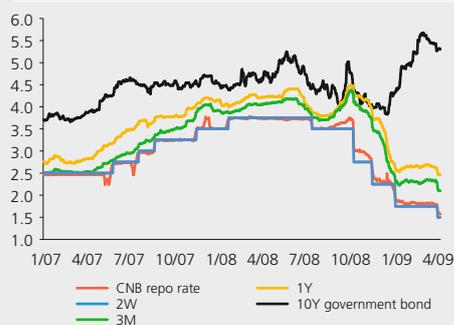
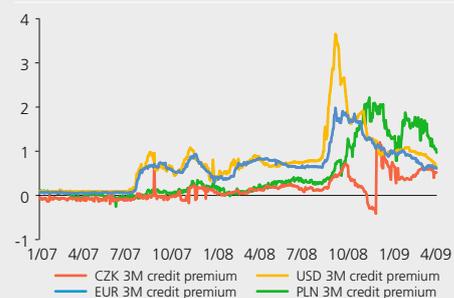


CHART III.1
Short-term interest rates vs. 10-government bond yield
(Czech Republic; %)



Source: Thomson Datastream

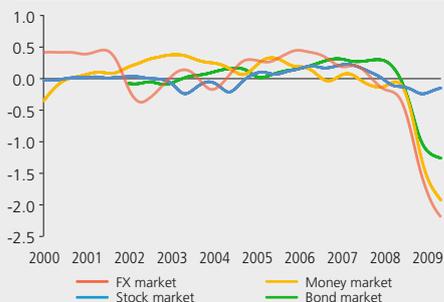
CHART III.2
Credit premia on the interbank market
(%)



Source: Bloomberg, Reuters, CNB calculation

Note: The credit premium is calculated as the difference between the 3M interbank rate and the 3M OIS of the relevant currency. The fall in the credit premium in the Czech Republic in January 2009 was caused by a fall in the OIS of 150 points on 7 January 2009. The fall reflects only reduced market liquidity and the overall shallowness of the OIS market.

CHART III.3
Market liquidity indicators for individual markets



Source: CNB, Bloomberg, Thomson Datastream, CNB calculation

3 ASSET MARKETS AND THE FINANCIAL INFRASTRUCTURE

3.1 THE FINANCIAL MARKETS

The financial market situation seemed to be stabilising gradually in the first three quarters of 2008. However, the crisis events in September and October had a strong impact on the various segments of the financial markets in virtually all the market economies, including the Czech Republic. The functioning of the Czech interbank market and the Czech government bond market changed significantly. Market liquidity decreased and market volatility increased sharply. This had an adverse effect on balance-sheet liquidity risk. The situation has gradually stabilised, however, and investment in Czech assets is still considered less risky by investors than investment in assets of the other Central European countries. A major risk which could worsen the situation on the Czech financial markets going forward is continuing increased risk aversion to the Central European region in line with the pessimistic expectations regarding its economic development, and the insufficient distinction being made between the individual countries of this region. Inadequate measures taken by key institutions to bolster the liquidity and capital of banking systems could be another, no less significant risk to the financial markets, although it is relatively small in the Czech case.

The situation on world financial markets, including interbank money markets, gradually calmed between the start of last year and September. On the Czech money market, the bid-offer spread stayed at around 10 basis points at all maturities, the spread between the monetary policy rate and interbank rates moved at its usual levels (see Chart III.1) and the credit premium remained close to zero (see Chart III.2). In mid-September, however, the situation started to deteriorate significantly on all major money markets. The collapse of US investment bank Lehman Brothers contradicted the widespread perception that it was impossible for a too large financial institution, or an institution whose balance-sheet is too strongly interconnected with other institutions, to default. The financial markets experienced increased uncertainty regarding the possible failure of other financial institutions as counterparties to transactions. This resulted in a significant rise in the credit premium (see Chart III.2).

Immediately after this event, owing to the high degree of international integration (see Box 5), the situation on the Czech money market also worsened slightly. Bid-offer spreads widened at all maturities to 20–35 basis points, all interbank rates with longer maturities started significantly exceeding the monetary policy rate, trading decreased at maturities longer than one week and activity was concentrated mostly in the overnight segment.³¹ Although the CNB lowered its monetary policy rate several times (cumulatively by 2.25 percentage points since August 2008), money market rates reacted more slowly than usual (see Chart III.1) because of a rise in the credit premium (see Chart III.2). Rates with longer than two-week maturity actually rose in 2009 Q1, mainly due to a marked increase in the risk premium (see section 2.1). The functioning of the monetary policy interest rate transmission channel is thus currently disrupted to some extent, owing to the different evolution of market and client rates (see section 4.1).

³¹ In April 2008, O/N contracts accounted for about 74% of all money market transactions in the Czech Republic (87% of transactions with residents), whereas in October the figure was 91% (97% of transactions with residents). In April 2009, O/N contracts accounted for 81% of all money market transactions (81% of transactions with residents).

Concerns about fund availability and lack of confidence in financial institutions (money market funds in particular) stimulated a hoarding of liquidity. The liquidity absorbed in two-week repo tenders decreased (see Box 5) and currency in circulation increased (see section 3.3). Liquidity fell sharply on the money market (see Chart III.3).³²

Box 5: The market indicator of balance-sheet liquidity

This box describes the construction of a market indicator of balance-sheet liquidity (MIBL) from data on banks' bids in the CNB's repo tenders, which take place three times a week. We start by assuming that a bank's behaviour in a tender (i.e. both the volume bid and the interest bid) is a function of its balance-sheet liquidity. In systems where banks traditionally demand liquidity from the central bank (e.g. in the euro area), banks with deteriorating balance-sheet liquidity will bid higher amounts more aggressively at an interest rate which is further from (higher than) the set (minimum) limit rate. In the Czech Republic, where the CNB traditionally absorbs liquidity from banks, banks will be less willing to deposit their liquidity with the CNB for two weeks in the case of deteriorating balance-sheet liquidity and will do so only at the maximum (limit rate).

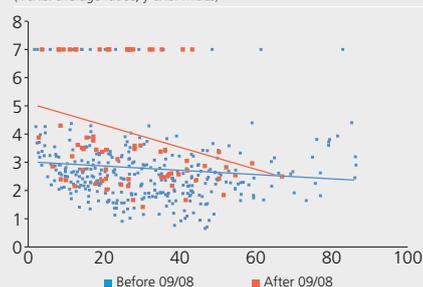
The construction of the Czech MIBL is based on applying the approach used by Drehmann and Nikolaou (2009), who construct this indicator for the euro area.³³ The calculation is performed for each bank i and each day of tender t according to the equation below, which combines information about the spread between the maximum repo rate and the bid rate and about the relative bid volume to the total liquidity absorbed, i.e.³⁴

$$MIBL_{it} = \log \left(1 / \left(\frac{(repo_rate_t - bid_rate_{it}) \cdot volume_{it}}{total_volume_t} + \epsilon \right) \right).$$

The bid volume must be weighted by the total volume absorbed to capture factors leading to a change in the bid volume that are not caused by a change in balance-sheet liquidity and are common to all banks (e.g. a change in the repo rate or generally lower tender volumes). For clearer interpretation the MIBL was calculated as inverse and logarithm.³⁵ Higher MIBLs thus indicate a greater risk of an outflow of balance-sheet liquidity.³⁶

CHART III.1 (Box)

Relationship between balance-sheet liquidity ratios and the MIBL
(x-axis: average ratios; y-axis: MIBLs)



Source: CNB, CNB calculation

Note: The observation with an MIBL equal to 7 is due to the transformation of the observation with a zero difference between the bid and limit rates. Three ratios were included in the average (x-axis): quick liquid assets to total assets, quick liquid assets to liabilities and quick liquid assets to deposits.

