FINANCIAL STABILITY REPORT

2009 / 2010

CNB CZECH NATIONAL BANK

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Maintaining financial stability is defined as one of the CNB's main objectives in Act No. 6/1993 Coll., on the Czech National Bank, as amended:

Article 2

(2) In accordance with its primary objective, the Czech National Bank shall

.....

d) supervise the activities of entities operating on the financial market, analyse the evolution of the financial system, see to the sound operation and development of the financial market in the Czech Republic, and contribute to the stability of its financial system as a whole.

The CNB defines financial stability as a situation where the financial system operates with no serious failures or undesirable impacts on the present and future development of the economy as a whole, while showing a high degree of resilience to shocks.

The CNB's definition is based on the fact that financial stability may be disturbed both by processes inside the financial sector leading to the emergence of weak spots, and by strong shocks, which may arise from the external environment, domestic macroeconomic developments, large debtors and creditors, economic policies or changes in the institutional environment. The CNB regularly monitors and closely analyses developments in all areas relevant to financial stability. The members of the CNB Bank Board meet on a quarterly basis with experts from key sections to discuss the current risk outlook in so-called macro-financial panels. A wide range of information on developments in the domestic financial system and abroad is presented at these meetings. The discussions precede the Board's monetary-policy meeting debating the new CNB macroeconomic forecast and provide the participants with a comprehensive picture of the economic and monetary situation.

The CNB's aim with regard to financial stability is above all to ensure a degree of resilience of the system that minimises the risk of financial instability. To fulfil this aim, the CNB as a monetary and supervisory authority uses the instruments made available to it by the Act on the CNB. Cooperation with other national and international authorities is also very important in this area. In order to maintain financial stability, the CNB focuses on prevention and broad communication with the public regarding the potential risks and factors posing a threat to financial stability. This Financial Stability Report is an integral part of such communication.

The global financial crisis has led not only to a strengthening of the importance of the objective of financial stability, but also to the institution of macroprudential policy designed to maintain financial stability. The main aim of macroprudential policy is to mitigate systemic risk, i.e. the risk of instability of the financial system as a whole. An intensive debate about the tools of macroprudential regulation, i.e. the set of pre-emptive measures intended to prevent financial instability, is going on at international level. At EU level, a joint institution for macroprudential policy – the European Systemic Risk Board – should start operating at the start of 2011. The CNB will be involved in the work of this institution.

LIST OF BOXES

The global financial crisis caused the world economy to slide into an unexpectedly strong recession in 2009. After the acute phase of this recession ended, a gradual recovery started in the second half of the year. This recovery, however, is based not only on renewed private sector confidence, but also on vigorous supportive economic policy measures. Although the Czech economy was not hit directly by the crisis, it was unable to avoid the impacts of the global shocks. However, the Czech financial system has remained stable during the crisis and its position has remained relatively strong. It therefore remains able to withstand the negative second-round impacts of the fading recession.

The main risk scenario for the Czech economy over the next two years is a renewed recession in its major trading partner economies and a subsequent slowdown in domestic economic activity. This scenario might materialise owing to worse credit availability because of a lack of funds in some foreign banking sectors, to potential crowding-out of private sector financing by growing government debt issues, or to rising regulatory uncertainty in credit institutions. Other factors might include the need of economic agents in many Western economies to reduce their debt, growth in commodity and energy prices in response to dynamic growth in emerging markets, and the generally adverse labour market situation. In the light of historical experience, renewed pressure for fundamentally unjustified appreciation of the koruna cannot be ruled out.

The second key risk is the deteriorating fiscal trend in many countries, including the Czech Republic. Contagion of concerns about the ability to finance government debt in critically indebted countries to other countries whose public finance is also showing some signs of potential unsustainability is a current threat. In the short term this could lead to a sharp rise in government bond yields with a strong negative impact on financial institutions' balance sheets. From the medium and long-term perspectives, growing government bond issuance to finance the high government debt could exert sustained upward pressure on loan interest rates. This would, in turn, have a markedly adverse effect on consumer demand, the creation of new supply capacity and the private sector's ability to repay loans.

DEVELOPMENTS IN 2009 AND 2010 Q1

In 2009 the global and domestic economies went through a sharp recession and a subsequent fragile recovery

After weakening appreciably in 2008 H2, the global economy slid into an unexpectedly strong recession in 2009. Although the Czech economy entered the global financial crisis in good condition, it was unable to avoid the strong impacts of the slump in external demand. A gradual recovery started in 2009 H2. However, the renewed economic growth remains very fragile, since it is based more on exceptionally large economic policy stimuli than on a natural recovery of corporate and household demand.

Loan growth fell and ex post real lending rates went up

Most Western economies experienced a sharp fall in lending growth in 2009. Rates of growth of loans to the private sector were very low or even negative. Overall growth in bank loans remained positive in the Czech Republic, but only thanks to rising loans for house purchase. By contrast, the stock of bank loans to corporations decreased, mainly because of a fall in demand for short-term loans linked with the contraction in economic activity. Nominal interest rates on loans to domestic non-financial corporations kept falling during 2009, while those on loans to households rose modestly. Owing to falling nominal income growth, real interest rates on loans to corporations and households measured on an ex-post basis tended to rise.

Corporations were faced with a sharp decline in demand and – as from the end of 2009 – rising commodity and energy prices

Corporations – and exporters in particular – coped with the dramatic fall in demand by cutting production, costs and margins, especially in the second half of 2009. This negatively affected their profitability. Corporate sector credit risk increased substantially, as indicated by a rise in the default rate on bank loans to corporations and a growing number of insolvency petitions filed. A recovery in economic activity in Western economies and continuing dynamic growth in Asian emerging economies at the end of 2009 led to a renewed upward trend in prices of commodities and energy-producing materials, adversely affecting corporations' cost situation.

Households responded to the adverse situation with lower demand for new loans

The decline in corporate economic activity led to a substantial rise in unemployment and a fall in nominal income growth. In combination with growing debt servicing costs, the household default rate increased with a slight lag. Credit risk was evident not only for bank loans, but also for non-bank loans. The growing risk of loss of employment coupled with growing uncertainty about household disposable income was reflected in slowing household debt growth. New loans for house purchase and consumption recorded substantially negative annual growth in 2009.

Public finance developed unfavourably

The recession and the supportive budgetary measures in most advanced countries, including the Czech Republic, were reflected in growth in public finance deficits and a surge in public debt to GDP ratios. Although the Czech Republic ranked among the advanced economies with lower deficits and also recorded relatively low government debt in 2009, the rate of growth of its public finance sustainability indicators began to send warning signals from the medium-term perspective.

Monetary policies remained easy

During 2009 and in the first few months of 2010 the key central banks left their monetary policy rates at historically low levels. This significantly helped financial institutions, corporations and households to cope with the crisis and recession. The low interest rate environment will probably have to be maintained for some time to come for the economic recovery to continue and banking sector stability to be preserved.

The exchange rate of the koruna had a stabilising effect

The currency market situation calmed during 2009, helping to stabilise the macroeconomic environment. Since spring 2009, the koruna has remained relatively stable at near-equilibrium levels.

The situation in global financial markets remains to some extent tense…

International financial markets were influenced by the supportive monetary and fiscal measures adopted in late 2008 and early 2009. On the one hand these measures reduced the extreme uncertainty about potential counterparty default and restored optimism in equity markets in particular. Risk premiums fell, market volatility declined and market liquidity increased. On the other hand, the authorities' direct market interventions reduced market activity and further increased counterparty selection. In late 2009, developments in the government debt markets of some advanced economies started to worsen the overall market situation.

…and the same goes for the Czech financial market

The situation in the Czech financial market was little changed. Low liquidity, weak activity and higher volatility persisted in the money market. The stock market has been showing an upward trend since March last year thanks to increased optimism supported by expansionary economic policy stimuli. The Czech government debt market has recorded no major deterioration and the financial markets' increased sensitivity to the Czech government finance trend has so far affected Czech government bond yields only modestly. Nevertheless, the credit risk premium has remained at an increased level, and not only in the case of the Czech government debt.

A decline in property prices improved their sustainability indicators

Property prices declined in 2009. This had been identified as a risk in previous Financial Stability Reports. The decline was linked primarily with a revision of future income trends, with the adverse labour market developments and with worse demographic factors. The downward movement in prices fostered an improvement in the property price sustainability indicators (the price-to-rent and the price-to-income ratio).

Growth in non-performing loans in the banking sector was accompanied by sufficient provisioning

The decline in economic activity in the Czech Republic starting in 2008 H2 led to a rise in NPLs and higher provisioning in the banking sector. Coverage of NPLs by provisions fell slightly to around 56% in March 2010. This can be attributed to a change in the NPL structure towards better secured loans and less risky categories. Analyses indicate that the provisioning is sufficient. This is supported by evidence of banks taking a prudent and conservative approach to loan classification.

The banking sector coped well with the adverse economic situation

In 2009, the banking sector recorded halt in total asset growth but achieved high profits despite a sharp increase in loan impairment. This was due in particular to an increased interest rate margin in a situation of falling market rates and a loan-portfolio pricing policy responding to the current and expected rise in credit risk.

The favourable asset market situation was reflected in the results of insurance companies, pension funds and mutual funds

The insurance sector recorded stagnant premiums written in non-life insurance only. Transitory bond and share portfolio losses were settled during 2009 and so the sector achieved high profitability. The favourable financial market situation, particularly as from 2009 Q2, had a positive effect on pension funds as well. At the end of 2009 revaluation differences were close to zero, and at the end of March 2010 they turned slightly positive. Unlike in 2008, therefore, pension funds did not have to bolster their capitalisation through capital injections from shareholders.

The investment fund sector gradually stabilised

The situation in the collective investment funds sector calmed in 2009. Whereas 2008 and 2009 H1 had seen outflows of funds from this sector, the more favourable financial market situation in 2009 H2 boosted capital yields and attracted more investors.

The future risk scenarios consider the possibility of a renewed recession and a loss of investor confidence as a result of uncertainty about public finance sustainability

Different adverse macroeconomic developments stemming from analyses of trends and weak spots abroad, in the domestic economy and in the financial sector were incorporated into alternative scenarios used to test the financial sector's resilience. These scenarios take into consideration the possibility of a renewed recession in the domestic economy connected with a decline in external demand and a potential loss of investor confidence as a result of concerns regarding Czech public finance sustainability. Banking sector liquidity was also tested.

RISKS TO FINANCIAL STABILITY

Forecasts for the Czech economy predict that unemployment will rise until mid-2011

The current forecasts predict that in the next two years the Czech economy should see a moderate renewal of economic growth. This would have a positive effect on the stability of the domestic financial system. The recovery process could be complicated by external demand volatility and the fact that economic activity in Germany and the euro area as a whole will grow much more slowly than before the crisis. Therefore, it can be assumed that the recovery of the Czech economy will have an asymmetric W shape and the unemployment rate will rise until 2011 H1. However, the scenario on which these forecasts are based is threatened by numerous risks, most of them originating abroad.

High private sector debt may return the economy to recession

Demand in Western economies and particularly in the EU will be subdued in the long term by the need for economic agents to reduce their gross debt, which increased in all sectors in the previous decade. Even a small change in the parameters affecting the debt burden or the capacity to service debts can have a relatively large impact on highly indebted sectors. The overall indebtedness of economic sectors in the Czech economy is relatively low, but it is impossible to rule out adverse impacts related to strong links with highly indebted EU economies.

Rising unemployment will hinder economic recovery

Households' main problem in the coming two years will be the labour market situation and the evolution of their income. Rising unemployment and a higher loan default rate will hinder economic recovery through an adverse effect on consumption demand. This, in turn, will further worsen the situation in the corporate sector. This feedback effect could be quite sizeable if the adverse future economic scenarios materialise.

Corporations and households are facing tighter financial conditions

The financial conditions for corporations and households remain relatively tight despite flat or falling interest rates on loans. Pessimistic expectations regarding future income, linked with lower-than-previously-expected selling prices of goods and services and slow growth in employees' wages, are becoming a major negative factor from the point of view of debt repayment ability.

There is a high level of uncertainty in financial markets

The renewed stability of financial markets must be viewed as being very fragile. The steeply rising money market yield curve and sharp increase in the slope of the government debt yield curve can be interpreted as meaning that there is great uncertainty about future market developments. This is being bolstered by the rising credit premium being demanded by investors in return for holding the soaring volume of government bonds.

The stability of financial institutions in some countries is conditional on a low short-term interest rate level

A greater increase in interest rate levels, linked, for example, to an exit from easy monetary policy, could have a destabilising effect on financial institutions in some countries. The persisting environment of low short-term interest rates is allowing banks to finance relatively cheaply and achieve an income level enabling them to cope with loan impairment losses.

Banks in some countries may not have sufficient funds for lending partly because of rising government debt issuance

Banking sectors in many countries do not have sufficient funding liquidity, so some large banks in these countries are still having to rely on funding from central banks or through government-guaranteed bond issues. Rising government bond issuance may further hamper banks' access to funds and crowd out private sector lending. This would adversely affect consumer and investment demand.

Access to loans may also be curbed by shortages of capital in banks and by regulatory uncertainty

Loan availability might also be curbed in some countries by shortages of regulatory capital. The high level of uncertainty associated with planned international regulations and additional liquidity and capital requirements may have a restrictive effect on the behaviour of financial institutions.

The decline in bank lending to domestic corporations has so far reflected reduced demand for loans, but there are also risks on the supply side

Banks operating in the Czech market have sufficient funds and capital and their clients have relatively low debt levels by international comparison. However, it cannot be ruled out that corporations may face worse access to credit in the years ahead. A significant rise in the number of corporate insolvencies and a subsequent rise in bank loan losses as a result of a renewed recession would greatly reduce the willingness of banks and other creditors to grant more loans.

The Czech banking sector would be hit by a combination of higher growth in non-performing loans and a fall in interest income due to a flattening-out of the yield curve

Higher growth in NPLs (to both households and corporations) in the case of a renewed recession in the Czech economy would have significant effects primarily on banks, which have more concentrated portfolios. In combination with a potential flattening-out of the yield curve, which would negatively affect banks' operating profits owing to declining interest margins, the sector's profitability would decrease sharply and could even put capital adequacy at risk. Should problems manifest themselves, liquidity risk in the building societies subsector could be reflected in the reputational risk of parent banks.

Concerns regarding public debt sustainability could sharply increase the price of loans

High public finance deficits and sharply rising government debt in advanced countries are among the main risks to financial stability. Concerns about public finance sustainability could generate financial market turmoil, leading to a sharp increase in government bond yields and endangering the economic recovery via rising debt service costs in the private sector. More costly and less available loans would also result in a slowdown in the creation of new supply capacity, with a negative effect on structural unemployment. There would be very limited monetary policy options for offsetting the tighter financial conditions.

The high Czech public finance deficit and rising government debt are increasing the risk of contagion from other countries

In the absence of additional consolidation measures, the Czech public finance deficit will remain at levels well above the Maastricht reference value in the coming years. Government debt will exceed 40% of GDP at the start of 2011 and the government's annual gross borrowing need will exceed CZK 300 billion. From the short-term perspective, Czech public finance still seems relatively sound in international comparison and the financing of Czech government debt could proceed without any major difficulties in the next few years. However, the events of April and May 2010 show that a deterioration in issuing conditions on government bond markets is a direct risk. This could happen quickly and unexpectedly as a result of contagion of doubts about the ability to finance government debt in critically indebted countries to other countries whose public finances are showing only partial signs of potential debt position unsustainability. This risk is increased by the fact that the financial markets are far less tolerant to small countries than large countries in terms of assessing national debt financing ability.

Domestic public finance is a strong risk from the medium-term perspective

In recent years, the Czech Republic has been a member of the group of countries that have rapidly growing public debt-to-GDP ratios. The so far relatively favourable view of Czech public finance sustainability could change quickly. Amid increasing global risk aversion to economies with unfavourable fiscal outlooks the risk premium on Czech government debt could rise faster than generally expected at present.

Fundamentally unjustified appreciation of the koruna still poses a risk

A potential renewed and fundamentally unjustified appreciation of the koruna associated with a renewed search for yield by investors must be regarded as an ever-present risk. This risk can be derived from historical experience and also from the fact that the Czech Republic has long been a highly stable country from the macroeconomic point of view.

Rising prices of commodities and energy-producing materials could generate a negative supply shock

Growth in commodity and energy prices in reaction to the recovery in Western economies and continuing growth in Asian countries could represent an additional adverse supply shock for economies with subdued demand. Such a shock would lead to a downswing in economic activity and to cost-push inflationary pressures. It would also create a tricky situation for monetary authorities.

