. Anecdotal evidence suggests that exporters now use hedging transactions to a larger extent than in 2001-2002, when they were hit by an appreciation shock.

30 The methodology for deriving the probability with which the market expects changes in the exchange rate is described, for example, in Cincibuch, M., and Bouc, P. (2004): An Interpretation of Czech FX Options. Finance a úvěr – Czech Journal of Economics and Finance 7-8/2004, pp. 286-304.

However, the correlation between the koruna-euro exchange rate and the exchange rates of other Central European countries declined again at the beginning of 2006. The different exchange rate developments can be explained by the fundamentals in individual economies, the effect of political events and by the interest rate differential against the euro. The widening negative interest rate differential of the koruna vis-à-vis the euro is stimulating the use of the koruna as a cheap financing currency for investment in other currencies. This might have counteracted the effect of the Central European market sentiment.

Chart II. 25

Correlation of changes in the exchange rate and other financial assets
(moving correlation of weekly changes in 90-day window)




Source: **Bloomberg**

Third, a higher degree of correlation on the foreign exchange market and other financial markets could be another risk affecting financial stability. Foreign investors enter the Czech financial market through the foreign exchange market and first buy (or borrow against a foreign currency) Czech korunas to purchase Czech securities. Higher volatility on one market will thus affect other markets, which could exacerbate any market turbulence.

An analysis of the correlation of koruna-euro exchange rate changes and the returns on other assets in the Czech Republic and Hungary indicates that the correlation between exchange rate change and yields on equities and bonds in the Czech Republic fluctuated until 2004. This correlation increased in 2005: the appreciation is becoming increasingly correlated with stock index growth and declining bond yields. In Hungary, this correlation pattern has persisted for some time. While part of the correlation between bond yields and the exchange rate can also be explained by expected movements in central bank interest rates in response to the appreciation of the currency, the correlation of changes in the exchange rate and equities is probably due to foreign investor activity.

Tab. II. 5

Average daily turnovers on the foreign exchange market
(USD millions; CZK for October 2005, HUF for 2005 Q4)

| | Total | | | Spot | | |
|---|---|---|---|---|---|---|
| | All monitored currencies | EUR | USD | All monitored currencies | EUR | USD |
| CZK | 2,388 | 899 | 1,438 | 505 | 447 | 45 |
| HUF | 3,371 | 876 | 2,350 | 855 | 657 | 118 |

Note: Includes transactions where at least one party is a bank in the Czech Republic/Hungary

Source: **CNB, MNB**

An illiquid foreign exchange market might have an adverse affect on financial stability, as it could foster higher exchange rate volatility. The available data allow us to compare daily turnovers on the foreign exchange market with Hungary.[31]

Liquidity in currency pairs including the Hungarian forint is higher than in pairs with the Czech koruna. Only in the overall view covering spot transactions as well as derivatives (forward contracts, swaps, options) is liquidity in the pair with the euro comparable. Most contracts in the Czech Republic and Hungary are with non-residents (70%–80% of all contracts). Other aspects of the liquidity and structure of the Czech foreign exchange market are given in the box *Structure and Liquidity of the Money and Foreign Exchange Markets* in section 2.3.1 *The Money Market*. Overall, the risks associated with liquidity on the foreign exchange market can be assessed as small.

### Box 2: Consequences of Capital Inflow and the Risk of Cross-Border Contagion

The strong inflow of capital in recent years has increased the integration of the Czech economy into international financial markets. Non-residents have a significant share in the equities of the financial and non-financial sectors thanks to past foreign direct investment. Moreover, they hold a range of other securities as portfolio investment, for example Czech government and corporate bonds and shares traded on stock exchanges. Prices of assets on the Czech financial markets often change in line with global market sentiment.

The dominance of foreign players on domestic territory may generate concerns about whether the Czech financial and real sectors are becoming too dependent on foreign factors. One of the traditional problems discussed in analyses of financial stability for strongly financially integrated markets is the risk of cross-border contagion. A shock which affects one country can generate turbulence on financial markets and spill over to other countries through existing links and financial

31 The latest BIS global survey of foreign exchange market turnovers, to which almost all central banks report their data, was carried out in April 2004. The next one is planned for 2007. The CNB surveys foreign exchange market turnovers twice a year and the MNB quarterly.

exposures. The issue of cross-border contagion has often been mentioned as one of the triggers of the Asian financial crisis in the latter half of the 1990s. The Czech Republic experienced this phenomenon during the currency crisis in 1997.[32]

The risk of cross-border contagion increases in particular if the cross-border exposures of global agents have very short maturity and investors can thus liquidate them virtually instantly. The table shows that the Czech Republic had the largest share of long-term international claims from foreign banks at the end of 2005.[33] Nevertheless, the share of short-term claims remains relatively high at 30%. The Czech Republic also has a relatively small share of international claims not allocated by maturity, i.e. equities, which could be liquidated by foreign investors, be they foreign direct investment or portfolio investment.