CHART III.2 (Box)

Market indicator of balance-sheet liquidity (MIBL)
(daily data)



Source: CNB, CNB calculation

³² The construction of the liquidity indicator is described in detail in Box 4 of the 2007 Financial Stability Report.

³³ Drehmann, M., Nikolaou, K. (2009): Funding Liquidity Risk: Definition and Measurement. WP Series No. 1024, European Central Bank, March 2009.

³⁴ If a bank made more than one bid in a single tender or if more than one tender took place in a single day, the bids were averaged.

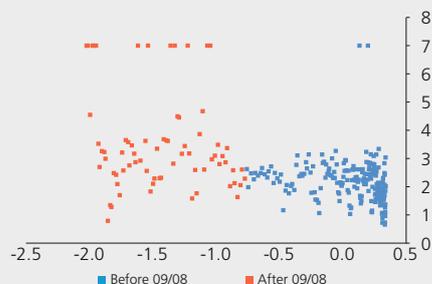
³⁵ ϵ is a very small number ensuring the existence of an inverse value for numbers close to zero.

³⁶ The MIBL indicator ranges between 0 and 7. It takes the highest value of 7 if a bank enters repo tenders with the CNB at the limit rate, i.e. the highest possible rate. This behaviour is interpreted as increased concern about a lack of liquidity on the part of the bank.

CHART III.3 (Box)

Relationship between balance-sheet liquidity (MIBL) and market liquidity

(x-axis: market liquidity indices; y-axis: aggregate MIBLs; daily data)

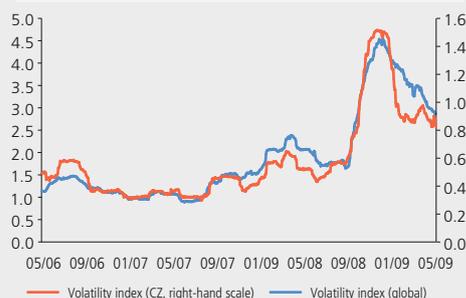


Source: CNB, CNB calculation

CHART III.4

Volatility on domestic and foreign financial markets

(historical volatility over past 90 days)

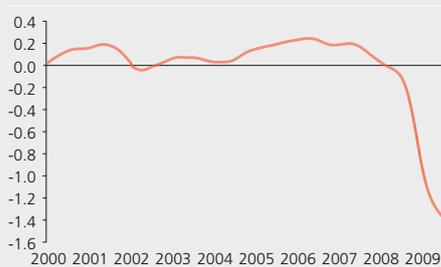


Source: Reuters, Thomson Datastream, CNB calculation

Note: Global volatility index = sum of historical volatility of S&P500, DJ Stoxx50, USD/EUR and YEN/USD rates, German and US 10Y government bonds, gold price, oil price and 3M EURIBOR and 3M LIBOR over past 90 days. Czech index volatility index = sum of historical volatility of PX stock index, CZK/EUR rate, 10Y government bond and 3M PRIBOR.

CHART III.5

Composite market liquidity indicator for the Czech financial market



Source: CNB, Bloomberg, Thomson Datastream, CNB calculation

Chart III.1 (Box) shows the monthly average MIBLs as a function of the average traditional balance-sheet liquidity indicators for the previous month (the ratios of quick liquid assets to assets, liabilities and deposits) and confirms some negative correlation between the ratios and the MIBL. The chart also shows that banks' unwillingness to deposit their liquid funds in repo tenders with the CNB has increased since last September (MIBLs reaching 7) and that the negative relationship between the two indicators has strengthened (the red line).

If we aggregate the MIBL across all banks, we obtain an indicator measuring the risk of an outflow of balance-sheet liquidity for the banking sector as a whole. Chart III.2 (Box) shows that this risk increased primarily in 2008 Q3, when banks' interest in entering tenders with the CNB decreased, and if they did enter them it had to be at a price close to the maximum rate. The indicator suggests increased concerns regarding a shortage of liquid funds on the market and the hoarding of liquid funds by banks in response to the worsening market situation following the September events. The liquidity problems, which peaked at the end of last year, can also be seen by comparing the aggregated MIBL with market liquidity. Chart III.3 (Box) confirms some correlation between market and balance-sheet liquidity and shows that the risk of an outflow of balance-sheet liquidity increased in the Czech Republic after the collapse of Lehman Brothers in September 2008. At the same time, there was a strong decline in market liquidity (see Chart III.5).³⁷

The autumn events hit not only the money market, but also other segments of the financial market. The increased uncertainty and risk aversion afflicting global financial markets since mid-2007 strengthened even further, resulting in much higher volatility (see Chart III.4) and lower liquidity (see Chart III.5).³⁸ The domestic volatility index largely tracked the global volatility index.

Market liquidity problems were also observed in the Czech government bond market (see Chart III.3). In mid-October 2008, in a situation of excess government bond supply on the market, particularly on the part of foreign institutional investors, market-makers' bid-offer spread widened from the usual 20 basis points to about 300 points. This wide spread temporarily almost paralysed trading in this market via market-makers. The trading volume on the secondary government bond market did not fall, however. Trades continued to be carried out through brokers. Overall, the volume of trading in government bonds increased by 26% year on year to CZK 643 billion in 2008.³⁹

³⁷ The relationship between market and balance-sheet liquidity is also used in Box 9 *Stress testing of banks' balance-sheet liquidity* in section 4.2.

³⁸ For the evolution of the market liquidity indicator in the euro area, see *Financial Stability Review*, ECB, December 2008, p. 61.

³⁹ Excess market supply of government bonds and deteriorating market liquidity in this market were also recorded in other EU countries outside the EMU. This may have been partly related to a change in the range of collateral accepted by the ECB for operations in the Eurosystem. Increased demand for liquidity by commercial banks increases the demand for eligible collateral accepted by the ECB and, by contrast, increases the supply of other high-quality securities, including government bonds denominated in the Czech koruna.

The CNB responded to the minimal activity on the interbank money market, the frequent fluctuations in participation in CNB sterilisation operations, the increased short-term interest rate volatility, the concentration of liquidity in a small group of banks and the deteriorating situation in the Czech government bond market by introducing liquidity-providing repo operations. This new type of operation allowed government bonds to be accepted as collateral (in addition to short-term bills) and helped ease market participants' concerns regarding the potential illiquidity of these securities. Price-setting on the government bond market recovered at least partially with about a one-week lag.