The residential and commercial property markets are not fully stabilised

The property market still poses a sizeable risk despite the fact that house prices have returned close to equilibrium values. Housing construction has declined sharply and the time to sell new residential projects has increased. Combined with tightening lending standards this has led to a higher risk of insolvency in the developer sector. This is confirmed by the NPL ratio in this subsector. The situation on the commercial property market, which has been virtually abandoned by foreign investors, remains unfavourable as well. The decline in demand has been reflected in a further fall in prices and a related increase in yields in all market segments. There has also been substantial growth in the vacancy rate. The risks of this segment can also be seen in a rising NPL ratio.

The domestic financial system was exposed to both expected and highly unlikely shocks in stress tests

With regard to the risks identified above, the resilience of the domestic financial system was assessed by means of stress tests on banks, insurance companies and pension funds using three scenarios of future economic developments entitled Baseline Scenario, Return of Recession and Loss of Confidence. A stress test was also performed on banks' balance-sheet liquidity. The first scenario is considered by the CNB to be the most probable. The other two alternative scenarios are characterised by a sizeable contraction in economic activity. The Loss of Confidence scenario is also used to test the impact of pressures for a sharp depreciation of the koruna and an increase in Czech long-term interest rates due to a negative reaction of the financial markets to the uncertainty about domestic public finance sustainability.

ASSESSMENT OF THE FINANCIAL SECTOR'S RESILIENCE

According to the stress tests the Czech financial sector still seems resilient to a wide range of risks

According to the stress tests, the Czech financial sector is resilient to the market, credit and some other risks undertaken despite the strongly pessimistic settings of both stress scenarios. No sector as a whole falls below the critical values of the solvency indicators (capital adequacy for banks, solvency for insurance undertakings and capitalisation for pension funds) in any of the stress scenarios. However, if the economy were to develop in line with the alternative scenarios, some institutions would suffer losses which might require capital injections from shareholders

Banks are resilient to credit and market risks

The stress tests indicate good resilience of banks to credit and market risks. This is due not only to a high initial capital buffer, but also to the ability of banks to generate income even in an adverse scenario.

Pension funds increased their capitalisation

The tests on insurance companies and pension funds show that they are resilient to market risks and some specific risks in all the scenarios. Owing to a pronounced increase in pension funds' capitalisation, this sector has become more resilient to the impact of losses arising from the revaluation of securities. New rules allowing insurance companies and pension funds to value part of their bond portfolios at amortised cost instead of fair value also play a role.

The domestic financial system showed the least resilience in the *Loss of Confidence* scenario, which causes a fall in GDP and a rise in interest rates

The biggest stress to the Czech financial system was the *Loss of Confidence* scenario, which led to credit and market losses amounting to around 2% of the assets of the entire tested financial sector. This scenario would cause a relatively strong decline in the solvency indicators of banks, insurance companies and pension funds, but would require relatively small capital injections into the financial system as a whole (of about CZK 5 billion, i.e. less than 0.15% of GDP). The other scenarios have smaller impacts – the *Baseline Scenario* requires no capital injections and the *Return of Recession* scenario would require only CZK 2 billion.

The stress tests of banking sector liquidity also indicate a high level of resilience

One of the risks that might arise if the highly adverse scenarios materialise is heightened nervousness on domestic financial markets. This might happen if, for example, a domestic bank was to fall below the regulatory threshold for the capital adequacy ratio or as a result of

bad news about the financial condition of a Czech institution's parent bank. Any panic would, in turn, be reflected in a run on the banks and in problems in asset markets. However, the stress test of balance-sheet liquidity, which was performed for two very extreme scenarios assuming, for example, that banks would be unable to boost their funding by borrowing from their parent companies, by issuing bonds or by taking deposits, indicates that the sector has relatively high resilience to market and balance-sheet liquidity risk.

FACTORS CONTRIBUTING TO THE CZECH FINANCIAL SYSTEM'S RESILIENCE

The starting position of the financial system, and particularly of the banking sector, remains very good for future years

The Czech financial system entered the recession in good condition. In 2009, most institutions maintained profitability close to the relatively high levels of previous years. The Czech banking sector's strong position is supported not only by sufficient profitability, but also by good funding liquidity, a high deposit-to-loan ratio and a very low proportion of foreign currency loans. The Czech banking sector has a positive net external position and is thus independent of external funding.

The banking sector entered 2010 well capitalised

The Czech banking sector is sufficiently capitalised. Its total capital adequacy ratio was 14.3% at the end of March 2010. In addition, the total capital adequacy ratios of all banks are above 10% for the first time since 2002. Tier 1 capital adequacy was 12.9% at the end of March 2010, indicating that banks have abundant high-quality capital dominated by retained earnings. By international comparison, the sector has a very good capital ratio, i.e. a relatively high ratio of capital to non-risk-weighted assets. In 2009 and early 2010 it still holds true that the Czech Republic has not been forced to adopt any measures to bolster banking sector solvency.

The riskiness of the Czech banking sector's profile is decreasing

The loan portfolios of Czech banks are currently dominated by loans to households, primarily loans for house purchase, which are still less risky than corporate loans. The risk related to the concentration of corporate portfolios is also decreasing. The banking sector meanwhile has relatively low connectivity in the interbank market, reducing the risk of rapid risk transmission via interbank exposures.

Insurance companies and pension funds are also well-capitalised

The sector of insurance companies and pension funds is also well-capitalised. A new "prudential mechanism" in the pension fund sector ensures that a process to increase a fund's capital is triggered in the event of sizeable losses and a fall in capitalisation.

The external position of the Czech economy remains stable, decreasing the risk of contagion

The external position of the Czech economy is stable, as evidenced by current and expected trade surpluses, modest current account deficits and relatively low external financing needs. Only the investment position is showing a deterioration.

CNB monetary policy should continue to foster stabilisation. The CNB's macroeconomic forecast dating from the beginning of May 2010 predicts a significant dampening of inflationary pressures. Accordingly, monetary policy rates, domestic short-term money market rates and client rates should remain at fairly low levels over the next two years. Assuming relative exchange rate stability, the resulting monetary environment should allow corporations and households to cope better with the none-too-favourable income situation.

Monetary conditions in the Czech Republic should remain easy and create favourable conditions for a recovery in private sector activity

PART I

1 INTRODUCTION

The Czech National Bank is pleased to present to the public its sixth Financial Stability Report (FSR). The main aim of the FSR is to identify and analyse the risks to the financial stability of the Czech Republic which may arise on the basis of previous and expected developments in the real and financial sectors.

Compared to last year, the analytical and modelling framework of the FSR has been further improved. This applies in particular to the banking sector stress tests, which have a dynamic nature and a longer (two-year) horizon. The balance-sheet liquidity tests use a larger number of liquidity shocks and better reflect the subsequent responses of the banks. The partial models applied have been re-estimated, revised and supplemented with a banking sector income model. Compared to last year, the FSR also uses new data sources, e.g. the SOLUS register and additional information from the ongoing joint stress testing project of the CNB and selected banks.

The financial sector's resilience is tested by means of alternative macroeconomic scenarios that capture the biggest risks to financial stability in the Czech Republic. The risk of W-shaped economic activity, i.e. a renewed recession characterised by a further sharp decline in GDP in 2010 and partly also in 2011, is considered in the *Return of Recession* stress test. By contrast, the *Loss of Confidence* scenario captures the potential combination of weak economic growth and adverse financial market developments. The two alternative stress scenarios are compared with a *Baseline Scenario* that corresponds with the CNB's official May forecast. The impacts of the scenarios are assessed not only from the perspective of the financial sector, but also with regard to the property market and the corporate and household sectors.

The structure of the FSR is unchanged. The report is divided into three main sections analysing the risks in individual economic sectors. The section entitled *The real economy* discusses developments in the external and domestic macroeconomic environment and in the key domestic sectors, i.e. households and corporations. The section entitled *Asset markets and the financial infrastructure* analyses in detail risks in the financial market, the property market and the financial infrastructure. The last section, *The financial sector*, sums up developments in the financial sector and assesses the Czech financial system's resilience to shocks under the alternative economic scenarios. For ease of use and clarity, the FSR for the first time contains short headlines summarising the main ideas and conclusions of individual parts of the text. The report ends with a table of key financial stability indicators.

As usual, the final part of the FSR is devoted to thematic articles that discuss in more detail some topical issues relating to financial stability. The article entitled *Stress Test Verification as Part of an Advanced Stress-testing Framework* summarises the CNB's updated stress-testing methodology and verifies that methodology with a view to identifying any inaccuracies and thus improving its quality. The article entitled *Financial Integration at Times of Financial (In)stability* assesses

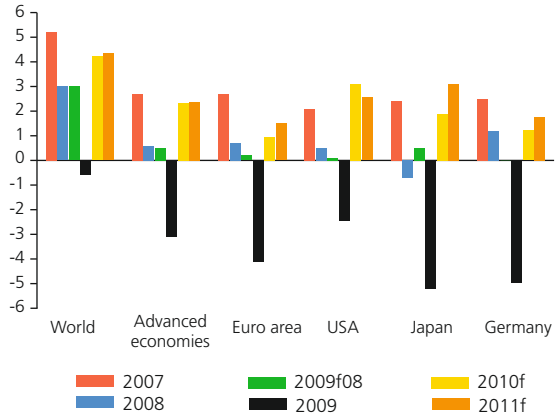
the impacts of the financial crisis on the speed and level of integration of the Czech financial market with the euro area. The third article, *Procyclicality of the Financial System and Simulation of the Feedback Effect*, examines the procyclical behaviour of financial institutions and analyses the possible impacts of procyclicality on the Czech banking sector. The last article deals with the *Regulation of Alternative Funds in the Czech Republic in the Context of the Debate on their Potential Regulation in the European Union*. The article recommends some changes to the current Czech regulations.

The title of the FSR was altered slightly last year to better describe the period to which the financial stability analysis relates. As some important full-year data become available only with a lag of several months, the FSR is published in the middle of the year. Nevertheless, many of the analyses are based on current data which extend beyond the first quarter of 2010. For this reason, the time period 2009/2010 is used in the title of the Report.

This Financial Stability Report was approved by the Bank Board of the Czech National Bank on 13 May 2010 and published on 18 June 2010. It is available in electronic form at http://www.cnb.cz/.

CHART II.1

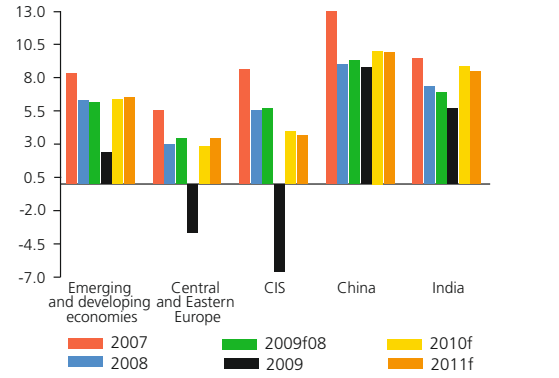
Economic growth worldwide and in the advanced economies
(year-on-year growth in %; outturns and October 2008 and April 2010 forecasts)



Source: IMF (World Economic Outlook, April 2010)
Note: 2009f08 is the October 2008 forecast for 2009.

CHART II.2

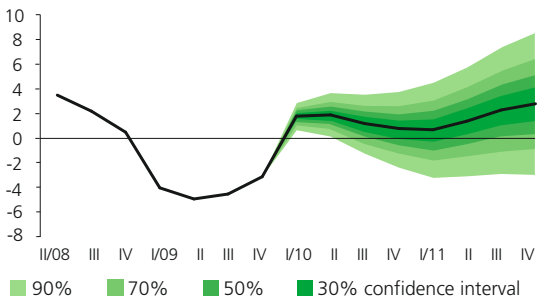
Economic growth in emerging and developing countries
(year-on-year growth in %; outturns and October 2008 and April 2010 forecasts)



Source: IMF (World Economic Outlook, April 2010)
Note: 2009f08 is the October 2008 forecast for 2009.

CHART II.3

Actual and projected economic growth in the Czech Republic
(%; CNB May forecast)



Source: CNB

2 THE REAL ECONOMY

2.1 THE MACROECONOMIC ENVIRONMENT

The external macroeconomic situation was dominated in 2009 by an unexpectedly strong recession. After the acute phase of the financial crisis ended, the global economy started to recover gradually in the second half of the year. This fragile recovery, however, is based not only on renewed private sector confidence, but also on vigorous supportive economic policy measures. Some countries' banking sectors are not yet fully stabilised and may face a lack of funds for lending in future years. Decreased availability of loans may also arise as a result of growing regulatory uncertainty. Escalating government debt in many countries may then exert upward pressure on loan rates, which would – against a backdrop of slower income growth – increase real debt servicing costs. The next two years can therefore still be regarded as a period of strong risks. Although the Czech economy was not hit directly by the financial crisis, it was unable to avoid the impacts of the global shocks. In 2010, it will still be exposed to the lagged adverse effects of the recession. The Czech economy remains very stable as regards its external balance. In the light of historical experience, this implies a risk of renewed fundamentally unjustified appreciation of the koruna. The financing of the Czech government debt could proceed without any substantial difficulties in the next few years. It cannot be ruled out, however, that the issuing conditions will deteriorate unexpectedly as a result of increased nervousness in the financial markets in the event of difficulties in other countries. From the medium-term perspective, however, Czech public finance poses a substantial risk to financial stability.

The unexpectedly strong contraction in economic activity is being followed by a very slow recovery

After weakening noticeably in 2008 H2, the global economy slid into recession in 2009 for the first time in several decades. The size of the contraction can be described as very unexpected, as shown by the differences between the end-2008 forecasts and the actual situation the following year (see the third and fourth columns in Charts II.1 and II.2). In October 2008 the IMF forecast was still assuming that global output would grow by 3% in 2009, but in reality it shrank by 0.6% (see Chart II.1). This was largely due to a sharp fall in economic activity in advanced Western economies, which include the Czech Republic.[1] The economic downswing in developing and emerging countries was much smaller on average, but showed large cross-country differences. Some large economies in this group continued to show relatively strong economic growth (see Chart II.2), whereas others shrank quite sharply. Developments in the Czech Republic and its neighbouring countries confirmed a high degree of synchronisation of the business cycle in the Central European region with the euro area cycle.

1 The breakdown of countries into groups is given in the statistical appendix of the World Economic Outlook (April 2010). The Czech Republic is classed as an advanced country, not a CEE country.

Turning to the Czech Republic's external environment, the unfavourable factors included not only a recession in Germany and other advanced EU countries, but also an unexpectedly sharp decline in production in the broadly defined CEE region, which had been showing dynamic growth in previous years. Current forecasts[2] expect an upswing in global economic activity in the next two years, although it will be quite uneven across countries and regions. The prospects for the Czech economy over the next two years are generally subdued. This is due mainly to expectations that economic activity in Germany and the euro area as a whole (the key region for sales of domestic products and services) will grow, but at markedly slower rates than before the crisis.

The Czech economy was unable to avoid the impacts of the global shocks

The Czech economy entered the global financial crisis and the subsequent recession in relatively good condition. It had no major macroeconomic imbalances and its financial system was robust in terms of both solvency and liquidity. The global financial turmoil thus affected the domestic economy to only a limited extent and the financial system remained stable throughout the period and, unlike in many other countries, did not need financial support from the government or central bank (see section 4.1). However, as a small open economy with an industrial and export orientation, it was unable to avoid the impacts of the global shocks. The sharp fall in external demand led to a decline in industrial production and subsequently to a relatively strong decrease in GDP.[3] The economy thus went into recession in 2008 Q4, and in 2009 Q1 its total output dropped by a dramatic 4.1% quarter on quarter. A weak recovery began in Q3. The halt in the GDP decline, or the renewal of modest growth, was linked primarily with a partial recovery in external demand. This recovery was due partly to the car-scrapping incentives introduced in some European countries. In 2009 as a whole, GDP dropped by 4.1%.