The second factor affecting the risk of cross-border contagion is concentration of foreign claims. For example, if foreign claims are concentrated with one large creditor and that creditor is hit by a shock which forces it to liquidate its foreign investments, the impact on the debtor country will be certainly greater than if the domestic economy uses foreign capital from several countries. The following table shows that foreign claims are relatively concentrated in the case of the Czech Republic (the three most important creditor countries hold around 80% of all foreign reported claims) compared to other countries of the region.

The third factor which co-determines the degree of risk of cross-border contagion is the degree of similarity of the creditor structures of individual debtor countries. For example, if a debtor country was hit by a large shock and all the creditors of that country were affected, it is possible that they would also withdraw their exposures from other countries where they have their claims. If the creditor structure of another country was completely identical to that of the country affected by the primary shock, this other country would also probably be hit by an investment outflow to the same extent.

To capture the degree of similarity of creditor structure, the Common Creditor Index is used. This ranges in value from 0 (no common creditor) to 1 (completely identical creditor structure).[34] The last table shows that the Czech Republic's creditor structure is broadly similar to that of Slovenia, Slovakia and Hungary, but less similar to that of Poland and other Central and Eastern European countries. However, the picture may be distorted by the inclusion of the claims of subsidiaries of reporting banks, including loans with longer maturities, which probably could not be instantly liquidated in the event of cross-border contagion.

The analysis suggests that the integration of the Czech economy into international financial markets and the high share of foreign ownership and capital flows into the Czech economy may create channels for the transmission of foreign shocks and foster greater susceptibility to the risk of cross-border contagion. Nevertheless, any contagion through the cross-border claims channel would have to be generated by a large shock in the source country with a major impact on creditor countries. Given the heavy involvement of advanced economies as creditors of the Czech economy and the relatively small share of claims on the Czech Republic in the creditors' total portfolios, the risk of cross-border contagion can be assessed as limited.

Tab. II. 3 box

**Maturity structure of international claims**
(% of all international claims)

| | Up to and including 1 year | More than 1 and less than 2 years | More than 2 years | Not allocated by maturity |
|---|---|---|---|---|
| Czech Republic | 30.7 | 3.0 | 53.8 | 12.5 |
| Hungary | 28.5 | 5.8 | 44.8 | 20.9 |
| Poland | 24.6 | 6.0 | 51.1 | 18.4 |
| Slovakia | 33.8 | 2.8 | 32.1 | 31.2 |
| Slovenia | 30.6 | 5.5 | 51.2 | 12.8 |
| NMS-8 average | 30.6 | 6.5 | 46.8 | 16.1 |

Source: **BIS International Banking Statistics**

Tab. II. 4 box

**Foreign claims by country of origin**
(2005 Q3; % of all foreign claims, including exposures of local subsidiaries of reporting banks)

| | AT | BE | DE | FR | GR | JP | NL | SE | USA | Top 3 |
|---|---|---|---|---|---|---|---|---|---|---|
| Czech Republic | 38.3 | 22.0 | 10.5 | 18.7 | 0.0 | 0.4 | 2.7 | 0.0 | 2.5 | 78.9 |
| Hungary | 27.4 | 11.2 | 30.3 | 3.7 | 0.0 | 1.3 | 3.6 | 0.1 | 2.4 | 68.9 |
| Poland | 8.6 | 6.7 | 28.2 | 2.8 | 0.0 | 2.5 | 10.4 | 2.0 | 5.3 | 47.3 |
| Slovakia | 54.8 | 7.5 | 9.0 | 1.3 | 0.0 | 0.2 | 5.2 | 0.1 | 2.1 | 71.3 |
| Slovenia | 40.4 | 6.7 | 29.1 | 9.5 | 0.2 | 1.3 | 0.9 | 0.1 | 0.4 | 79.0 |
| NMS-8 | 26.3 | 11.2 | 20.8 | 7.1 | 0.0 | 1.2 | 5.1 | 6.4 | 3.0 | 58.2 |

Source: **BIS International Banking Statistics**

Tab. II. 5 box

**Common Creditor Index**
(2005 Q3; 0 no common creditor, 1 same creditor structure)

| | EE | HU | LV | LT | PL | SK | SI | BG | RO | CR | TR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CZ | 0.2 | 0.6 | 0.2 | 0.2 | 0.4 | 0.6 | 0.7 | 0.5 | 0.6 | 0.5 | 0.4 |

Source: **BIS International Banking Statistics, CNB calculation**

32 A description of the 1997 currency crisis and the role of cross-border contagion can be found in Šmídková, K. et al. (1998): Koruna Exchange Rate Turbulence in May 1997. Monetary Policy Division Working Paper 2-98, CNB.

33 The BIS data make a distinction between *international claims*, which comprise (i) claims of non-resident banks on domestic entities except banks owned by reporting non-resident banks (*cross-border claims*) and (ii) loans granted by banking subsidiaries directly in the territory of the given jurisdiction in foreign currency (*foreign currency local claims*), and *local claims*, which comprise claims of banking subsidiaries on residents in local currency only. *Foreign claims* are then the sum of international and local claims. International claims in the BIS statistics thus overestimate the true extent of international claims.

34 For a description of the methodology, see Van Rijckeghem, Caroline and Weder, Beatrice (2001): Sources of Contagion: Is it Finance or Trade?, Journal of International Economics 54(2), pp. 293-308.