The money and bond market situation both at home and around the world calmed only at the end of 2008 after key world institutions responded by providing liquidity to non-banking institutions, most notably money market funds. Credit premia and market volatility decreased in response to these measures, but are still rather high (see Charts III.2 and III.4).

The increased government demand for savings linked with the funding of the financial sector and with the stimulation of demand raise questions about the markets' ability to absorb the greatly increased government debt issues in the years ahead and the risk of private entities being squeezed out of the market. The governments of advanced countries have not yet recorded any major difficulties with debt financing, although they are meeting with increased volatility of demand for their issues. The impact of rising issues of government and government-guaranteed debt on interest rates has so far been highly asymmetric. Large countries, including those which are already heavily in debt or whose debt is expected to grow markedly, have not yet registered any rise in demanded returns (see Chart III.6). Paradoxically, this may reflect the fact that the government debt of these countries is viewed as a relatively safe asset. By contrast, some smaller advanced countries, including the Czech Republic, are exposed to an increase in the returns demanded on government debt (see Chart III.7). The indirect squeeze-out effect resulting from rising interest rates is thus more of a threat for smaller and heavily indebted economies. Even in these countries, however, the rise in interest rates does not necessarily reflect a growing public debt financing need but rather a general increase in perceived country risk.

In the short run, the growing government debt issuance and issuance of government-guaranteed bank debt may, amid increased risk aversion and worse functioning of the financial markets, worsen the conditions and raise the costs of private entities' issues. A specific type of squeeze-out may then arise, with large private firms decreasing their financing via bond issues and instead raising funds by borrowing from banks, which raise funds by issuing bonds guaranteed by the state. Such banks will then have less funds at higher prices for smaller firms.

The rising government demand for debt financing need not automatically lead to medium- and long-term growth in global real interest rates. This is because of an expected fall in private entities' demand for debt financing or an increase in the private saving rate. Part of the current increase in the saving rate to the detriment of consumption, which can be explained by the precautionary motive in a strong recession, will probably be only temporary. However, the private saving rate in Western economies can be expected to move at higher levels than in the previous

CHART III.6**Ten-year government bond yields for selected developed countries**

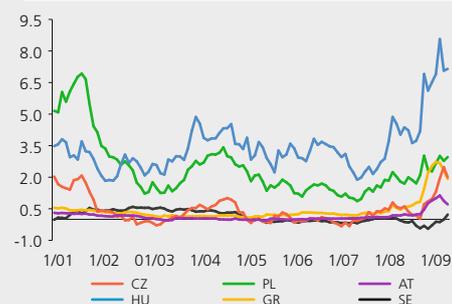
(15 January 1999 = 100; monthly averages)



Source: Thomson Datastream, CNB calculation

CHART III.7**Yield spreads on ten-year government bonds for selected countries**

(%; monthly averages)

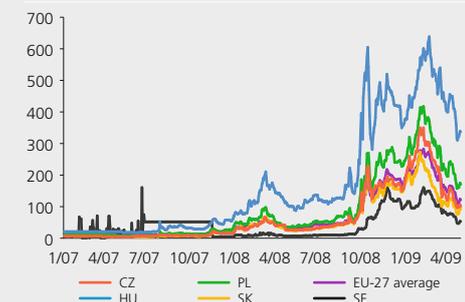


Source: Thomson Datastream, CNB calculation

Note: Yield spreads on 10-year government bonds of selected country relative to German 10-year government bonds.

CHART III.8**Credit default swap spreads for selected European governments**

(b. p.)



Source: Thomson Datastream

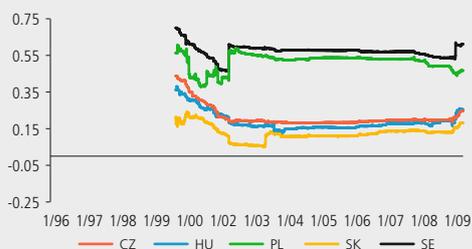
Note: 5Y CDS spreads; for data reasons Malta, Cyprus, Bulgaria, Estonia and Latvia were not included in the average.

ten years after the recession comes to an end. By increasing their savings, households will try to offset at least partially the deterioration in their balance sheet caused by the fall in asset prices and at the same time reduce their overleveraging.⁴⁰

The behaviour of part of the corporate sector will be similar. If the private supply of savings grows by more than the government demand for savings, long-term global equilibrium real interest rates might even decrease. The observed rise in real corporate bond yields (see section 2.1) can then be interpreted as a marked increase in current interest rates above their long-term equilibrium level due to a sharp increase in credit risk.

The deteriorating financial market situation affected different countries in different ways. The increasing differences in perceived risk across countries (see section 2.1, Chart II.11) influenced investors' investment allocation decisions. The differing perceptions of countries are reflected not only in historically higher differences in government bond yields (see Chart III.7), but also in various levels of investors' country risk aversion in the form of differences in credit default swap spreads for government bonds (see Chart III.8). The spread between Czech and German government bond yields is still far lower than in the case of Hungary or Poland, for example. This may suggest that foreign investors regard investing in these countries as more risky than, for example, investing in Czech assets.⁴¹ An analysis of financial integration using news-based measures arrives at similar conclusions (see Box 6).

CHART III.4 (Box)
Evolution of γ on money markets



Source: Thomson Datastream, CNB calculation

Box 6: News-based measures of financial integration⁴²

An important sign of financial market integration⁴³ is that asset prices respond to common (global) news rather than to local news, i.e. news typical of a specific country. Local shocks, be they in the form of positive or negative local news, thus do not pose a systematic risk to integrated markets, since the latter are diversified by investment in assets from other regions. Easy diversification of systematic risk is possible thanks to barrier-free investment across the integrated region. If markets are financially integrated, yields on financial assets of different countries, but having the same risk characteristics, should depend on global rather than local news. News-based measures of financial integration are based on this

⁴⁰ This assumption is supported by a rise in the saving rate of US households to 4% in February 2009, as compared to around 1% in 2003–2008. For details see IMF World Economic Outlook (April 2009, pp. 29–32 and pp. 63–64).

⁴¹ On 1 January 2009, the Czech Republic ceased to be part of one of the most used benchmark indicators, the JPMorgan Euro EMBI (Emerging Market Bond Index), because of its reclassification by the World Bank as a high-income country. This positive news for the Czech Republic may have swayed foreign investors' decision-making.

⁴² The analysis is based on the results of CNB Research Project No. C2/09: Babetskii, I., Komárek, L., Komárková, Z. (2009): Financial Integration and International Transmission of Shocks: The Case of New EU Member States.