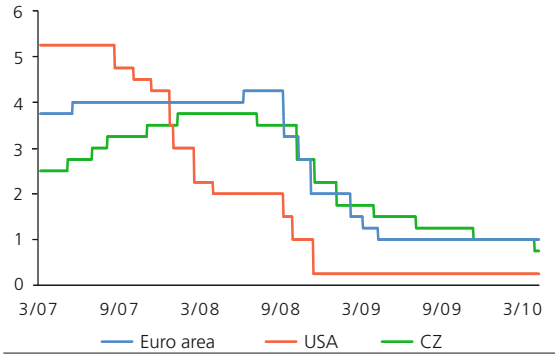
Unemployment will rise until mid-2011 despite a modest recovery

The Czech economy should see a gradual renewal of economic growth in the next two years. In its May forecast the CNB expects GDP growth of 1.4% in 2010 and 1.8% in 2011 (see Chart II.3). The recovery will be uneven, however, as external demand will fall temporarily. Along with further growth in unemployment, which reacts to a decline in demand with a lag, the recovery is expected to have an asymmetric W shape. The general unemployment rate (or registered unemployment rate),

CHART II.4

Monetary policy rates since the start of the financial turbulence

(%)

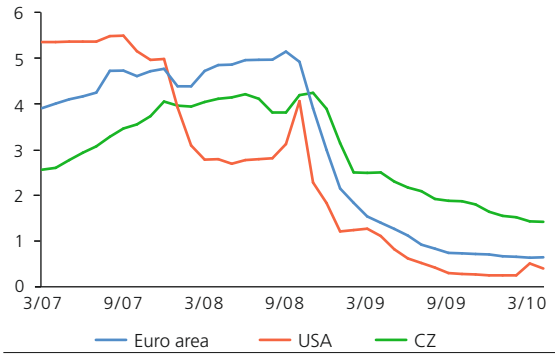


Source: Thomson Datastream

CHART II.5

Three-month market rates since the start of the financial turbulence

(%)



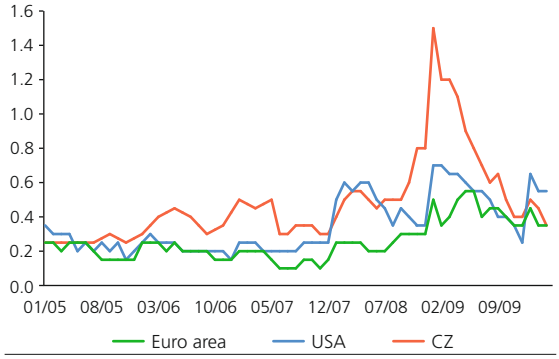
Source: Thomson Datastream

2 The April IMF forecast and the April Consensus Forecasts (a publication containing the average estimates of a broad representative sample of analysts and forecasters, whose forecasts for the external environment are used by the CNB) expect the advanced countries (including the Czech Republic) to follow a similar path over the next two years. Charts II.1 and II.2 use IMF estimates, as they, unlike the Consensus Forecasts, cover the whole global economy.

3 Domestic exports of goods and services peaked in 2008 Q3. In 2009 Q1 and Q2 they fell by more than 15% year on year. Industrial production decreased at even somewhat higher rates in the first two quarters of 2009.

CHART II.6

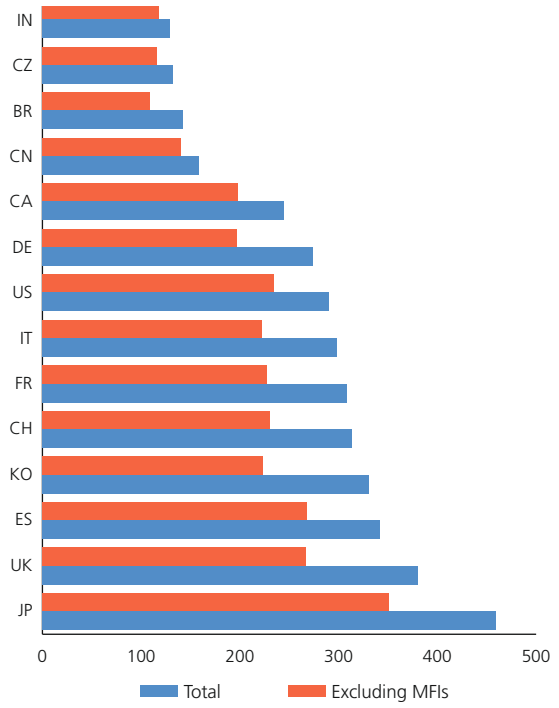
Uncertainty regarding expected GDP growth in selected economies
(mean deviation of GDP growth estimates for given and next year from Consensus Forecasts; in percentage points)



Source: Consensus Forecasts, CNB calculation

CHART II.7

Total gross debt of economies
(% of GDP)



Source: McKinsey and CNB calculation for CZ
Note: Total gross debt is the sum of the debt of households, corporations, government and financial corporations. Data for the end of 2008 and for CZ for the end of 2009. MFIs – monetary and financial institutions.

which will rise from an average of 6.7% (or 8.1%) in 2009 to 8.6% (or 10.3%) roughly in mid-2011, will, together with lower growth rates of both wages and non-wage income compared to previous years, have an adverse effect on consumer demand and will result in an increase in the default rate of loans provided to the household sector, including the house purchase loan segment (see section 2.3).

Monetary policies remain easy

The key central banks continued to ease their monetary policies[4] during 2009 and have left their monetary policy rates at historically low levels in 2010 (see Chart II.4). The reduced monetary policy rates also affected short-term money market rates (see Chart II.5), although not proportionally in all countries (see section 3.1). The low interest rate environment is contributing significantly to the ability of financial institutions, corporations and households to cope with the impacts of the crisis and recession.

In the final months of 2009, international and national authorities opened a debate regarding the timing of the exit from their supportive economic policies. The debate is focused on how quickly central banks should raise their key rates and when their unconventional liquidity-providing facilities for banking sectors should be discontinued. The prevailing view in central banks is that the low interest rate environment should be maintained for some time to come for the economic recovery to continue and banking sector stability to be preserved.

A marked rise in interest rates could have a destabilising effect

The continuation of easy monetary policy is supported by weak demand-pull inflationary pressures reflecting the existence of a negative output gap and highly subdued credit growth as well as very modest wage growth in an environment of high unemployment. Any sizeable interest rate growth in the next few years – irrespective of whether it is generated by tighter monetary policy, discontinuation of support policies, the impacts of even unjustified concerns about a future rise in inflation, or by loss of confidence in governments' ability to repay loans – could become a risk factor in some countries as regards the stability of financial institutions. The current environment is allowing banks to finance relatively cheaply and achieve a yield level enabling them to cope with loan impairment losses and the decline in the value of securities holdings. This applies above all to banks in countries that were hit hard by the crisis.

The recovery is still weak and dependent on economic policy support

Although the acute phase of the global financial crisis is now history,

4 The CNB lowered its monetary policy rate (the two-week repo rate) four times in 2009, by a total of 1.25 p.p. In the first few months of 2010, the CNB's monetary policy rate remained at 1%. At the beginning of May the monetary policy rate was cut further to 0.75%.

there are still many risks which could significantly slow the global economy or take it back into recession and which could cause the weak economic growth in Western economies to become a longer-term phenomenon. Concerns about a profound and protracted recession or depression subsided in mid-2009 and the uncertainty surrounding future economic growth decreased considerably both for the world economy as a whole and for the Czech economy (see Chart II.6). However, this cannot be interpreted as meaning that the risks associated with the fall in economic activity and its impact on the balance sheets of corporations, households, governments and subsequently financial institutions has disappeared. The current lower uncertainty regarding economic growth in advanced economies going forward simultaneously implies a high degree of agreement that the economic recovery will be slow and weak. There is also a broad consensus that the modest increase in economic activity ongoing since mid-2009 is based not only on renewed private sector confidence, but also on radical supportive economic policy measures.

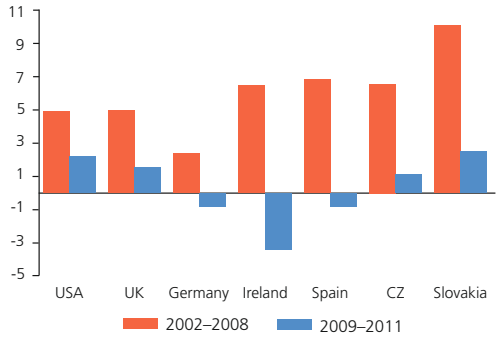
The need to reduce debt will have an adverse effect on demand

Demand in Western economies and particularly in the EU will be subdued in the long term by the need for economic agents to reduce their debt, which increased in virtually all sectors in the previous decade. Chart II.7 summarises gross debt levels in the form of loans received and bonds issued by individual sectors.[5] These sectors have many assets vis-à-vis other sectors and in some cases also vis-à-vis other countries and their net debts may thus be much lower. Owing to changes in market variables (property, stock, bond or currency prices), however, debtors in all sectors may be hit by an increase in the value of debt relative to assets either through a decrease in the value of assets (for example if stock or property market bubbles burst) or a rise in the value of debt (for example due to currency depreciation where the debt is issued in foreign currency). Similarly, a decrease in income in a situation where the debt level remains constant and interest rates fall much less than the rate of income growth can be a severe shock to debtors. Overall, therefore, the gross debt level can be one of the yardsticks for assessing the potential stress of debtors if the economy takes a turn for the worse. Even a small change in the parameters affecting the debt burden or the capacity to repay debts can have a relatively large impact on highly indebted sectors.

The overall indebtedness of economic sectors in the Czech economy is low relative to the per capita GDP level, but the output of the Czech economy may be indirectly adversely affected by its strong links with those euro area economies whose debt is high. However, the favourable situation of the Czech economy is being decreased by a rising investment position deficit (see Chart II.20) and lower financial strength to maintain market confidence owing to its lower per capita GDP relative to

CHART II.8

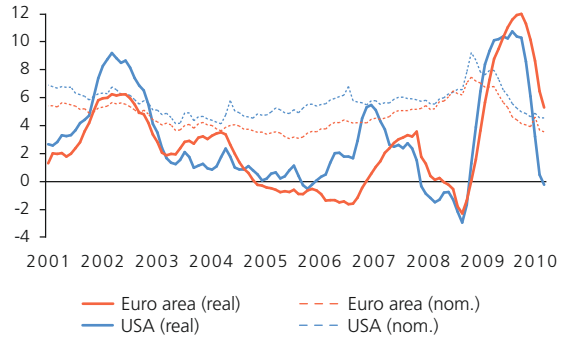
Nominal GDP and forecast for nominal GDP
(average year-on-year growth in %)



Source: IMF (World Economic Outlook, April 2010)

CHART II.9

Nominal and real interest rates on corporate debt in the euro area and USA
(%)

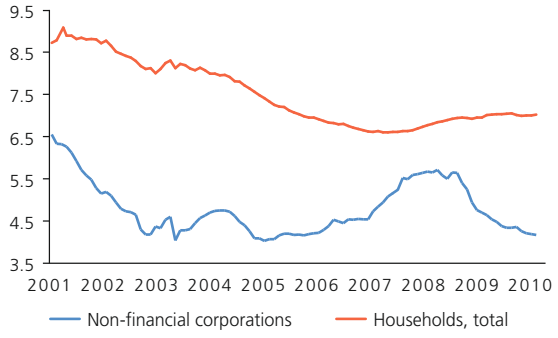


Source: Merrill Lynch Corporate Indices, Thomson Datastream
Note: Corporate bond yields in the euro area and the USA (adjusted for current producer price inflation in the case of real rates).

5 The data are taken from McKinsey (2010): *Debt and Deleveraging: The Global Credit Bubble and its Economic Consequences*, McKinsey Global Institute, January 2010.

CHART II.10

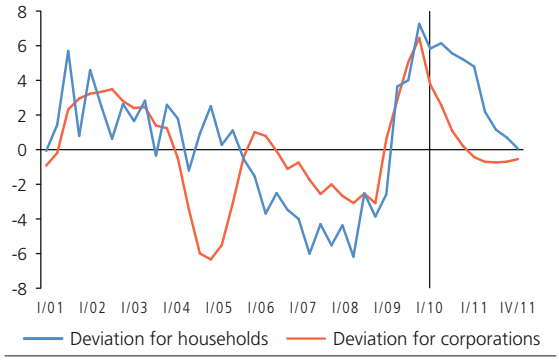
Interest rates on loans
(% p.a. on total stock of loans)



Source: CNB
Note: Interest rates on overdrafts are not included in the case of households

CHART II.11

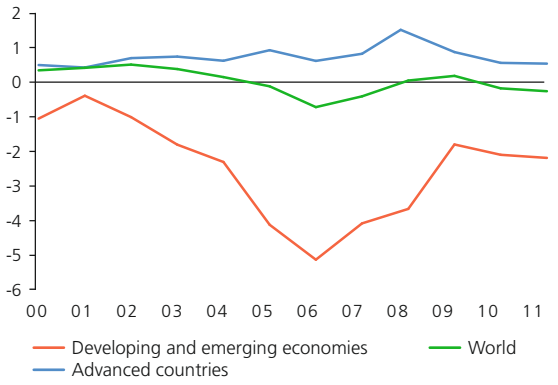
Approximation of deviation of real interest rates from the long-term average
(% p.a.)



Source: CNB

CHART II.12

Difference between investments and gross national savings
(% of GDP)



Source: IMF (World Economic Outlook, April 2010)

the advanced economies given in Chart II.7. It cannot be ruled out that household and corporate loan demand and subsequently also consumer and investment demand will fall significantly in countries with high debt levels. This factor is bolstering the strong downward revision of expectations regarding future income connected not only with lower sales of goods and services, but also with pressures on employees' wages and corporate selling prices. If we proxy income growth with nominal GDP, the 5–10% annual increases in nominal income seen for many years now would be replaced by a period of negative or very low growth in many countries (see Chart II.8). This could be a strongly adverse factor from the point of view of debt repayment ability.

The private sector will face higher real debt servicing costs

The financial condition of households and particularly of corporations could be favourably affected to a certain extent by a decline in nominal lending rates. Low nominal income growth rates mean, however, that real debt servicing costs may be very high for many indebted entities in the period ahead. This applies above all to sectors that had excess capacity in the previous period. Real interest rates on corporate loans in the euro area are still relatively high, while an upturn in industrial producer price inflation in the USA – generated also by depreciation of the dollar – has already led to a marked decline in real interest rates (see Chart II.9).[6] In the Czech Republic in 2009 average interest rates decreased only on loans to corporations, while those on loans to households showed a slight increase (see Chart II.10). Taking into account the evolution of prices and income in these sectors, we can state, however, that real debt servicing costs have increased and will probably remain high relative to the long-term average in 2010. They should return to their usual levels in 2011 (see Chart II.11)[7].

Banks in some countries may not have sufficient funds for lending

One of the most discussed factors that might hinder economic recovery in the EU in the coming period is banks' ability to meet the private sector's potentially renewed demand for loans. Banking sectors in many countries are still suffering from a shortage of funding liquidity, as indicated by excessively low deposit-to-credit ratios in some countries (see Chart IV.4). Many banks in these countries are thus still having to rely on funding obtained from central banks or through government-guaranteed bond issues. Although it can be assumed that governments and central banks will discontinue their support policies very slowly,

6 Real interest rates calculated as the difference between current rates on loans to corporations (or corporate bond yields) and current producer price inflation are a very rough approximation of real corporate debt costs. In economies importing energy-producing materials and commodities, an increase in the prices of these commodities can significantly distort the actual growth in producers' selling prices.

7 Real interest rates are approximated for the two main categories of loans of Czech banks (loans to households for house purchase and loans to corporations). Interest rates on loans for house purchase are adjusted for year-on-year growth in gross disposible income of households. Interest rates on loans to corporations are adjusted for industrial producer price inflation. The average is calculated for 2000–2009 and the outlook for 2010–2011 is created by using Baseline scenario data and by keeping interest rates constant at the December 2009 level.

banks in some countries may have difficulties refinancing their liabilities as a result of this exit.[8] The growing need of governments to raise funds to finance public deficits, which may start limiting the availability of funds for private sector financing and exert upward pressure on lending rates, is an ever increasing threat (see Box II.1).[9] The acuteness of this threat is only partially reduced by falling growth in demand for loans from private entities and a modest global excess of savings over investment, which should continue over the next two years (see Chart II.12).

Problems on the credit supply side may reduce economic potential

A marked change in loan dynamics occurred in 2009. Rates of growth of loans to the private sector were very low in Western economies and growth in loan portfolios virtually halted in some countries (see Chart II.13). Bank lending growth in the Czech economy stayed positive (see Chart II.14), but differed markedly across sectors (see sections 2.2 and 2.3). The sharp slowdown in lending activity in 2009 was due largely to a decline in private entities' demand for loans resulting from their lower economic activity and a sharp rise in uncertainty. If, however, the worse access to loans caused by the above supply-side factors on the part of banks persists in future years after demand for loans recovers, the financial conditions for households and corporations will deteriorate, negatively affecting consumer and investment demand. More costly and less available loans would also result in a slowdown in the creation of new supply capacity and in the postponement of the structural adjustment of economies. This would generate higher structural unemployment. Ultimately, it could significantly delay the return of economic activity to its previous path.