⁴³ In the 2006 Financial Stability Report (Box 6, p. 29), we demonstrated how the speed and degree of integration of the Czech Republic, Hungary, Poland and Slovakia develop compared to the euro area on the basis of price-based measures of financial integration, i.e. the application of the concepts of beta-convergence and sigma-convergence.

assumption – see Baele et al. (2004)⁴⁴ In line with these assumptions, the price movements of a benchmark asset should reflect all relevant common (global) news. Thus, in a fully integrated market, the price changes of an asset in a single country should not be systematically higher or lower than the price changes of the benchmark asset. The quantification of the degree of integration of shocks can be estimated using the following regression:

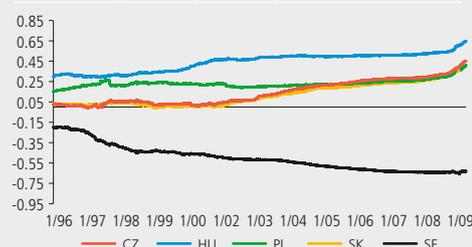
$$\Delta r_{i,t} = \alpha_{i,t} + \gamma_{i,t} \Delta r_{b,t} + \varepsilon_{i,t}$$

where $r_{i,t}$ represents individual asset yields (exchange rates, interbank interest rates, government bonds, national stock indices) in country i at time t , and b denotes the benchmark country (Germany for the government bond market, otherwise the euro area). $\alpha_{i,t}$ is a specific constant for each country, Δ denotes the difference operator and $\varepsilon_{i,t}$ is an error term. Growth in this type of integration requires α to converge to zero and γ to one. The time-variable parameters γ were estimated using recursive estimation.

The magnitude of parameters γ expresses the degree of identical response of an asset of a selected country and a comparable benchmark asset to certain news. Simply stated, parameter γ shows to what extent an asset of a selected region responds to news in the same way as the benchmark asset, assuming that the benchmark asset responds to global news only. The higher the value of the parameter, the higher the integration of the assets under comparison. As in reality credit, liquidity and foreign exchange risks are not identical across individual countries and assets, the change in the yield on a local asset is not expected to be explained fully and solely by the impact of global (common) news.

The empirical part of the box is focused on measuring the integration of financial markets in five countries, namely the Czech Republic, Hungary, Poland, Slovakia and Sweden, compared to the euro area, or Germany in the case of the government bond market. The estimated γ parameters for the individual markets and countries over time are presented in Charts III.4–III.7 (Box). The highest degree of integration for the Czech Republic measured using the above method was obtained for the stock and foreign exchange markets (see Charts III.5 and III.7). The γ parameters were around 0.4, as in the case of Poland. By contrast, the lowest degree of integration was achieved by the money market in the case of the Czech Republic (see Chart III.4, γ around 0.2), as in the case of Hungary, while Poland achieved a higher degree (around 0.4). To some extent, the degree of integration on the money market may reflect the alignment of the selected states' monetary policies with that of the euro area. Thus, idiosyncratic local news (a change in the monetary policy rate of the relevant state) may prevail far more on the money market than on the stock market. As regards the government bond market, the Czech Republic turned out to be the most integrated Central European country, with γ of around 0.35 (see Chart III.6).

CHART III.5 (Box)

Evolution of γ on foreign exchange markets

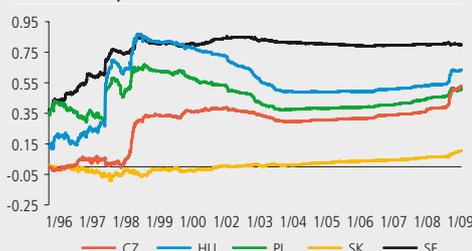
Source: Thomson Datastream, CNB calculation

CHART III.6 (Box)

Evolution of γ on government bond markets

Source: Thomson Datastream, CNB calculation

CHART III.7 (Box)

Evolution of γ on stock markets

Source: Thomson Datastream, CNB calculation

⁴⁴ Baele, L., Ferrando, A., Hördahl, P., Krylova, E., Monnet, C. (2004): Measuring Financial Integration in the Euro Area. Occasional Paper Series, No. 14, European Central Bank, pp. 1–93.

Not surprisingly, the lowest, or negative, value was recorded for Hungary. The asymmetrical movement in Hungarian government bond yields compared to Germany indicates that news having a positive impact on German government bond yields negatively affects Hungarian ones. The integration of the Slovak stock and bond markets showed a very low value due to the shallowness of these markets (see Charts III.6 and III.7). By far the highest degree of integration, with the exception of the foreign exchange market, was recorded by the Swedish financial markets, in line with economic intuition. The inverse behaviour of γ in the case of the Swedish foreign exchange market reflects a negative relationship between the response of the krona and the euro with respect to the dollar. It may be said that the Swedish krona and the euro behave in these pairs as substitute assets. Global news thus has opposite effects on them.

Overall, stock markets are the most integrated on average for the selected countries (the highest γ on average), while government bond markets are the least integrated. Although γ shows relative stability over time for all the selected markets, it is rising slightly over time for the Czech Republic, Poland and Hungary (except in the government bond market). Sensitivity to the spread of news varies across the countries (various values of γ). This is due, among other things, to the differences in credit, liquidity and foreign exchange risks in the individual countries increasing at the start of the current crisis, or to the chosen monetary policy.⁴⁵ The lowest sensitivity is observed on average in Slovakia (although this is affected by the greatest shallowness of the individual markets⁴⁶), followed by the Czech Republic and then Poland and Hungary (at roughly the same level), while the highest sensitivity is recorded for Sweden.

CHART III.9
Stock indices

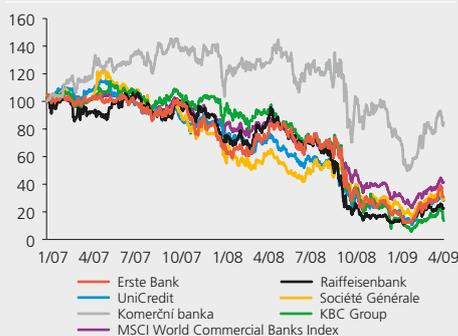
(1 January 2007 = 100)



Source: Thomson Datastream, CNB calculation
Note: CZ = PX, EU = DJ STOXX 50, USA = S&P 500, PL = WIG80

CHART III.10
Share prices of selected banks and World Commercial Banks Index

(1 January 2007 = 100)



Source: Thomson Datastream, CNB calculation

While stock exchange indices fell sharply in October 2008, some stabilisation was recorded in late 2008 and early 2009, mainly in expectation of the effects of the new US President's anti-crisis measures and the anti-crisis packages of governments in various countries (see Chart III.9). However, the outlook for global economic growth remains highly uncertain (see section 2.1), so further price falls in major stock indices in the USA and Europe cannot be ruled out. The same goes for the Prague Stock Exchange's PX index, which at the start of March 2009 (the lowest value since the beginning of the crisis) was down almost 70% from its October 2007 peak of 1,936.10 points (see Chart III.9).

⁴⁵ Differences in monetary policy are evident, for instance, in the foreign exchange and money markets. For example, the γ of the Hungarian foreign exchange market significantly exceeds those of the other countries. The higher value may be due to the not entirely free exchange rate of the forint against the euro.

⁴⁶ However, this is expected to grow following the introduction of the euro, as happened in other euro area countries (e.g. Greece).

As in the case of national stock exchange indices, the share prices of individual banks have been under selling pressure since October 2008 (see Chart III.10). The approved US rescue package was used not to clean up banks' balance sheets (by purchasing toxic assets), but to increase the capital of selected financial institutions. European banks, unlike US ones, have so far less been transparent in quantifying the true impact of the crisis on their balance sheets. The identification of further potential losses is likely to exert downward pressure on their share prices. Shares of domestic banks and parent banks of Czech banking institutions have not avoided falls, either; their balance sheets have been affected by the global financial crisis to only a limited extent and only indirectly (see Chart III.10 and section 4.1).

The significant fall in some banks' share prices may reflect other risks, such as declining confidence in the banking sector and its stability. There are also concerns that highly indebted or single-industry-oriented Central European economies may record a greater fall in economic growth than Western economies, which may threaten the stability of European banks specialising in this region (see section 4.1.1). This risk is reflected in a sharp increase in credit default swaps (one of the possible instruments for insuring against counterparty loan default) of some European banks operating in Central Europe (see Chart III.11⁴⁷).

The effects of the ongoing global financial crisis were also observed on the foreign exchange markets. The episode of appreciation of more or less all the Central European currencies against the euro in mid-2008 turned around during the summer as investors started to offload these currencies (see Chart III.12). The quick sales of currencies by foreign investors were related mainly to the sale of assets held in these countries. The quick sales of currencies affected other European countries, too (see Chart III.12). However, compared to other European countries (Poland, the UK and Sweden) the Czech koruna depreciated the least in this period. The depreciation pressure on the Czech koruna went hand in hand with a sharp rise in volatility on foreign exchange markets due to the drying-up of market liquidity in these markets (see Chart III.3). Trading volumes shrank and markets became shallower. After the volatility of the Czech koruna against the euro decreased, the koruna started to appreciate again slightly against the euro in 2009.

The commodity market was also affected by the financial crisis, which strengthened in 2008 H2. While prices of energy-producing and industrial commodities fell in response to the global decline in economic activity, prices of precious metals – substituting for risky financial assets – increased (see Chart III.13).

To identify the risk of increased risk aversion to the Central European region and insufficient cross-country differentiation, which would materialise mainly in depreciation pressures, an alternative adverse scenario entitled "market nervousness" was constructed.

CHART III.11
Credit default swaps of selected European banks

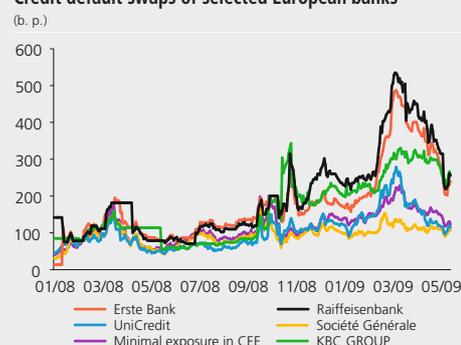


CHART III.12
Exchange rates of selected currencies against the euro

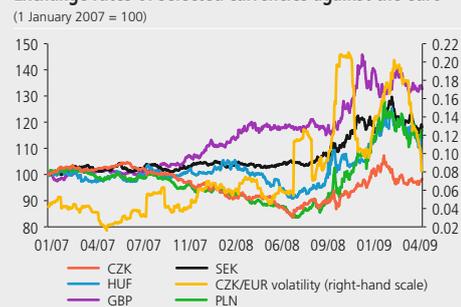
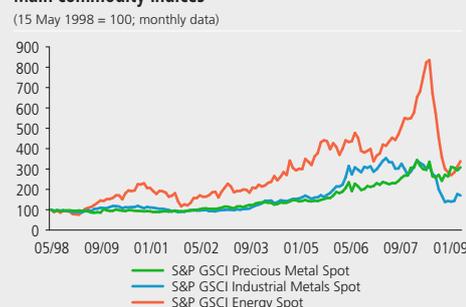


CHART III.13
Main commodity indices



47 The Société Générale banking group has a lower ratio of CEE assets to its total assets than, for instance, Erste Group or Raiffeisenbank.

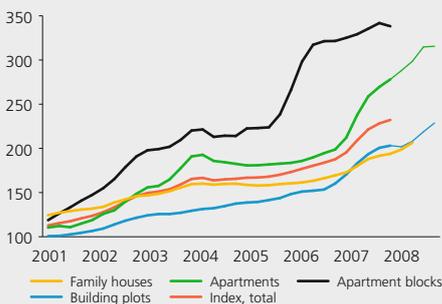
Alternative scenario B: “market nervousness”

Scenario B simulates a situation of a greater decrease in domestic and external economic activity combined with stronger depreciation pressures on the Czech koruna due to an increase in risk aversion to the CEE region. Real GDP would decline by almost 4% in 2009, while the exchange rate would temporarily exceed CZK 30/EUR. The significantly weaker koruna would exert stronger inflation pressures, to which the central bank would respond by sharply increasing interest rates. This would then help to partly correct the previous depreciation. The absolute decline in the domestic economy and the high interest rates would result in rising default rates in the non-financial corporation and household sectors, which in the case of corporations would be only partly offset by the pro-export effect of the weaker exchange rate. Overall credit growth would slow almost to zero, and share and property prices would show deeper declines. We also assume that, owing to the low economic activity, the financial sector would generate net income 20% lower than the average for the last two years.

3.2 THE PROPERTY MARKET

Prices continued to rise on the Czech housing market in 2008, despite declines in property prices in some advanced economies. The ratio of apartment prices to income increased. Apartment rental returns were still lower than interest rates on loans for house purchase. Given the worsening economic situation of households, a decline in prices of apartments in the period ahead cannot be ruled out. The number of apartments under construction keeps growing, which may mean a build-up of risks for the property development sector. This sector is still affected by a worsening situation on the commercial property market, with virtually all segments of the market seeing a combination of record-high planned supply and a decline in realised demand. This has led to an increase in the yields demanded on individual types of investment and a rise in the vacancy rate.

CHART III.14
Property prices – transfer prices according to tax returns
(absolute index; 1999 Q1 = 100)



Source: CZSO, CNB calculation
Note: 2008 data preliminary or calculated from supply prices (for prices of apartments and building plots)

3.2.1 Residential property prices

The rapid rise in property prices observed in 2007 continued for virtually all types of residential property in the Czech Republic in 2008 (see Chart III.14). At the same time, the CZSO data on property transfer prices for 2007 and partly also for 2006 were revised upwards. High growth was recorded mainly for apartment prices (a year-on-year increase of 35% in 2007 H2) and building plots (a year-on-year rise of 25%), while slower growth (of about 13% and 4% year-on-year respectively)

was recorded for prices of family houses and apartment blocks, which, however, had risen very fast in previous years according to the revised data. Although the year-on-year price growth slowed in 2008, it remained relatively high overall (prices of apartments and building plots were rising by around 13% towards the end of the year, while prices of family houses and apartment blocks were increasing by roughly 10% at the end of H1). This price growth across the different types of property reinforced considerations of an overheating of the property market and a possible future decline in this market that were raised in the 2007 Financial Stability Report.