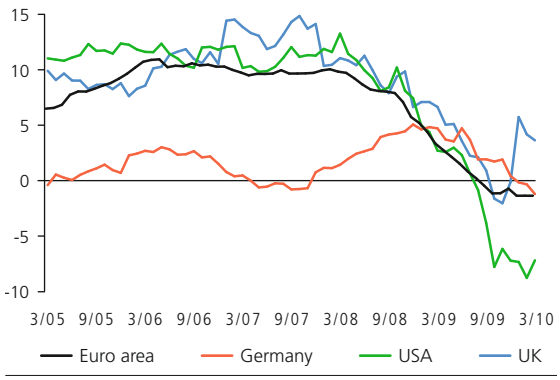
Insufficient capital and regulatory uncertainty are medium-term risks

A shortage of regulatory capital could gradually become an important barrier to lending to the private economy. This shortage could arise not only due to continued losses from NPLs and impaired securities, but also because of regulatory pressure to increase capitalisation. The behaviour of financial institutions may also be fundamentally affected by the high degree of uncertainty associated with planned international regulations and liquidity and capital requirements (see Box 6 in section 4.1). Over the next few years, when the new regulations and requirements will first be discussed, then enacted and then implemented, the uncertainty and administrative burden may be reflected not only in limited lending,

CHART II.13

Rates of growth of loans to the private sector in selected countries

(%)

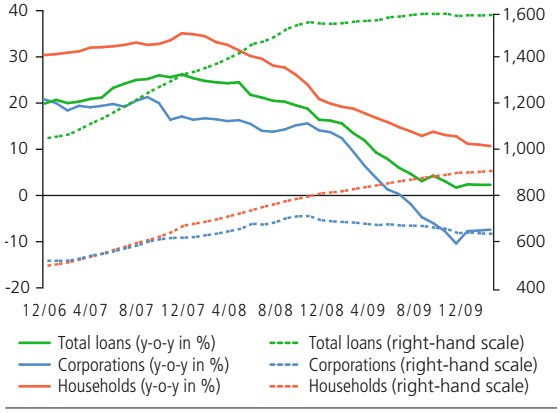


Source: Thomson Datastream

CHART II.14

Year-on-year growth rates and stocks of bank loans in the Czech Republic

(private sector; % and CZK billions)



Source: CNB

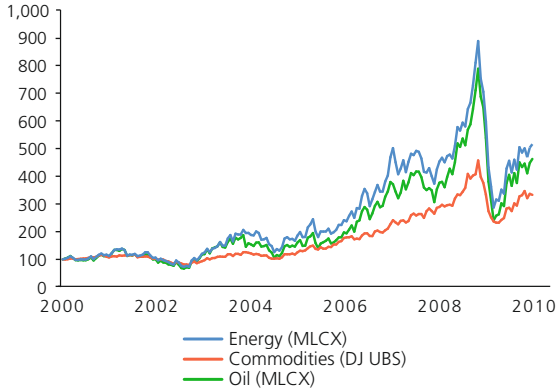
8 Concerns regarding the sufficiency of funds are also linked with other factors. One of these is that large international banks will have to refinance a large volume of maturing resources in the next few years. The IMF's Global Financial Stability Report (April 2010) estimates that debt securities worth almost USD 3,000 billion will mature in large European banks in the next three years. The complex situation for banks in some countries also stems from the fact that it remains difficult for them to acquire funds from the financial markets, as some market segments (particularly asset securitisation) are still not functioning properly and are still experiencing heightened risk aversion (see section 3.1).

9 Growth in long-term market rates would also lead to a rise in rates on house purchase loans. Combined with high unemployment, this would lead to an increase in housing loan defaults and in forced sales of property.

but also in a weaker focus on risk management as managers of financial institutions pay more attention to regulatory issues.

Chart II.15

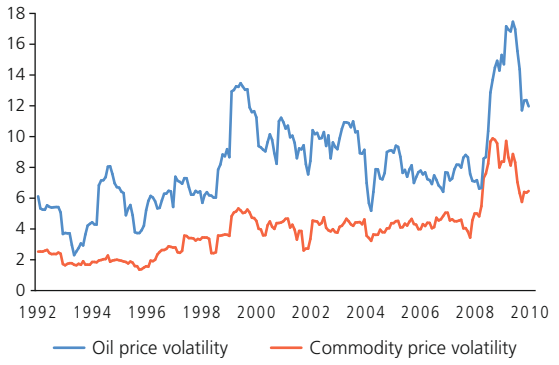
Energy and commodity price indices
(1995 = 100)



Source: Thomson Datastream

Chart II.16

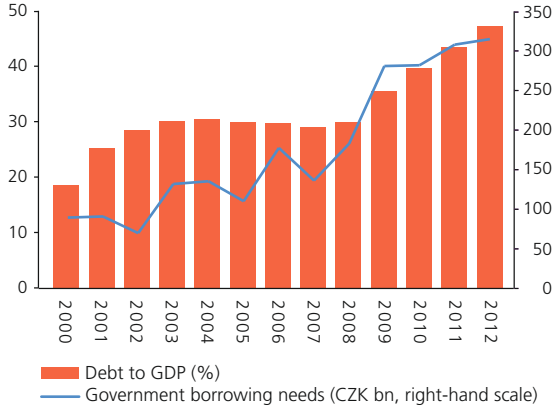
Energy and commodity price volatility
(standard deviations, moving 12M)



Source: Thomson Datastream
Note: MLCX Crude Oil Spot Index for oil, DJ UBS-Spot Commodity Index for commodities.

Chart II.17

Government debt-to-GDP ratio and gross government borrowing needs



Source: CZSO, CNB, MF CR
Note: CNB estimates used for debt-to-GDP ratio for 2010–2012 and MF CR estimates used for central government borrowing needs.

Growth in prices of commodities and energy-producing materials may become a major adverse factor

The reaction of commodity and energy-producing materials prices to the renewed increase in economic activity in Western economies and the continuing dynamic growth in Asian emerging economies represents a renewed risk. Prices of energy-producing materials remained at relatively high levels during the global recession (see Chart II.15). If the prospects for a recovery in Western economies lead to a renewal of their pre-crisis price levels, and if prices of other commodities increase as well, this would represent a negative supply shock for economies with weakened demand. Such a shock would lead to a downswing in economic activity and in cost-push inflationary pressures. It would also create a tricky situation for monetary authorities. If they responded to the cost-push inflation by raising interest rates, there would be another negative shock to demand. Risks related to energy and commodity prices are also being indicated by the increased volatility of these prices in recent years (see Chart II.16).

The risks related to Czech public finance are gradually rising

Owing to the decline in GDP and some budgetary measures, the public finance deficit increased by more than 3 p.p. to 5.9% of GDP in 2009. The rise in the deficit combined with a 1.5% decline in nominal GDP caused the government debt-to-GDP ratio to rise by more than 5 p.p. to 35.4% in 2009 (see Chart II.17). If further consolidation measures are not taken (beyond those effective since 2010), the public finance deficit will remain well above the Maastricht reference value in the coming years and government debt will exceed 47% of GDP at the end of 2012. This will be accompanied by increased issuance of government bonds in the financial markets (see Chart II.17). In 2007 the total gross government borrowing need had been CZK 135 billion, whereas in 2009 it was almost CZK 280 billion and from 2011 it is expected to exceed CZK 300 billion.[10] The financing of Czech government debt could proceed without any major difficulties in the next few years, however, as Czech banks have sufficient funds and face lower demand for loans by corporations. Moreover, foreign investors diversifying their bond portfolios may be interested in buying the debt of stabilised non-euro area countries in addition to euro area countries' bonds. It cannot be ruled out, however, that the issuing conditions will deteriorate unexpectedly as a result of increased nervousness in the financial markets in the event of difficulties in other countries (as was the case in the southern periphery of the euro area at the end of April 2010) or that domestic banks will decide to diversify their public debt holdings internationally.

10 For details see the Czech Ministry of Finance document *Funding and Debt Management Strategy for 2010*, December 2009.

Should the Czech Republic be exposed to protracted weak economic growth and solve its tricky fiscal situation by increasing government debt and raising taxes and social security contributions, it may gradually become a stagnating, high-cost economy which is viewed as risky. As a result, its long-term potential would deteriorate, its capacity to repay its accumulated debts[11] would decrease, its financial sector's ability to withstand risks would fall and its external balance would deteriorate. For this reason, credible fiscal consolidation focused on the expenditure side of public finance should become a priority in the present situation. Further budget-intensive fiscal expansion would probably be of limited effectiveness and could undermine confidence in Czech public finance sustainability (see Box 1) and ultimately also external economic stability and financial system stability (see section 4.2).

Box 1:

PUBLIC FINANCE SUSTAINABILITY FROM THE INTERNATIONAL PERSPECTIVE

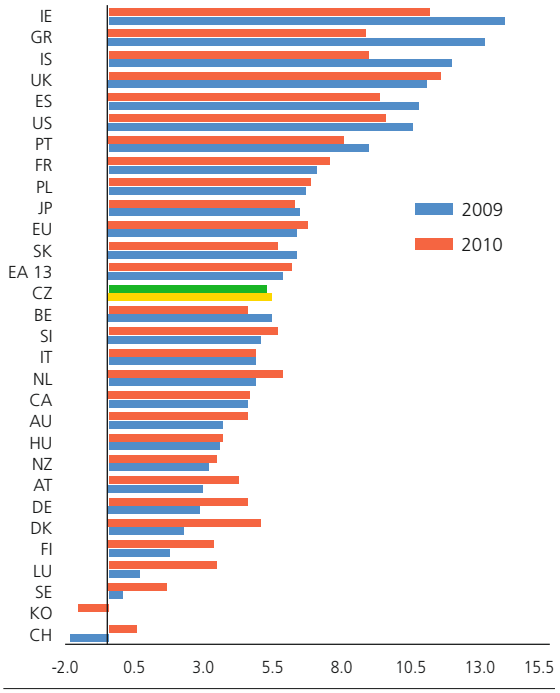
High public finance deficits (see Chart II.1 Box) and sharply rising government debt in advanced countries (see Chart II.2 Box) are the main risks to financial stability going forward. The last decade is exceptional in that government debts and the structural public finance problems were already increasing in advanced countries in the years of strong economic growth before the crisis. During the crisis, tax income fell sharply, most governments spent vast amounts of public money on demand-oriented anti-recession measures (beyond automatic stabilisers) and some governments were also forced to use public funds to solve problems in their financial systems. Part of credit risk was also shifted from banks to governments by the fact that governments provided large guarantees for bank bond issues and implicitly for bank deposits. Although these guarantees do not primarily lead to any payments from government funds and to any rise in deficits, they pose a significant risk.

The high deficits are being reflected in a greatly increased government debt level, which will very probably approach 100% of GDP in many advanced countries after 2011. In some countries, including the USA, this limit will be exceeded. Financing the rising debt will drain large amounts of funds from the international financial markets. In the event of a loss of confidence in the ability of some governments to continue financing their debts smoothly, adverse impacts could arise in the form of rising long-term interest rates even in relatively stable countries such as the Czech Republic whose government debt is

11 On the basis of projections of economic growth and interest rates on public debt, a Deutsche Bank study ranks the Czech Republic among the countries with potentially the highest need for consolidation measures if public debt is to be kept at a sustainable level. See Deutsche Bank (2010): *Public Debt in 2020. A Sustainability Analysis for DM and EM Economies.*

CHART II.1 BOX

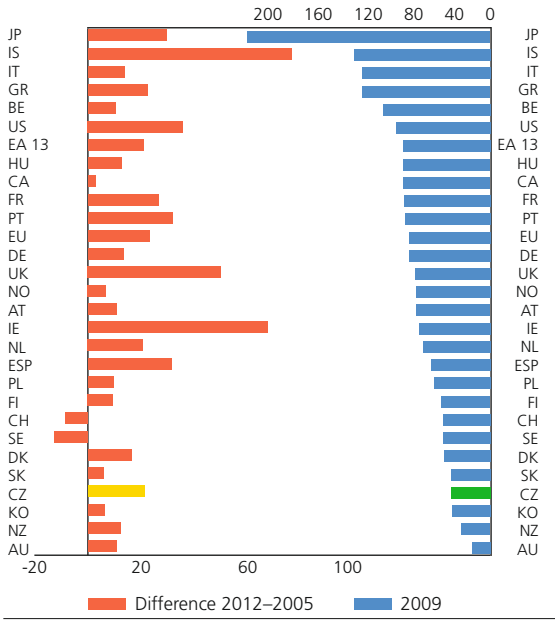
Public finance deficits of advanced countries in 2009 and 2010
(% of GDP)



Source: ECB, IMF
Note: Excludes Norway, which reports high surpluses (9.7% in 2009 and 10.8% in 2010).

CHART II.2 BOX

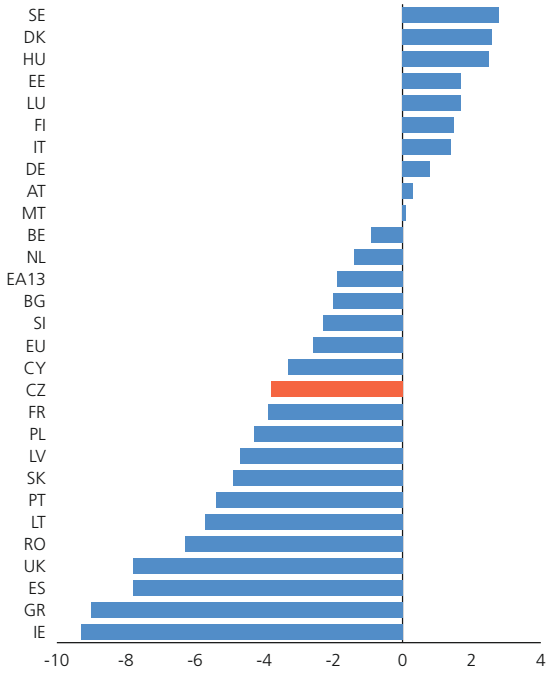
Government debt-to-GDP ratios
(%; 2009 and estimates of change between 2005 and 2012)



Source: OECD, EC

CHART II.3 BOX

Cyclically adjusted primary budget balances in the EU
(2009; % of GDP)



Source: EC
Note: European Economic Forecast, Spring 2010

not yet so high. The increased long-term interest rate volatility could then generate higher exchange rate volatility via capital flows. Last but not least, countries with higher government debt levels would be permanently exposed to the risk of contagion from other countries whose debt position sustainability comes into question. This was confirmed at the end of April 2010, when Greece's problems spilled over to Portugal and Spain. Another clear lesson from the Greek crisis is that financial markets are asymmetrically far less tolerant to small countries showing public finance deficits than to large ones.

The increased and rising government demand for savings in the coming years may thus lead not only to rising interest rates on government bonds, but also to limited availability of lending resources for the private sector and to rising interest rates on loans to corporations and households. The fiscal problems will then be further escalated directly by an increase in interest rates on government bonds and indirectly by a decline in economic activity due to "costly" loans to the private sector through a worsening of the budget revenue side.[12]

In a situation of slow economic growth and rising government debt financing costs, the fiscal sustainability of governments of advanced countries is becoming a significant challenge for many advanced countries, which need to undertake fundamental structural reforms. These reforms must necessarily involve a pronounced decrease in primary public budget deficits (i.e. deficits excluding debt servicing interest costs).[13] This will be accompanied, at least initially, by a negative demand shock weakening economic growth. Without credible fiscal consolidation, however, the negative demand shock would ultimately happen anyway via rising interest rates due to the increased risk of government default on bond redemption, to the crowding-out effect of government demand for savings or to growth in inflation expectations and the related responses from central banks. In other words, the supportive fiscal policies are having two contrary effects – one increasing demand via government and private expenditure and the other pushing it down via higher lending rates. In a situation of rising debt and heightened nervousness in the financial markets, the overall effect of the supportive fiscal policies may be negative, particularly

12 Greece found itself in this situation in 2010. The country's imprudent fiscal policy was masked for a time by high demand for government bonds linked with banks' ability to obtain liquidity through operations with the ECB. Banks demanded government bonds of their countries and then used them as collateral in operations with the ECB. Not surprisingly, Greek banks were very active in this practice and Greece experienced the highest net increase in liquidity supply in the euro area in 2006–2009 (see Chart 1.19 on p. 22 of the IMF's Global Financial Stability Report, April 2010).