The property price growth in the Czech Republic in 2008 seemed fast compared to countries which had seen significant price increases in the recent past (see Chart III.15) and in which the global financial crisis manifested itself, among other things, in a relatively rapid decline in property prices last year. For example, property prices fell by about 20% in the USA, 15% in the UK, 10% in Ireland and 3% in Spain in 2008. Although property price inflation in these countries had been similar to that in the Czech Republic until 2007, the trend diverged sharply in 2008. Property prices in advanced economies which are geographically close to the Czech Republic and which are its major trading partners (Germany and Austria) have been broadly flat since the turn of the millennium.

Our estimate of comparable *price-to-income* and *price-to-rent* indicators for the Czech Republic⁴⁸ and for other economies (see Chart III.16) suggests that these indicators were lower in the Czech Republic in 2007 than in most countries with rapid price growth. The rise in apartment prices in the Czech Republic in 2007–2008 increased both indicators, shifting them to the right and upwards, but this was partly a process of catch-up with the level common abroad. Even after a decline in both indicators in response to the fall in property prices abroad in 2008, these indicators should remain slightly lower in the Czech Republic. On the other hand, they are higher than those of the Czech Republic's major trading partners.

Available supply prices indicate slowing year-on-year growth in apartment prices in 2008 and early 2009 (see Chart III.17). This might be linked with the economic slowdown and the related tightening of the conditions for house purchase loans. According to some sources, prices have started to flatten out year on year (IRI data). The fall in annual growth in supply prices in 2008 H2 is related mainly to base effects and seems relatively insignificant. However, signs of a decline in absolute supply prices appeared in 2009 Q1. Chart III.17 also shows some convergence of prices between Prague and the rest of the Czech Republic, with both supply and transfer prices growing faster outside Prague.

CHART III.15
Property prices – international comparison

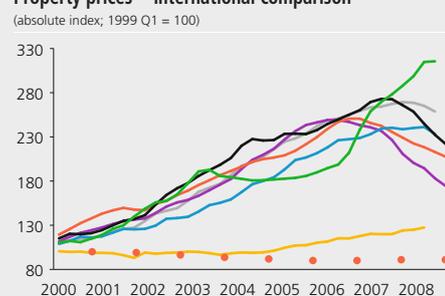


CHART III.16
Relationship between price-to-income and price-to-rent indices for various countries

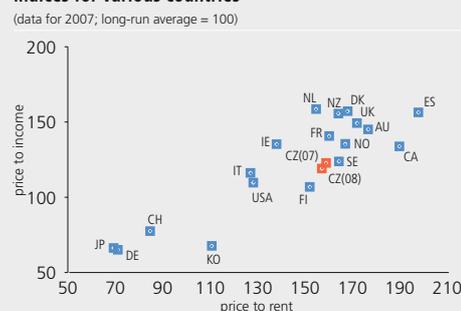


CHART III.17
Property prices – transfer prices and supply prices

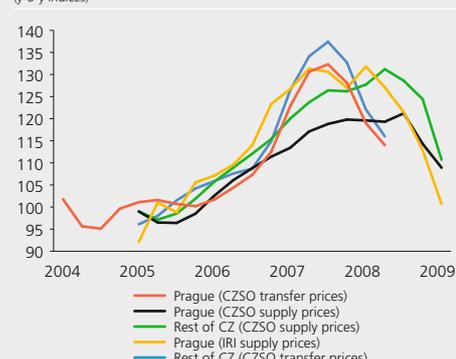


TABLE III.1
Calculated impacts of the "economic depression" scenario on apartment prices

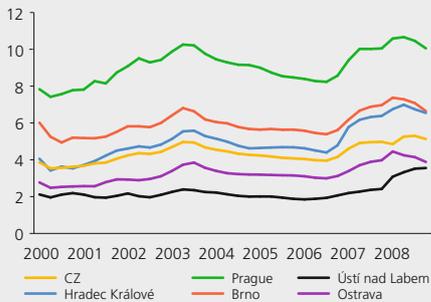
	Change	Coefficient	Total impact in CZK/m ²
Net migration	-0.69	1,729	-1,190
Unemployment rate	1.4	-350	-496
Average monthly wage	-1,502	3.4	-5,110
Loans	-2,179	0.093	-203
Total in CZK/m ²			-6,998
Total in % of current price			-31.8%

Source: CNB calculation, coefficients from Estimate B in Table 3 of the thematic article *Property Price Determinants in the Czech Regions* in this Report

⁴⁸ For the advanced economies, the *price-to-income* and *price-to-rent* indices in Chart III.16 are related to their long-run averages for 1990–2006, while the indices for the Czech Republic are compared to their averages for 2000–2006. The shorter period for the calculation of the averages for the Czech Republic places some limitations on their comparability.

CHART III.18
Price-to-income ratios

(ratio of price of 68 m² apartment to wage for last 4 quarters)



Source: CZSO, CNB calculation

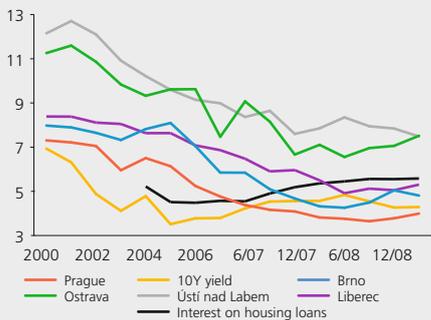
Note: 2007 and 2008 data preliminary or calculated from supply prices.

As indicated in the thematic article *Property Price Determinants in the Czech Regions* in this Report, the rapid growth in apartment prices over the past two years has been linked mainly with demand impulses such as relatively fast wage growth (of 8.5% in nominal terms and 2.1% in real terms for 2008 as a whole), declining unemployment (of 1.3 percentage points to 5% in 2008 H1 according to the MLSA⁴⁹), record demographic characteristics⁵⁰ and continued growth in loans for house purchase. The worsening macroeconomic environment can thus be expected to lead to a decline in property prices. Table III.1 outlines a rough calculation suggesting that prices might decline by about 30% in the extreme scenario entitled “economic depression” (see section 4.1.1).⁵¹ However, owing to the conservative behaviour of banks in the past and the relatively low LTV ratios of mortgage loans granted in the past, the impact on banks’ balance sheets is relatively low even in such a relatively unlikely event.

The riskiness of the current apartment price level can also be illustrated using growth in the *price-to-income* ratio (see Chart III.18) over the past two years. Despite decreasing slightly in late 2008, the ratio is close to historical highs for most regions, which again suggests apartment prices might be overvalued relative to households’ ability to repay house purchase loans from their wages. In terms of this partial indicator, Prague seems to be the riskiest region. However, Prague shows much better values than the other regions for other relevant indicators (e.g. higher net migration and lower unemployment) and will be less affected by the economic recession than other regions with large shares of industry.

CHART III.19
Rental returns

(averages for period in %; comparison with yields on 10Y government bond and house purchase loan rates)



Source: IRI, CNB

Apartment rental returns⁵² improved somewhat during 2008, increasing above long-term government bond yields again for most regions (see Chart III.19). This shift seems to reflect mainly a shift in substitution between owner-occupied and rental housing, with worse access of households to house purchase loans being reflected in increased demand for rental housing. The increase in the apartment rental return might also mean that hypothetical speculative investment in property is becoming relatively more profitable. However, since apartment rental returns are still below the interest rates on house purchase loans for most regions, no expansion in speculative purchases can be expected.⁵³

49 However, unemployment increased in 2008 H2 and especially at the start of 2009, but this has not yet fed through to property prices.