13 For example, for the Czech government debt-to-GDP ratio to stabilise at levels just above 40% after 2011, the cyclically adjusted primary deficit (estimated at roughly 3% in 2009) would probably have to decrease to almost zero. Given the present expectations of future macroeconomic trends, this would require a reduction in expenditure, an increase in taxes, or a combination of the two of around CZK 100 billion.

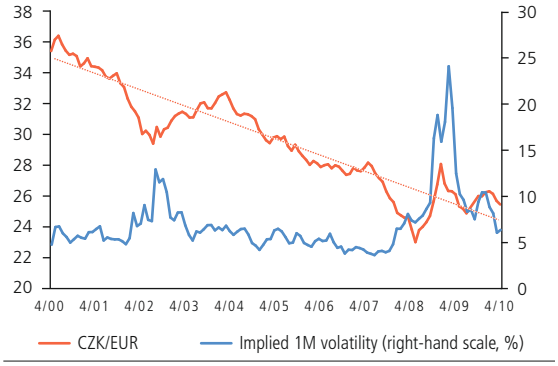
for small open economies, even in the relatively short term.[14] This risk is another argument for relatively fast and maximally credible progress with fiscal consolidation.

By international comparison within the group of advanced countries, Czech public finance still seems relatively sound and less vulnerable to changes in sentiment in international financial markets. As regards deficits, the Czech Republic in 2009 ranked among the advanced economies with lower deficits (see Chart II.1 Box) and this is likely to remain the case in 2010. Similar or better values compared to the relevant groups of countries can be found for the Czech Republic in the case of other fiscal indicators as well. At the end of last year the share of debt held by foreign creditors was 10% (euro area average 44%, Greece 79%), the share of short-term debt with maturity of up to one year was 14.7% (euro area average 13.3%), the share of the foreign currency component of the debt was 8.6% (non-euro area countries 40%) and debt servicing costs were 1.4% of GDP[15] (euro area average 3%).

Based on the above data, the Czech government debt may currently seem relatively problem-free, but its fast rate of growth is a warning signal from the medium-term perspective. In recent years, the Czech Republic has belonged to the group of countries with a rapidly rising gross government debt-to-GDP ratio (see Chart II.2 Box). The worsening fiscal trend in the Czech Republic is also indicated by the estimated cyclically adjusted primary public finance balance, which was higher for the Czech Republic than the EU and euro area averages in 2009 (see Chart II.3 Box). In this situation, the view of Czech public finance sustainability could change fundamentally in a negative direction in just a few years' time.

Chart II.18

The koruna exchange rate and its volatility



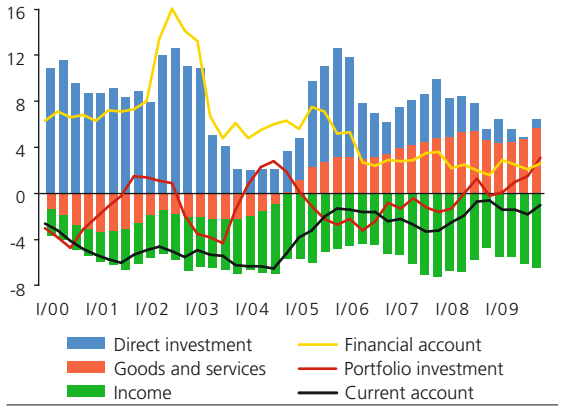
Source: CNB calculation based on CNB data
Note: The dotted line shows the long-term trend.

14 New empirical analyses dealing with governments' expansionary expenditure policy have found that its effectiveness is decreasing (see, for example, Burriel, P., de Castro, F., Garrote, D., Gordo, E., Paredes, J., Pérez, J. (2009): *Fiscal Policy Shocks in the Euro Area and the US. An Empirical Assessment*, ECB Working Paper 1133, December 2009, or Kirchner, M., Cimadomo, J., Hauptmeier, S. (2010): *Transmission of Government Spending Shocks in the Euro Area: Time Variation and Driving Forces*, Tinbergen Institute Discussion Paper 10-021/2, February 2010. Government expenditure multipliers are usually less than one even in the short run and fall to zero or turn negative in just a few years. The multipliers also decrease with growing government debt. These results suggest that although fiscal consolidation based on government expenditure cuts will have a negative effect on economic growth in the short term, this effect will be quite limited and short-lived. In countries with high government debt it may even be positive in the short run.

15 The net interest costs of servicing the Czech national debt calculated on a cash basis were CZK 45 billion last year, at an average interest rate of just under 4%.

CHART II.19

The balance of payments
(% of GDP)



Source: CZSO, CNB
Note: Annual moving totals of balance of payments components and nominal GDP.

TABLE II.1

FINANCING OF THE EXTERNAL POSITION OF THE CZECH ECONOMY

CZK billions	2009	2010	2011
Financing of current account	*-30*	*-30*	*-35*
– current account (deficit)	37	40	50
– reinvested earnings	-67	-70	-85
Amortisation of external debt	*135*	*95*	*137*
– debt service	174	142	192
– interest paid	-39	-47	-42
*Short-term debt as of 31 December 2009**	*499*	*417*	*417*
Capital account surplus	*-41*	*-38*	*-38*
Financing need in CZK billions	***563***	***444***	***481***
Financing need in USD billions **	***29.9***	***23.6***	***25.6***
FX reserves (as of 31 December 2009)	764	764	764
FX reserves***/financing need	136 %	172 %	159 %

Source: CNB
Note: Current account and reinvested earnings – CNB May 2010 forecast.
Data on debt amortisation – CNB estimate based on an analysis of the Czech Republic's investment position.
The financing need is made up of the items in italics (interest paid is already included in the current account).
* Short-term debt as of 31 December 2008 used for 2009.
** Calculations based on average exchange rate for February 2010 (18.82 CZK/USD).
*** FX reserves level as of 31 December 2009 (CZK 764 billion) used in each case.

A fundamentally unjustified appreciation of the koruna is still a significant risk

The stabilisation of the macroeconomic environment in 2009 was also fostered by a calming of the situation in the currency markets. From August 2007 to August 2008 the koruna sharply appreciated, but in mid-September 2008, after the collapse of Lehman Brothers, it strongly depreciated. This was due to a sharp growth in aversion to the risks of CEE countries. However, thanks in part to extensive communication by the Czech authorities, investors relatively quickly included the Czech Republic in the category of sound advanced economies. The koruna then eliminated a large part of its depreciation and since spring 2009 has remained relatively stable – despite occasional fluctuations – at levels that can be considered consistent with the fundamental characteristics of the Czech economy and the long-term trend (see Chart II.18). The partial weakening from the excessively strong pre-crisis levels helped domestic corporations to cope with the effects of the fall in external demand (see the assessment of developments in the exporter segment in section 2.2). According to prevailing market expectations, the koruna will appreciate very slowly in the period ahead. A survey of forecasts of world analysts and forecasters in *Foreign Exchange Consensus Forecasts* in April 2010 stated that the koruna-euro exchange rate is expected to be 25.24 at the end of July 2010 and 24.61 at the end of April 2011 (18.83 and 18.56 respectively for the koruna-dollar exchange rate).

A potential renewed and fundamentally unjustified appreciation of the koruna associated with a renewed search for yield by investors must be regarded as an ever-present risk. This risk can be derived from historical experience and also from the fact that from the macroeconomic point of view the Czech economy is highly stable and even its public finances may seem relatively sound (see Box II.1).

External stability remains a strong point of the domestic economy in the short run

The external stability of the Czech economy strengthened during 2009, and this trend should continue over the next two years. Thanks mainly to an increase in the trade surplus, the current account deficit decreased to 1% of GDP (see Chart II.19). Assuming exchange rate stability, the CNB expects it to stay close to this level in 2010 and 2011 (1.1% and 1.3% of GDP respectively). Trade in goods and services will then be in a sizeable surplus. So, including the capital account surplus associated with the positive net flows between the Czech Republic and the EU, the overall external financing need will only slightly exceed the short-term debt level, which, in a standard situation, can be financed largely from short-term external assets of the private sector.

Compared to 2009, the total need will thus decrease in the next two years[16] (see Table II.1). Nevertheless, the investment position recorded a deterioration, which deepened further in 2009. Including the net FDI inflow, however, it remains at the positive levels usually seen in previous years (see Chart II.20). The situation is similar for gross external debt, which continues to be 80% covered by banking sector assets and more than 60% covered by net foreign assets (see Chart II.21). The Czech economy thus remains highly stable as regards its external balance.

Alternative economic scenarios

Potential alternative future macroeconomic paths together with the risks identified became the basis for the alternative economic scenarios used in section 4.2 to test the resilience of the Czech financial sector. The paths of key variables in each scenario are shown in Charts II.22a–d. The evolution of other variables relevant to the stress tests in relation to the evolution of the macroeconomic environment (credit growth, the default rate, the NPL ratio[17] and property prices) will be presented for each scenario in the following sections of this Report.

The ***Baseline Scenario*** corresponds to the CNB's official May macroeconomic forecast published in Inflation Report II/2010. It predicts a gradual recovery of the real economy, which will be temporarily interrupted in the second half of this year and renewed in the second half of 2011. The scenario also assumes that monetary-policy relevant inflation will return to the inflation target from below over the entire forecast horizon, the exchange rate will be stable with a modest appreciation in 2011 and short-term interest rates will gradually increase.

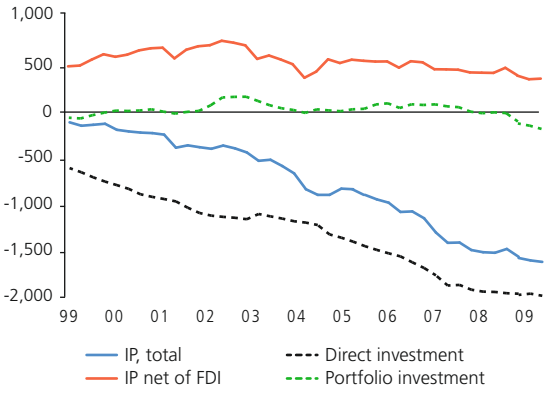
The ***Return of Recession*** stress scenario captures the risk of a longer-lasting W-shaped recession, i.e. a further substantial decline in GDP in 2010 and partly also in 2011. The fall in domestic GDP will be generated mainly by a greater weakening of external demand (for example due to inappropriately selected exit strategies from support policies in the major economies). Domestic corporations and households will be faced with an adverse trend in their income, reflected in a decline in consumption and investment. The exchange rate will remain broadly stable. Given the very weak inflationary pressures, short-term interest rates will be at very low levels. Increased financial market sensitivity to foreign and domestic fiscal risks will, however, prevent a decline in both long-term interest rates and rates on client loans.

16 Gross external financing need is calculated as the sum of the current account deficit, repayments of long-term external debt principal and existing short-term external debt. It is an approximation of the amount of foreign currency funds to cover the estimated external financing need in the given year. The calculation of the external financing need is part of the analyses of the sustainability of the external balance of the economy. For more details see Financial Stability Report 2008/2009, Box 1.

17 Both the default rate and NPL ratio relate to an identical event, i.e. a breakdown in a debtor's payment discipline. Whereas the default rate is a (usually forward-looking) flow indicator focused on a particular time interval (see the Glossary), the NPL ratio is a stock indicator describing the level of NPLs at a given point in time.

Chart II.20

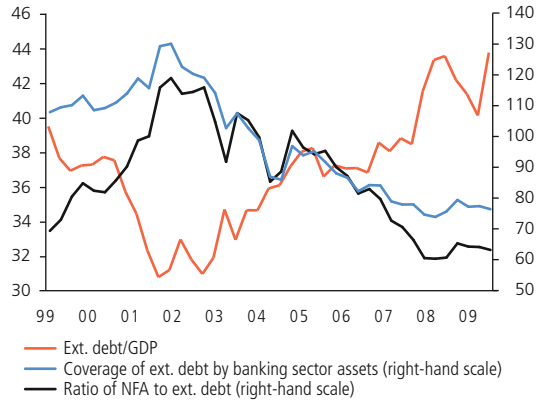
The investment position of the Czech Republic
(CZK billions)



Source: CNB

Chart II.21

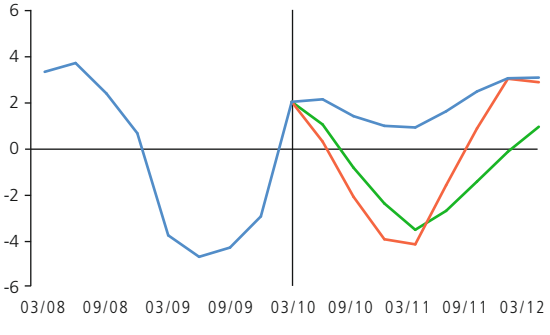
Ratio of the gross external debt of the Czech Republic to GDP and its coverage by the external assets of financial institutions
(%)



Source: CNB
Note: Assets of the banking sector (including the CNB) and net external assets of the financial sector.

Chart II.22a

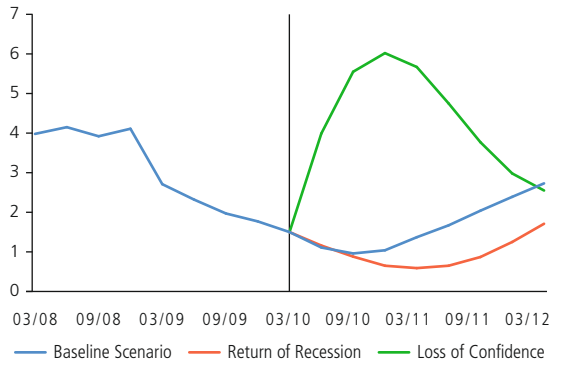
Alternative scenarios: real GDP growth
(%)



Source: CNB

CHART II.22B

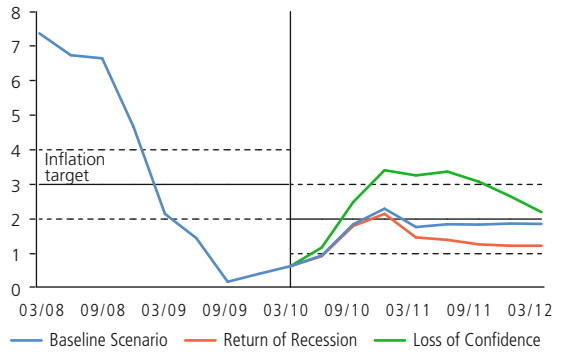
Alternative scenarios: 3M PRIBOR
(%)



Source: CNB

CHART II.22C

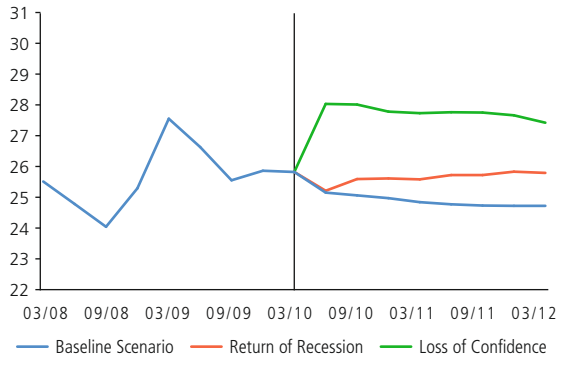
Alternative scenarios: inflation
(%)



Source: CNB

CHART II.22D

Alternative scenarios: exchange rate
(CZK/EUR)



Source: CNB

The ***Loss of Confidence*** stress scenario simulates the potential combination of weak economic growth (relative to the *Baseline Scenario*) and adverse developments in the financial markets and subsequently also in the financial sector. The Czech economy will slide back into a relatively strong recession, which will exacerbate its public budget problems. Concerns about public finance sustainability will generate a negative reaction from the financial markets. There will be a loss of investor confidence, the yields demanded on Czech government bonds will increase and the koruna will depreciate sharply. This depreciation will lead to a sizeable rise in potential inflationary pressures, to which monetary policy-makers will react by raising short-term interest rates. Client interest rates will thus also rise significantly. This, together with the unfavourable income situation and growing unemployment, will be reflected in a rise in corporate and household defaults. At the same time, owing to pessimistic expectations, the property market situation will start to deteriorate markedly in excess of the projection, depending on the evolution of the macroeconomic environment (see section 3.2). A weak economic recovery will start towards the end of 2011.

2.2 NON-FINANCIAL CORPORATIONS

The situation in the corporate sector worsened significantly in 2009 compared to previous years. However, some indicators in recent months are suggesting a modest recovery and a start of a reversal in the negative trend. A possible return of recession in Western European countries is still the biggest risk to the corporate sector.

Corporations' financial results deteriorated in 2009

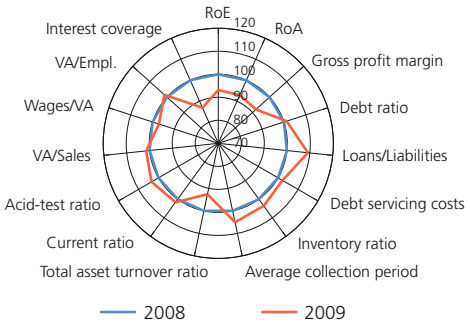
Corporations faced a dramatic fall in external and later also domestic demand, especially in 2009 H1. This was reflected in their financial results for 2009. However, the economic decline hit corporations with varying intensity. Large foreign-controlled corporations coped best and were even able to slightly increase their profits compared to the previous year. They were probably aided in this by measures such as car-scrapping incentives introduced in some European countries. By contrast, domestically controlled corporations recorded a year-on-year decline in profit. Overall, the corporate sector's profit fell slightly year on year and its profitability indicators worsened. Corporate solvency, which had also deteriorated at the start of the economic crisis, started to improve gradually in late 2009 and showed a year-on-year increase thanks mainly to a fall in short-term liabilities. Some improving indicators of the activity of non-financial corporations also suggest a potential positive change in economic trend (see Chart II.23).

The negative output gap is exerting upward pressure on credit risk and unemployment

Corporations responded to the negative demand shock by cutting costs, production, margins and prices (see Box 2). This reaction, creating an environment characterised by very slow nominal income growth, reflects the formation of a wide actual or perceived negative output gap. Those corporations which invested in the Czech Republic for example around 2005 – in line with the optimistic expectations following EU entry and assuming that annual real GDP growth rate would be 5% in future years – will probably be confronted with substantially lower output levels. If real GDP grows in future years according to the *Return of Recession* and *Loss of Confidence* stress scenarios (see the end of section 2.1), the gap between actual and originally estimated potential GDP will reach even 20% by the end of 2011 (see Chart II.24). The difference between the previously expected and subsequently lower sales will generate risks associated with the repayment of loans obtained in the pre-crisis rapid economic growth phase. It will also result in further growth in unemployment owing to dismissals of employees that corporations are currently employing in the hope of a recovery in demand. This may increase credit risk in the segment of loans to households (see section 2.3).

CHART II.23

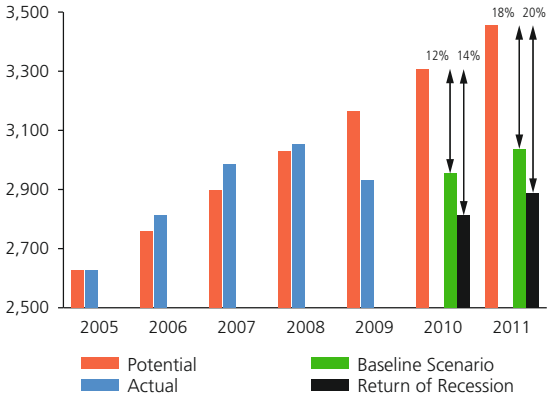
Key financial indicators for non-financial corporations
(2008 = 100; index > 100 = improvement; index < 100 = deterioration)



Source: CZSO, CNB

CHART II.24

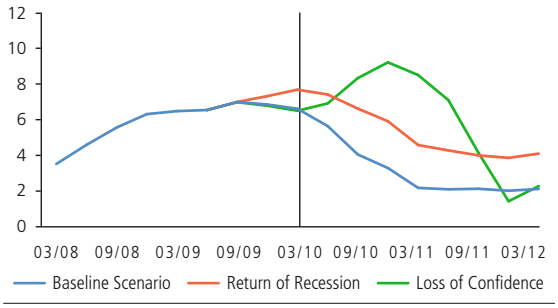
Potential and actual GDP according to 2005 expectations compared to the alternative scenarios
(CZK billions; constant prices)



Source: CNB

CHART II.25

12-month default rate on bank loans to corporations
(%)



Source: CNB
Note: Given that the 12M default rate is calculated as a forward-looking indicator, the values for the individual scenarios differ from 2009 Q3 onwards.

TABLE II.1 BOX

COMPANIES HIT STRONGLY OR VERY STRONGLY BY THE ECONOMIC CRISIS IN INDIVIDUAL AREAS
(weighted proportion of responses in %)

	Reduced demand for products and/or services	Problems financing activities through usual financial channels	Customer payment problems
Total	**52.1**	**27.2**	**34.4**
manufacturing	66.4	30.9	36.3
other industries*	37.0	23.4	32.4
small enterprises	37.2	31.2	45.1
medium-sized enterprises	52.0	22.5	40.0
large enterprises	55.9	28.7	29.0
exporters	75.4	29.1	31.6
non-exporters	41.0	26.1	36.1

Source: CNB
Note: * construction, trade, hotels and restaurants, transport and communication, and real estate, rental and business activities.
Small enterprises (20–49 employees), medium-sized enterprises (50–199 employees), large enterprises (200 employees or more).
Exporters: Companies that obtained more than half of their income from the sale of their main product in 2006 through sales in foreign markets.

TABLE II.2 BOX

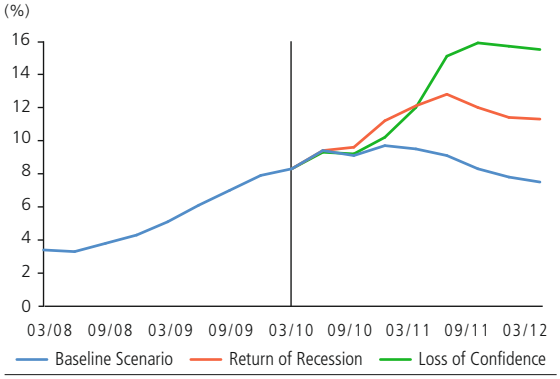
IF THE REDUCTION OF COSTS IS OF ANY RELEVANCE WHEN YOUR FIRM FACES A SLOWDOWN IN DEMAND, HOW IS THIS GOAL ACHIEVED?
(weighted proportion of responses in %)

	2007	2009
Reduce base wages	0.0	3.9
Reduce flexible wage components	18.3	25.1
Reduce the number of permanent employees	18.7	42.9
Reduce the number of temporary or other employees	26.6	37.5
Adjust the number of hours worked per employee	3.5	12.2
Reduce non-labour costs	42.4	54.6

Source: CNB
Note: Reactions to current crisis; responses obtained in June and July 2009 (2009 column). Responses to hypothetical question about how firms react to a negative demand shock, obtained in autumn 2007 (2007 column).

CHART II.26

NPL ratio for bank loans in the non-financial corporations segment
(%)



Source: CNB

Box 2:

CORPORATIONS' RESPONSE TO THE ECONOMIC CRISIS

In September and October 2007 the CNB conducted a business survey on wage and price-setting behaviour.[18] A total of 399 firms from the business sector (excluding power generation and financial intermediation) with 20 or more employees took part in the survey. These firms were contacted again in June and July 2009 and asked to answer several questions in order to obtain information about the impact of the financial and economic crisis on corporations and about corporations' cost-cutting reaction.[19] In all, 241 corporations responded to the survey update.

The crisis had hit corporations primarily through lower demand. The risks of secondary insolvency and a credit crunch were also high in the corporate sector, but less significant than the factor of lower demand (see Table II.1 Box). 52% of corporations had been hit strongly or very strongly in the area of demand, 34% were experiencing strong or very strong customer payment problems, and 27% were having problems financing activities through the usual financial channels. The results also showed that the manufacturing corporations, large enterprises and exporters had been affected more strongly by lower demand. By contrast, small enterprises had been hit harder by secondary insolvency risk.

Corporations had responded to the crisis most frequently by cutting costs (89% of corporations). In addition to cost cuts, 49% of corporations had reduced production, 40% had lowered margins and 34% had accepted lower prices. Compared to the original 2007 survey, when corporations had answered how they would react to an unexpected drop in demand, they had responded less often with price and margin cuts in the actual crisis.[20]

Other data (see Table II.2 Box) reveal that the most important cost-cutting strategy was a reduction in non-labour costs (55% of corporations). Labour costs had been cut by reducing the number of permanent (43%) and temporary employees (38%) and also by cutting the number of hours worked per employee (12%). A quarter of corporations had cut bonuses and 4% had reduced base wages.

18 The survey results are given in Babecký, J., Dybczak, K., Galuščák, K. (2008): *Survey on Wage and Price Formation of Czech Firms*, CNB Working Paper 12/2008.
19 Some of the questions were intentionally left the same as in the original 2007 survey to enable an assessment of how corporations were reacting to the lower demand during the crisis compared to their intended reaction to unexpectedly weaker demand in a standard situation.
20 According to the original 2007 survey, 51% of corporations would have reacted to an unexpected fall in demand by cutting prices and 54% by reducing margins.

Credit risk increased

A pronounced increase in corporate sector credit risk is evidenced by the 12-month default rate,[21] which increased in 2009 H2 (see Chart II.25). However, it should gradually decrease over the two-year horizon for the *Baseline Scenario* according to the CNB's internal model and stabilise at levels around 2%, which corresponds to the 2007 average.[22] This is also reflected in an increase in the share of non-performing bank loans, which are rising during 2010 in all the scenarios considered (see Chart II.26). Nonetheless, the widely used leading indicator of corporate sector creditworthiness indicates an overall deterioration of the financial soundness of corporations over the one-year horizon (see Chart II.27).[23]

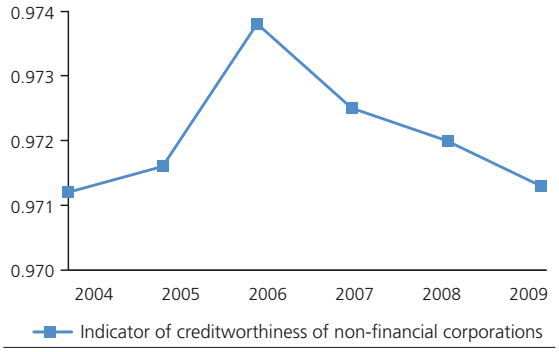
Worse corporate solvency is also indicated by a rising number of insolvency petitions filed in 2009 (see Chart II.28).[24] The CNB's internal model[25] indicates, however, that the number of insolvency petitions filed should decrease slightly in the period ahead for the *Baseline Scenario*. The annual rise in insolvencies in the Czech Republic (57%) was more than twice the average in Western European countries (22%), but much lower than in the Western European countries hit hardest by the crisis – Spain (94%) and Ireland (81%).

The recession is affecting export-oriented firms in particular

The negative demand shock had a major effect on export-oriented firms. Lower sales compared to the very optimistic pre-crisis expectations were reflected in loan repayment problems for many exporters. This led to faster growth in the non-performing bank loan ratio compared to the non-financial corporations sector as a whole (see Chart II.29). The pre-crisis values of this indicator had been much lower for exporters than for the overall non-financial corporations sector, but the trend reversed at the end of 2009 (8.25% for the 700 largest export-oriented firms compared to 7.8% for the sector as a whole). The available data from the Central Credit Register also suggest that exporters are dealing with exchange rate volatility through natural hedging to a greater extent

CHART II.27

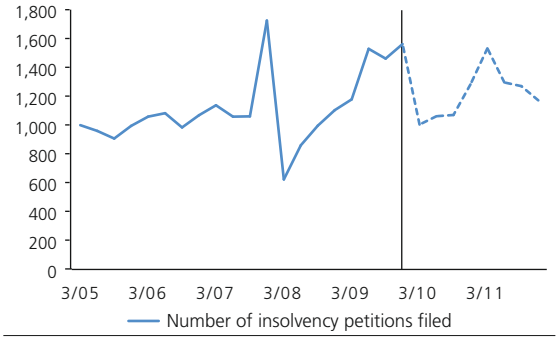
Indicator of creditworthiness of non-financial corporations



Source: CNB

CHART II.28

Corporate insolvencies

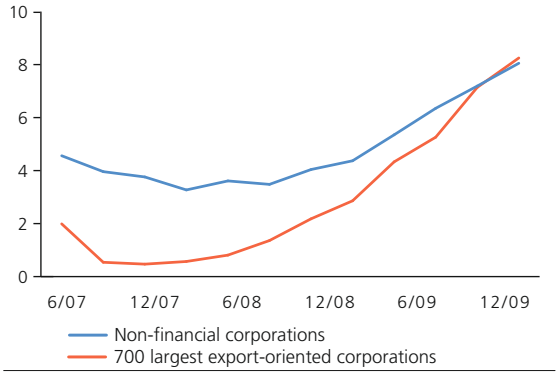


Source: Czech Ministry of Justice, CNB
Note: A new insolvency act took effect on 1 January 2008.

CHART II.29

Non-performing bank loan ratio

(%)



Source: CNB (CCR)

21 Compared to Financial Stability Report 2008/2009, a methodological change has been made in the calculation of this indicator (see section 4.2).

22 The main macroeconomic factors used in the corporate sector default rate model are the change in GDP, external demand, investment, the exchange rate and inflation. The cost side of non-financial corporations' balance sheets in the model is represented by the change in interest rates.

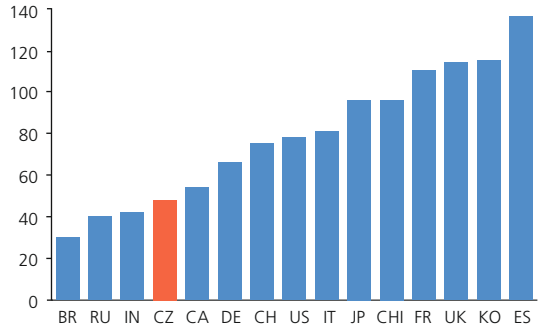
23 This indicator, based on financial indicators covering the profitability, indebtedness, liquidity and activity of firms, evaluates corporations' resilience to potential bankruptcy over the next 12 months – see Jakubík, P., Teplý, P. (2008): *Scoring as an Indicator of Financial Stability*, Financial Stability Report 2007, CNB, pp. 76–85.

24 The history of insolvencies in 2008 and partly also in early 2009 was affected by a new insolvency act. The postponement of its date of effect from June 2007 to January 2008 led to an extraordinary number of petitions being filed at the end of 2007. Many firms and creditors were probably waiting for the new act before filing their petitions but were ultimately probably unable to delay it any longer and so an unusually large number of petitions was filed at the end of the year.

25 The model of the number of insolvencies in the economy uses consumption and investment growth, change in external demand, real interest rates, change in the real exchange rate and change in real wage costs. For more details on the model estimation methodology, see Jakubík, P., Seidler, J. (2009): *Corporate insolvency and its macroeconomic determinants* (in Czech), Ekonomický časopis, No. 7, Vol. 57, pp. 619–633.

Chart II.30

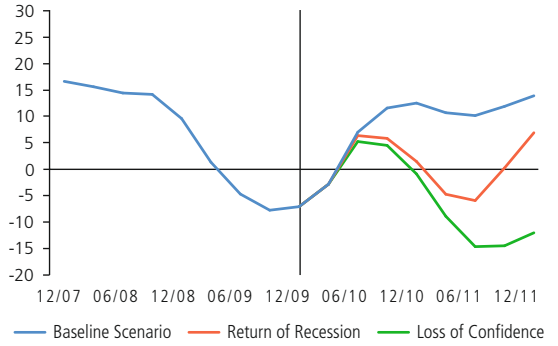
International comparison of ratios of debt of non-financial corporations to GDP
(2008 data; % of GDP)



Source: CNB, McKinsey

Chart II.31

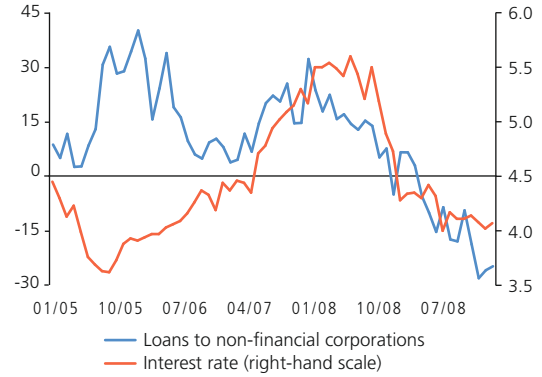
Year-on-year growth in loans to non-financial corporations
(%)



Source: CNB

Chart II.32

Loans to non-financial corporations
(new business; y-o-y growth in % and interest rate in %)



Source: CNB

than in the past. The share of foreign currency bank loans in total loans received by the 700 largest export-oriented firms was about 38% at the end of 2009 (compared to less than 34% at the end of 2007), which is about double the average for the non-financial corporations sector.