50 Population growth usually results in a need for new dwellings. According to the CZSO, the population grew by 86,400 in 2008, the second-highest increase since the 1950s (behind 2007). This was due to a rise in natural population growth of 46% year on year, the highest figure since 1980, combined with the second-largest increase in migration ever recorded (immediately behind 2007). The growth in property prices was mainly linked with the increase in migration.

51 The coefficients used correspond to Estimate B in Table 3 of the thematic article. In addition to the assumptions of the “economic depression” scenario, a complete halt in migration to the Czech Republic is assumed.

52 The apartment rental return is given by the ratio of the 12-month rent to the apartment price. It is the inverse of the *price-to-rent* indicator. Unlike the *price-to-rent* indicator, however, the apartment rental return can be compared directly with interest rates.

53 Any speculative investment in property financed by mortgage loans implicitly assumes further growth in property prices.

With prices rising, housing construction saw continued fast growth at the start of 2008 (see Chart III.20). In the first three quarters of the year, the number of housing completions rose by 9.1% and the number of housing starts by 6.4% year on year, suggesting a further increase in the record values observed in 2007. However, housing construction fell sharply in Q4, with housing completions and starts declining by 30.4% and 19.1% year on year respectively. At the same time, the number of apartments under construction increased by 3%. The largest shares in the number of buildings under construction were recorded by family houses (50.6%) and apartment blocks (19%). This may indicate problems for developers, since it means they incur additional costs due to delays in selling apartments. The relatively high risk attaching to this segment of the property market, as mentioned in the 2007 Financial Stability Report, can also be illustrated by a fall in the value of developers' shares traded on the PSE.⁵⁴

3.2.2 Commercial property prices

The above-mentioned risks to the developer sector linked with residential property are being intensified by a none-too-good situation on the commercial property market. According to information from King Sturge, almost all market segments saw a combination of record-high planned supply (growth in the total volume of planned projects, primarily for shopping centres and office buildings), driven by developers' overly optimistic expectations,⁵⁵ and a sharp fall in investor demand in 2008 (a decline in total realised investments in Chart III.21).⁵⁶ The fall in demand was due to an annual decline in the volume of transactions of about 60% to EUR 1,059 million in 2008, the lowest level since 2002. The Czech Republic mainly saw transactions in the office and retail markets in 2008.

Such a substantial decline in demand had to generate a fall in prices. The latter can be illustrated by an increase in the prime yields demanded on commercial property to roughly the 2005 level (see Chart III.22; a higher yield means that the investor demands a lower price for any given rent). While this rise in yields was in line with the growth in yields on long-term financial instruments in 2007 and 2008 H1 (the related spread narrowed), yields on commercial property increased in 2008 H2 despite a decline in government bond yields.

The slower economic growth and excess supply also resulted in an increase in the vacancy rate for both the office market (a rise from about 6% at the start of the year to 9% at the end of the year; see Chart III.23) and the logistics and industrial real estate market (an increase from 10% in January 2008 to 17.2% in 2008 Q3; the vacancy rate then fell to 15.6% in December 2008). In response to this,

CHART III.20

Housing construction

(numbers of starts, completions and dwellings under construction in given year in thousands)



Source: CZSO

CHART III.21

Planned supply and realised demand on the commercial property market

(2006 = 100)



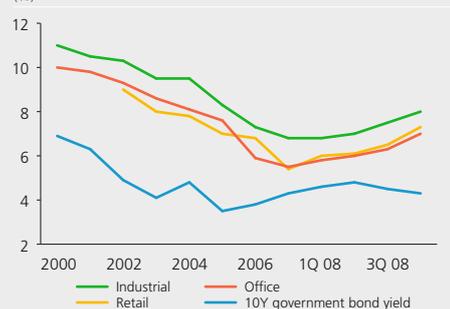
Source: King Sturge

Note: Supply of industrial, retail and office property calculated from new supply in m²; realised investments from data in EUR.

CHART III.22

Yields on commercial property

(%)



Source: King Sturge

Note: The figures for industrial property for 2008 are only estimates (owing to an insufficient number of transactions).

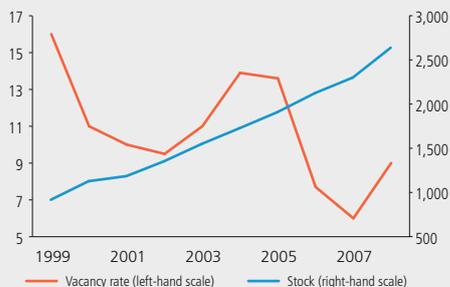
⁵⁴ While ORCO's share price had been over CZK 3,500 in June 2007, it fell below CZK 100 per share in March (a slump of around 97%). Similarly, ECM's shares declined from CZK 2,000–2,050 per share in April 2007 to less than CZK 220 per share. On the other hand, developers' problems have not yet affected their ability to repay bank loans (for details see section 4).

⁵⁵ On the logistics and industrial property market, for example, developers had been planning around 22 projects throughout the Czech Republic in January 2008. Of these, 13 had been completed as of December 2008.

⁵⁶ Most US, UK and Irish investment funds pulled out of the Czech market in 2008 H1 and demand was maintained by German and Austrian real estate funds. However, the acquisition activities of these funds declined substantially at the start of 2009.

CHART III.23
Vacancy rate and total stock of office property

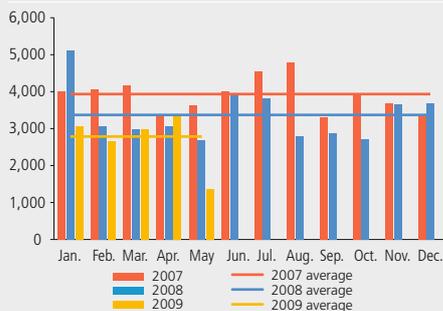
(vacancy rate in %; stock in thousands of m²)



Source: King Sturge

CHART III.24
Total value of transactions processed by SKD in individual months of 2007, 2008 and 2009 (up to 14 May)

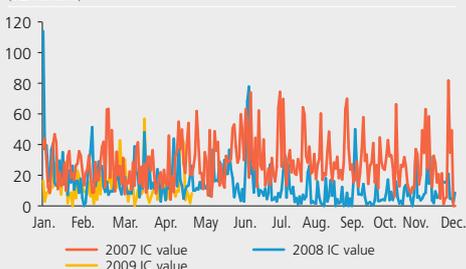
(CZK billions)



Source: CNB

CHART III.25
Comparison of intraday credit values in 2007, 2008 and 2009 (up to 14 May)

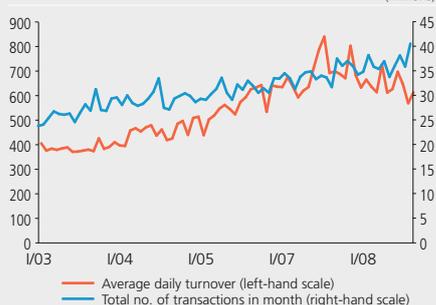
(CZK billions)



Source: CNB

CHART III.26
CERTIS interbank payment system – number of transactions processed in 2003–2008

(CZK billions)



Source: CNB

the realised supply of new offices in Prague for 2009 recorded an annual decline of 55%. In mid-2008, the logistics and industrial property market saw a virtual halt in new construction. This “freeze” can be also illustrated by the fact that no major transactions were executed in this market segment in the Czech Republic in 2008. The retail space market was a relatively stable segment, with flat demand during 2008, and was essentially capable of accepting new projects.