The aggregate corporate debt ratio is still relatively low in international terms

Corporate credit risk is being partly moderated by a modest year-on-year decline in corporations' average debt due to falling short-term liabilities and rising equity. The ratio of net debt (loans + bonds – financial assets) to EBITDA decreased year on year (6.6% in 2009 compared to 7.1% in 2008). Similarly, the net debt ratio to PBTDA dropped to 7% in 2009 from 7.4% in 2008. However, the average ratio of debt to income (EBIT) increased slightly (to 2.1% in 2009 from 1.9% in 2008), while the average debt-to-sales ratio was stable (at roughly 11% in both 2009 and 2008). By contrast, estimated nominal debt servicing costs fell year on year. This was facilitated by a reduction in interest rates on corporate loans in 2009 (see Chart II.23). Conversely, the ratio of interest paid to income (EBIT) generated rose to 9% in 2009 (from 7.8% in 2008). At the end of 2009, the aggregate debt ratio of non-financial corporations decreased in relation to both GDP (46% in 2009 as against 48% in 2008) and the sector's total financial assets (39% in 2009 as against 40% in 2008). The debt of the Czech corporate sector thus remains relatively low in international terms (see Chart II.30).

The slowdown in corporate loans is primarily due to falling demand for operating loans

The weaker economic activity and tighter non-interest lending standards were reflected in a decrease in the rate of growth of bank loans in the corporate sector despite falling interest rates (see Charts II.31 and II.32). This was due mostly to a decline in short-term loans, linked mainly with falling production and declining demand for operating loans. The available data also indicate that corporations partly replaced bank loans and loans from other financial intermediaries with borrowings from affiliates and – in the case of large corporations – also by bond issues of their own.[26] The overall slowdown in corporate loans was thus not as significant as the data on bank loans might suggest. One risk generated partially by corporations' worse access to loans is that of delayed payments to trading partners, which may in turn generate secondary corporate insolvency. However, the average delay in payments in the Czech Republic in 2009 was comparable with that in Germany and much lower than in some CEE countries.[27] From this perspective, the risk of secondary insolvency of Czech corporations currently appears to be quite low.

26 Affiliates comprise both resident and non-resident companies, parent companies in particular. In addition, corporations issued an extraordinary volume of bonds last year, but their value is comparatively low (about 14% at the end of 2009) relative to the total debt (loans and bonds).

27 According to data from Creditreform, the average payment delay in 2009 was 12 days in the Czech Republic, 16 days in Germany, 20 days in Slovakia, 30 days in Hungary and a full 93 days in Poland. The average settlement period is 36 days in the Czech Republic, 27 days in Germany, 28 days in Slovakia, 60 days in Hungary and 30 days in Poland.

2.3 HOUSEHOLDS

Besides the corporate sector, the economic downturn also hit the household sector in 2009 through its impact on households' balance sheets. The worsening labour market situation, which is adversely affecting consumption and households' ability to repay their debts, remains the main risk going forward. A rise in the number of households whose financial income does not cover their debt repayments, combined with a marked rise in unemployment may, via its impact on consumption, have a negative feedback effect on the economy as a whole.

Growth in unemployment and a rising default rate is creating a risk of an additional decline in aggregate demand

The fall in GDP started to be reflected in rising unemployment and falling nominal income growth in 2008 H2. The household default rate then started increasing with a slight lag. The adverse evolution of these indicators is having a negative additional impact on aggregate consumption and will hinder the economic recovery in the period ahead. Internal estimates put the aggregate feedback effect on economic growth at around 0.7% of annual GDP for the *Baseline Scenario* and up to 1.5% of annual GDP for the adverse scenarios (*Return of Recession* 1.5%, *Loss of Confidence* 1.3%). Of this total, the default effect would account for roughly 0.5% and 0.6% of annual GDP respectively and the rest would be caused by the rise in unemployment.[28] The sharp rise in unemployment, coupled with a rising default rate due also to the decline in nominal income, would lead to an additional fall in aggregate demand, which would further worsen the situation in the corporate sector. This effect could be quite strong in the highly adverse scenarios.

The biggest risk for the household sector is the labour market situation and the evolution of nominal income

The labour market situation and the evolution of nominal income will remain the principal risk for the household sector going forward. During 2009, corporations responded to the sharp fall in demand by cutting the numbers of permanent and temporary employees (see Box 2). This trend was felt most strongly in 2009 H1 (see Chart II.33). In the first phase of lower economic growth (in 2008 H2) corporations primarily laid off less qualified workers, but after the next phase started the reduction in employment affected all professions.[29] As the economy gradually recovers, corporations can be expected to create new jobs, causing the labour market situation to start improving gradually in 2011. Despite the expected upswing in demand for labour, long-term unemployment – unlike short-term unemployment – could keep rising

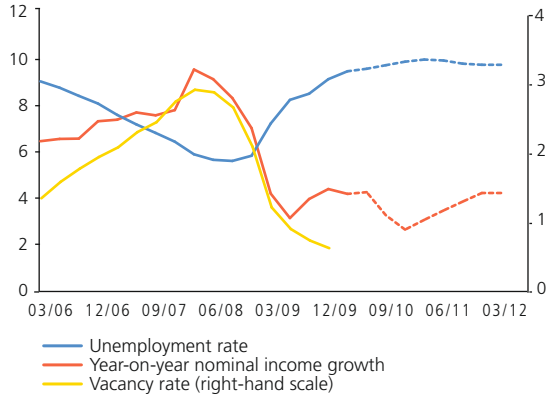
28 The feedback effect of rising unemployment on aggregate consumption is based on the assumption of a different marginal propensity to consume between employed and unemployed households.

29 In 2009 Q1, the average unemployment benefit paid rose by CZK 271 to CZK 5,739 compared to the previous quarter (however, there was also a rise in unemployment benefits effective from January 2009).

CHART II.33

Nominal incomes, unemployment and vacancies

(%)

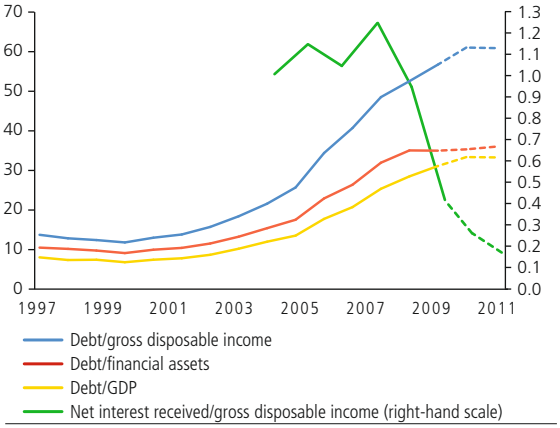


Source: Czech Ministry of Labour and Social Affairs, CNB
Note: Seasonally adjusted data; prediction according to Baseline Scenario.

CHART II.34

Ratios of household debt to gross disposable income, financial assets and GDP

(%)

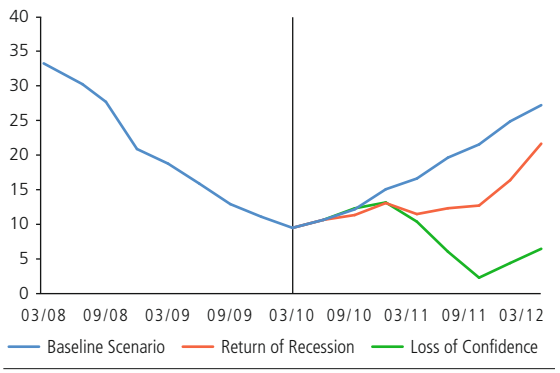


Source: CNB

CHART II.35

Year-on-year growth in loans to households

(%)

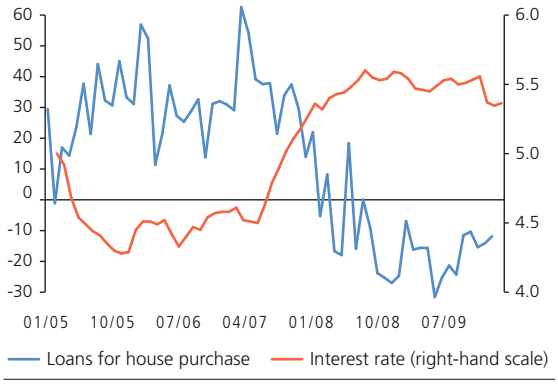


Source: CNB

during 2011.[30] In the *Baseline scenario*, the registered unemployment rate should increase by around 0.5 p.p. in 2010 and decline modestly by approximately 0.2 p.p. in 2011. In the adverse scenarios, the rise could be as much as 2.4 p.p. in 2010 and 0.8 p.p. in 2011.

Chart II.36

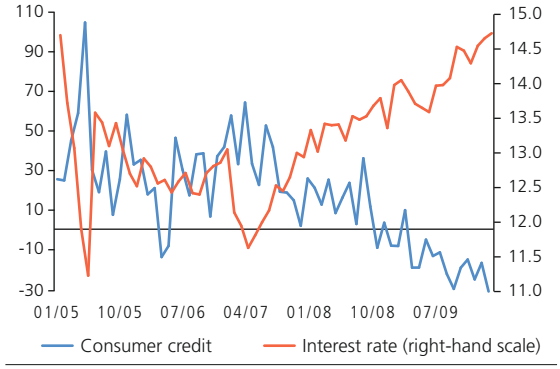
Loans to households for house purchase
(new business; y-o-y growth in % and interest rate in %)



Source: CNB

Chart II.37

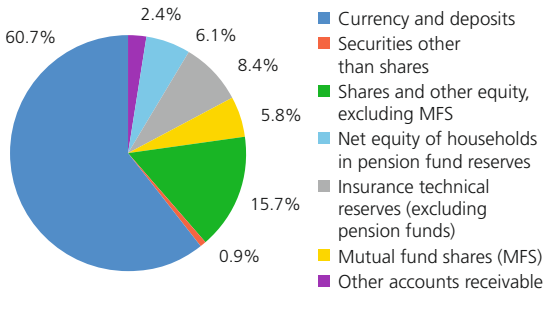
Consumer credit to households
(new business; y-o-y growth in % and interest rate in %)



Source: CNB

Chart II.38

Financial assets of households in 2009
(%)



Source: CNB

The pace of growth in debt slowed

The adverse macroeconomic situation and the deteriorating situation in the corporate sector, together with the growing uncertainty regarding future household disposable income, are slowing the rate of growth of household debt. New loans for house purchase and consumption were showed strongly negative year-on-year growth in 2009 (see Charts II.36 and II.37). The composition of house purchase loans has shifted towards longer maturities in recent years. The ratio of debt to gross disposable income reached 54% in 2009 (52% in 2008) and that of debt to GDP amounted to 30% (28% in 2008), while that of debt to financial assets remained unchanged at 35% in 2009 compared to 2008 (see Chart II.34).[31] In the *Baseline scenario*, the pace of lending to the household sector should cease to decline in mid-2010. Nevertheless, in contrast to the corporate sector, growth in lending should remain positive in all the scenarios considered (see Chart II.35). The rapid rise in debt in the past may also have been due to subsidies and tax support for debt financing of property purchases (in particular deductions of interest from the tax base), which create the illusion of a lower financial burden associated with loan repayments. It can meanwhile be assumed that such support is highly ineffective in terms of making housing affordable, since it is already contained in prices and eliminating it could cause property prices to fall or loan costs to decline.

Debt servicing costs increased

Rising debt servicing costs are an adverse factor for households in debt. Owing to a gradual tightening of bank lending standards, average interest rates on bank loans to households increased in the last two years. This trend was observed for both bank consumer credit (see Chart II.37) and house purchase loans (see Chart II.36). The rise in household debt servicing costs is confirmed by growth in average interest rates on the total volume of bank loans to households.

A sharp rise in the number of insolvent households cannot be ruled out

The falling income and flat debt interest costs are reducing households' financial reserves and causing the default rate to rise. According to a simple microeconomic simulation of the balance sheets of indebted

30 The total number of vacancies in the pre-crisis period was around five times the figure at the end of 2009 (151,000 on average in 2008 Q2, compared to 33,000 in 2009 Q4).

31 By international comparison Czech household indebtedness is still lower than that in EU countries (debt-to-GDP ratios in 2008: Germany 61%, Ireland 109%, Greece 50%, Spain 84%, France 51%, Italy 39%, Netherlands 119%, Austria 52%, Portugal 96%, United Kingdom 99%).

households, around 6.5% of families with mortgage loans (roughly 1.6% of the population) would not be able to repay their debts in the *Baseline Scenario*. However, in the adverse scenarios, up to 20% of this set of families (5% of the population) could get into this situation – 13% of families (3.3% of the population) in the *Return of Recession* scenario and 20% of families (5% of the population) in the *Loss of Confidence* scenario. A negative shock to the income side of the balance sheet was modelled using a fall in nominal income and a rise in unemployment. The expenditure side was encumbered by a rise in interest rates. An assumption of constant minimum living costs was used to calculate the financial reserve.[32] Unlike in this simulation, the impacts of adverse macroeconomic developments on households' budgets would in reality be dampened by households' financial asset holdings.[33]

Households still have more financial assets than liabilities at the aggregate level

At the aggregate level, households still have more financial assets than liabilities and remain net recipients of interest payments. However, in the last year there has been a sharp decline in net interest received due to a growing difference between interest rates on loans and deposits. On the other hand, the ratio of financial liabilities to assets fell and aggregate financial liabilities currently make up around 37% of households' financial assets. Moreover, approximately 60% of financial assets are held by households in the form of deposits and currency, which are not subject to capital loss risk (see Chart II.38). The financial asset location distribution is little changed from the pre-crisis situation, with just a partial shift out of investment funds and into bank deposits and currency (a 5.8% share at the end of 2009, compared to 7.7% in mid-2008).

The credit risk of households is set to continue rising next year

Credit risk growth is indicated by the 12-month default rate, which was fluctuating around 5% for bank loans during 2009 (see Chart II.39).[34] The results of the internal macroeconomic model for all the scenarios considered suggest that in contrast to the corporate sector, this indicator will fall only slightly in 2010 H2 and will not return to its 2008 value even at the two-year horizon. Some improvement should be recorded in 2011, when the indicator for the *Baseline Scenario* could stabilise around 5%. The rising credit risk is also reflected with a lag in growth in bank NPLs (see Chart II.40). A similar trend can be seen for non-bank loans. According to the available statistics, the non-bank NPL ratio rose

32 The microeconomic simulation of households' budgets was based on the income distribution of households with mortgages calculated from CZSO data. Given the absence of information on the distribution of mortgage loan amounts, these values were simulated using households' income and the average household mortgage loan amount.

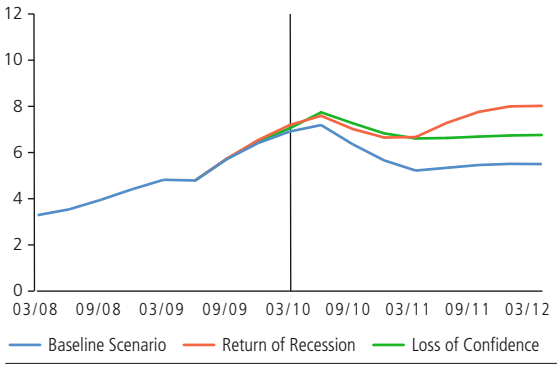
33 No information is available on the distribution of financial wealth between indebted and non-indebted households. It can be assumed, however, that the financial asset holdings of indebted people will tend to be lower.

34 The 12-month default rate for past periods is calculated using data from the Banking Client Information Register operated by the Czech Banking Credit Bureau.

Chart II.39

12-month default rate of households

(%)

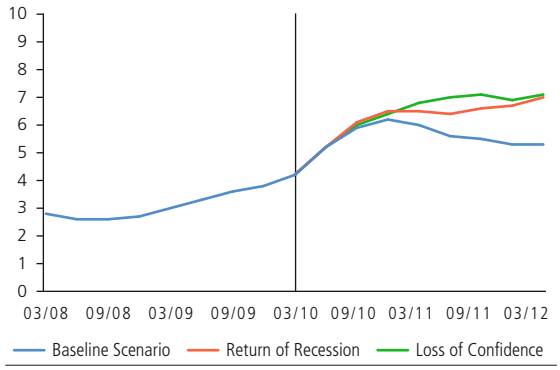


Source: CNB
Note: Given that the 12M default rate is calculated as a forward-looking indicator, the values for the individual scenarios differ from 2009 Q3 onwards.