Developers have so far responded to the decline in demand mostly by either temporarily suspending or completely stopping project implementation. However, given the specifics of the Czech property market, where in the past developers have often made “speculative” advance purchases of land and have often not sold their projects to investors but have created their own property portfolios, such deferred implementation of projects implies significant sunk costs and additional default risks. Such risks are being reinforced by tighter bank lending conditions, for example an increase in the required contribution of own capital from approximately 10% to 30%–50% or an increase in the required pre-lease percentage (10%–15% in the past, around 30% today; 50% for industrial projects).

3.3 THE FINANCIAL INFRASTRUCTURE⁵⁷

Financial stability continued to be supported in 2008 by the smooth operation of the interbank payment system CERTIS and the short-term bond system SKD, both of which are administered by the Czech National Bank. The high level of risk management of these two systems largely rules out the danger of them becoming a channel for the propagation of financial difficulties between institutions or markets and for generating financial instability. This risk did not materialise even during the financial crisis. The slight decline in the turnovers of these systems and the decrease in intraday credit are consistent with the developments in the financial markets. In connection with the global financial crisis, there was a one-off jump in the volume of currency in circulation in October 2008. However, it returned relatively quickly to levels in line with the long-term trend.

The value of the transactions processed by SKD⁵⁸ declined slightly in 2008, while the value of intraday credit recorded a significant decrease due to developments in the interbank market and the short-term bond market, which meant a change in the previous trend.

The value of the transactions processed by SKD rose gradually between 2000 and 2006. Having declined slightly in 2007, it recorded a further fall to around CZK 40 trillion in 2008, which represents a decline of about 6% from a year earlier (see Chart III.24). An average of CZK 159 billion was processed every day. SKD’s turnover in roughly 23 days equalled annual nominal GDP. The values

⁵⁷ This section is devoted solely to the financial infrastructure systems administered by the CNB. The other components of the financial infrastructure were examined in detail in an annex to the 2004 Financial Stability Report.

⁵⁸ The Short-Term Bond System (SKD) is used for issuing and registering all book-entry securities with maturities of up to one year and for settling trades in these securities. At present, T-bills and CNB bills are registered in SKD. The system enables sales of securities, repos and sell and buy operations, as well as pledges and exchanges of securities.

of the transactions in each month of 2008 were lower than a year earlier. The decline, observed since February, peaked in October, whereas the values recorded in November equalled those recorded a year earlier and the December values were slightly higher than those seen in 2007 (see Chart III.24). These figures document the situation on the Czech financial market, which saw a deterioration in the situation on the interbank market, a drying-up of liquidity in the government bond market and a decline in the volume of liquidity-withdrawing repo operations by the CNB in mid-October owing to the global financial crisis (see section 3.1).

Smooth and stable interbank settlement is supported by the use of intraday credit (see Charts III.25). Through SKD, the CNB provides CERTIS⁵⁹ participants with interest-free intraday credit to boost their cash liquidity during the day and thus ensure smooth operation of the payment system. All intraday credit extended to commercial banks by the CNB is collateralised. The volume of intraday credit had shown a gradual upward trend in previous years, but in 2008 it declined by 50% to CZK 3,590 billion. The decline in the use of intraday credit may reflect slightly lower interbank payment turnovers and a downswing on the short-term bond market. It may also indicate that banks have no problems with intraday liquidity owing to a more prudent approach to liquidity management (see Box 5) and thus have no need to use this instrument. In any case, the importance of this indicator should not be overestimated, since past experience shows that banks have often made surprisingly little use of interest-free intraday credit, despite having sufficient collateral.

CERTIS ran smoothly, with a continued upward trend in the number of payments settled and a slight fall in average daily turnover (of 7%). In 2008, CNB Clearing processed 435.6 million transactions totalling CZK 162,993 billion. This equates to a daily average of 1.72 million transactions. The average daily value of the transactions was CZK 644 billion (see Table III.2). The peak amount in a single day was 5.485 million processed transactions, which is a record. These figures reveal the extent of payment settlement in CERTIS and its significance for financial stability. It took roughly six days to reach a turnover equal to annual nominal GDP. The average daily turnovers recorded a decline compared to 2007 every month from April onwards. This represents a change in trend consistent with lower payment activity by banks (see Charts III.26 and III.27).

In October 2008, following the failure of Lehman Brothers, there was a one-off jump in the volume of currency in circulation due to corporations' and households' increased demand for cash. Although the total volume thereby increased by CZK 45.5 billion (around 16%) to CZK 399 billion at the end of 2008 (about 10.8% of GDP, see Chart III.28), the excess currency is gradually returning from circulation and the current values are in line with the long-term trend. This corresponds to the situation in the euro area, which in October 2008 saw a jump in currency in circulation of 13%, comparable to that in the Czech Republic. The ratio of currency in circulation to GDP is slightly lower in the euro area (the EUR 783 billion of currency in circulation at the end of 2008 equates to 8.5% of GDP).

CHART III.27

Average daily turnovers in CERTIS in individual months of 2007 and 2008

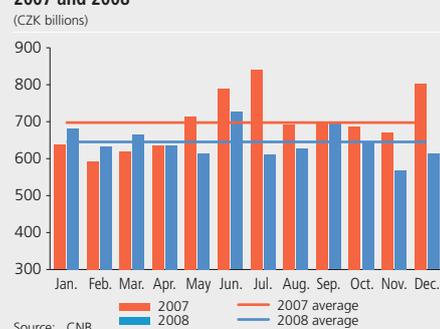


TABLE III.2

CERTIS interbank payment system – statistical information

Period	Turnover (CZK billions)	Average daily turnover (CZK billions)	No. of transactions (millions)	Average daily no. of transactions (millions)	GDP/Average daily turnover
2002	100,343	431	262	1.12	5.6
2003	96,938	385	317	1.26	6.6
2004	110,127	434	333	1.32	6.4
2005	123,354	488	356	1.40	6.0
2006	151,537	604	382	1.52	5.3
2007	174,854	697	411	1.64	5.1
2008	162,993	644	436	1.72	5.7

Source: CNB

CHART III.28

Stock and growth of currency in circulation 2000–2009 (up to 30 April 2009)



59 CERTIS (Czech Express Real Time Interbank Gross Settlement System) processes all domestic interbank transfers in Czech koruna in real time.