Chart II.40

NPL ratio for bank loans in the household segment

(%)

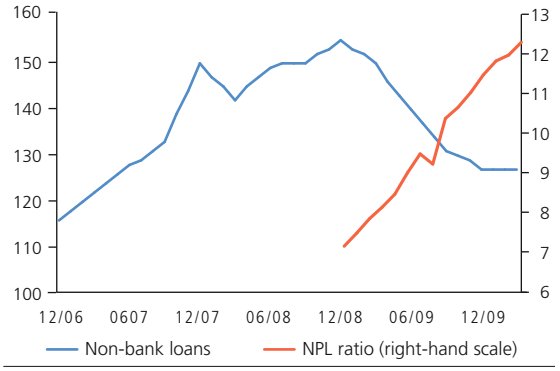


Source: CNB

Chart II.41

Non-bank loans to households

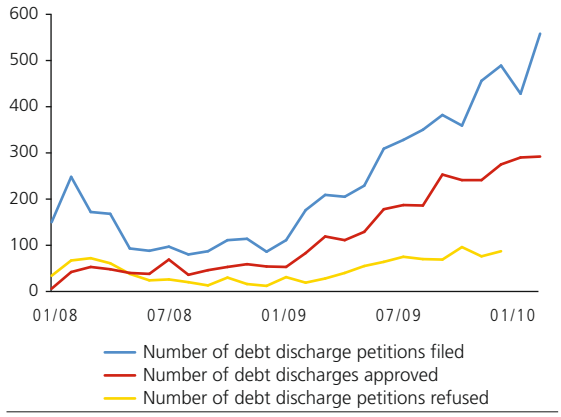
(total loans in CZK billions; NPL ratio in %)



Source: SOLUS, CNB
Note: The total volume of NPLs is only approximate.

CHART II.42

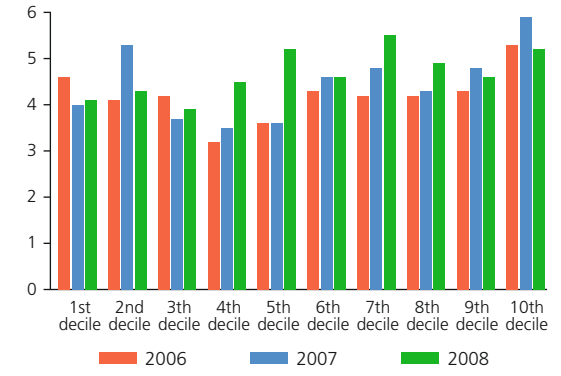
Discharge of debts of private individuals
(monthly data)



Source: Creditreform s.r.o., CNB calculation

CHART II.4 BOX

Households' debt burden
(ratio to net money income in %)



Source: CZSO

steeply during 2009 to its current value of around 13% (April 2010, from around 7% in January 2009).[35] This increase was due not only to a sharp rise in new NPLs (the estimated 12-month default rate for January 2010 was 6%, compared to 5% in January 2009), the vast majority of which are consumer loans, but also to a nominal decline in non-bank loans provided to households (see Chart II.41).[36]

The number of personal bankruptcies surged

This trend also corresponds with the number of discharge petitions filed.[37] The sharp rise in discharge petitions (personal bankruptcies) was due to both the adverse economic situation and to the fact that households are gradually starting to make use of the option of debt discharge. The appropriate level for the Czech economy can be assumed to be 8,000–9,000 petitions a year. Czech households might reach this level in the second half of this year.

Box 3:

HOUSEHOLDS' DEBT BURDEN AND LOAN REPAYMENTS

Given households' growing problems with making loan repayments this box examines households' debt burden in more detail. It is based on CZSO data for 2008.[38] The data thus cover only the initial period of the global financial crisis. Nevertheless, they may signal risks that could slow the expected recovery in economic activity.

In 2008, consumer credit was obtained by 20% of households and house purchase loans by roughly 13% of households. Consumer credit is used to the greatest extent by households from the two lowest-income groups, whereas house purchase loans are obtained most often by households from the two high-income groups. While the take-up of loans in these groups increased in 2008, medium-income households borrowed to a lesser extent. The volume of new loans is the highest in the case of high-income households. The debt burden of households, as measured by the ratio of repayments to income, increased by 0.2 p.p. compared to 2007 to 4.8% in 2008. It increased among medium-income households and in some low-income households owing to the decline in income (see Chart II.4 Box).[39] This indicates a rise in households' vulnerability.

35 The calculation of the NPL ratio and the 12-month default rate is based on data from the SOLUS register. The CNB started using these statistics this year.
36 The 12-month default rate for non-bank loans is at similar levels as the default rate of bank consumer loans.
37 The option of debt discharge is based on Act No. 182/2006 Coll., on Insolvency and Methods of Resolution Thereof (Insolvency Act), which took effect on 1 January 2008.
38 The data come from the EU-SILC *Living Conditions 2008* survey conducted in 2008 H1 and published in 2009 Q4, and from the CZSO's household budget statistics for 2008.
39 Recent data from the household budget statistics show that the debt burden of households increased by a further 1 p.p. to 5.8% in 2009.

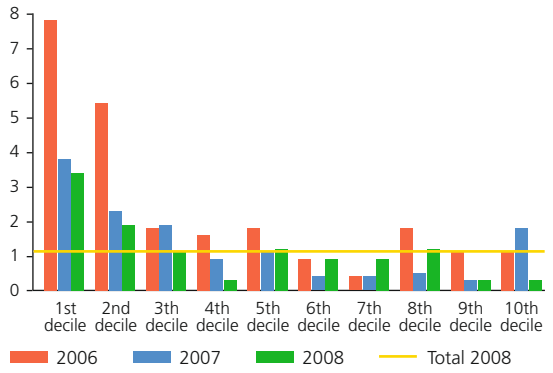
In 2008, as in the previous year, repayment problems were reported by 1.1% of households in the case of consumer credit and 0.3% of households in the case of house purchase loans. Problems with repaying these loans were reported by medium-income households and, in the case of house purchase loans, by households in the two lowest-income deciles (see Charts II.5 and II.6 Box). The two lowest-income groups of households had above-average difficulties making repayments of all types of loans. The contraction in economic activity and worsening labour market situation recorded in 2009 subsequently reduced households' ability to repay loans. The NPL ratio jumped by 1 p.p. in the past two years to approximately 4% (January 2010). Moreover, roughly 67% of households had difficulties making ends meet with their income.

Although the proportion of households obtaining loans increased in 2008, particularly in the case of house purchase loans, problems making loan repayments rose as well. The deteriorating macroeconomic environment in 2009, which is no longer covered by the analysed data, later further worsened households' financial situation and their ability to repay loans.

Chart II.5 box

Problems making consumer credit repayments

(%)

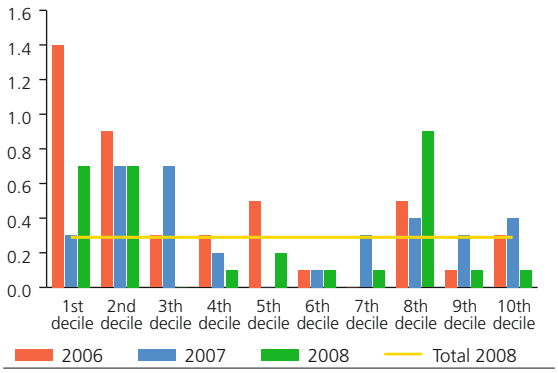


Source: CZSO

Chart II.6 box

Problems making housing loan repayments

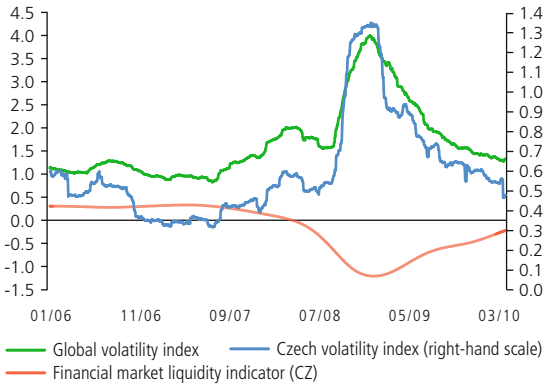
(%)



Source: CZSO

CHART III.1

Volatility and liquidity in financial markets

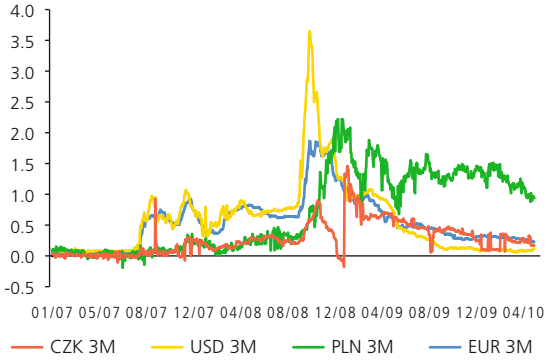


Source: Bloomberg LP, CNB, Thomson Reuters, CNB calculation
Note: Global volatility index = sum of historical volatility of S&P500, DJ Stoxx50, USD/EUR and YEN/USD rates, German and US 10Y government bonds, gold price, oil price and 3M EURIBOR and 3M LIBOR over past 90 days. Czech index volatility index = sum of historical volatility of PX stock index, CZK/EUR rate, 10Y government bond and 3M PRIBOR. The indices are normalised over the entire period. The calculation methdology for the Czech market liquidity indicators is described in FSR 2007, Box 4.

CHART III.2

Credit premiums on the interbank market

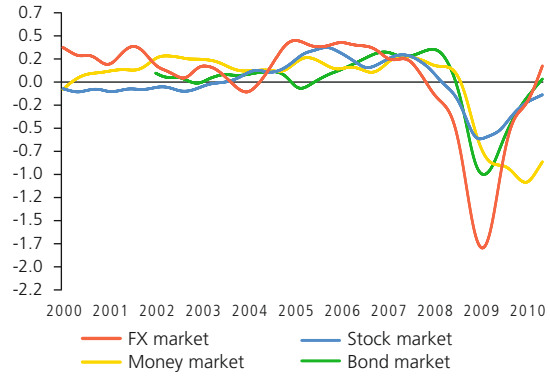
(%)



Source: Thomson Reuters, CNB calculation

CHART III.3

Market liquidity indicators for individual Czech markets



Source: Bloomberg LP, CNB, CNB calculation

3 ASSET MARKETS AND THE FINANCIAL INFRASTRUCTURE

3.1 THE FINANCIAL MARKETS

The global financial market situation has calmed thanks to the monetary and fiscal measures adopted, but uncertainty about future credit and liquidity premiums is still evident in the markets. The situation in the Czech financial market has generally stabilised, although low liquidity, weak activity and higher volatility persist in the money market. The Czech stock market has been maintaining an upward trend since March last year, but is still under the influence of increased optimism driven by the expansionary stimuli of international economic policies. The Czech government debt market has recorded no significant worsening so far. Nevertheless, the credit premium for Czech government debt is still elevated and the combination of high growth in the Czech national debt and rising global risk aversion to countries with adverse fiscal outlooks might increase it further. The Czech economy has an advantage that the government and central bank were not forced to adopt unconventional measures during the global financial crisis, so there is no uncertainty associated with any exit from such measures. However, problems could spread from fiscally unstable countries such as Greece to much more stable economies such as the Czech Republic and cause an adverse fiscal outlook.

Nervousness persists in the markets

The situation in most financial markets has gradually calmed since the end of 2009 Q1. Market volatility has declined, liquidity has increased (see Chart III.1)[40] and yields have been rising, particularly in stock markets (see Chart III.15). Although these financial market indicators are showing an improvement compared to their markedly adverse trends in late 2008 and early 2009, some nervousness persists in the markets. Most financial market indicators still remain in a worse position than before the crisis.

The foreign interbank market is under the influence of measures adopted…

Increased uncertainty about economic developments going forward is ever present in foreign interbank markets. Despite falling risk aversion, credit lines – particularly at longer maturities – are being opened very gradually and mostly selectively amid persisting concerns regarding counterparty credit risk revaluation. Counterparty selection is associated mainly with credit and liquidity risks, which have been reduced only partially, temporarily or even "artificially" by the measures adopted by governments and central banks (see section 2.1). Expectations associated with the exit strategies of central banks and governments may exert

40 For the market liquidity indicator in the euro area, see Financial Stability Review, ECB, December 2009, p. 63.

some upward pressure on future yields and stop credit premiums falling to their pre-crisis level (see Chart III.2), especially at longer maturities.

…and the domestic market situation is unchanged – low liquidity, weak activity and higher volatility

There is persisting uncertainty regarding future developments in the domestic money market. Moreover, domestic banks lack motivation to finance themselves in this market. The situation is little changed from last year, which was characterised by higher volatility and lower liquidity (see Chart III.3). The bid-offer spread is around 30 b.p. at all maturities. The spread between the monetary policy rate and interbank rates remains higher than before the crisis (see Chart III.4). Trading at overnight maturities is falling (see Chart III.5) and that at longer maturities remains low.[41] A persisting high credit premium (driven, as in other countries, by counterparty credit risk; see Chart III.2) and uncertainty regarding liquidity risk linked with potential changes in the monetary policies of domestic and foreign central banks[42] are limiting the decline in market interbank rates towards the low monetary policy rate (see Chart III.4).[43] The wide bid-offer spread is also linked with falling money market liquidity and activity (see Charts III.3 and III.5). Despite this, Czech banks' balance-sheet liquidity position has not been greatly affected (see section 4.1), as confirmed by low interest in the temporarily introduced liquidity-providing repo operations (see Chart III.5).

Yield curves are rising steeply…

Expectations regarding short-term rates and economic policy changes are also apparent from the shape of the money market yield curve (see Chart III.6). The inverted shape of the yield curve at the end of 2008, when investors were expecting central banks to ease monetary policies further, was replaced by a steeply rising shape caused both by falling short-term rates and by flat or rising long-term rates (see Chart III.7). The slope of the curve increased most of all between the two-year and five-year yield. This may indicate that the calming and stabilisation of the financial system is fragile and that there is still uncertainty in the markets regarding future developments. A potential increase in the already present sovereign credit risk is strengthening this uncertainty.

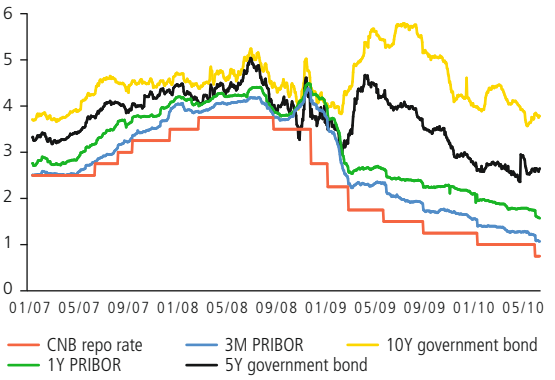
41 The volume of koruna deposit transactions at maturities of over three months was very low in 2009, increasing modestly only at the start of this year (to CZK 286 billion in January 2010). In April 2008 it had been almost CZK 623 billion, whereas a year later it was only CZK 90 billion.

42 Owing to the advanced integration of Czech financial markets with the EMU (see the thematic article in Part II: *Financial Integration at Times of Financial (In)stability)* and the ownership links of the domestic banking sector with the EMU banking sector, the timing of the ECB's exit strategy also needs to be taken into consideration.

43 While the monetary-policy rate has declined cumulatively by 3 p.p. since August 2009, the market 3M PRIBOR fell by 2.08 p.p., but the long-term rate, e.g. client rate to households for house purchase was down only by 0.18 p.p.

Chart III.4

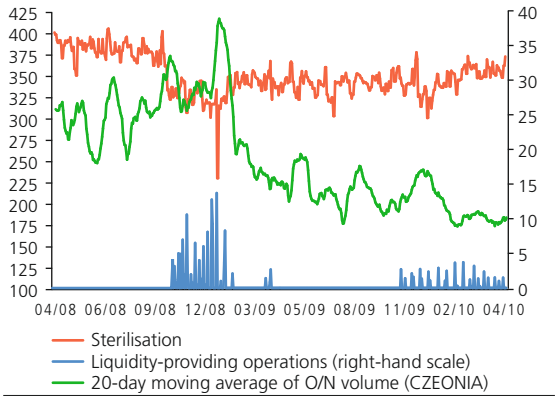
Monetary policy rate and market rates
(CZ; % p.a.)



Source: Thomson Reuters

Chart III.5

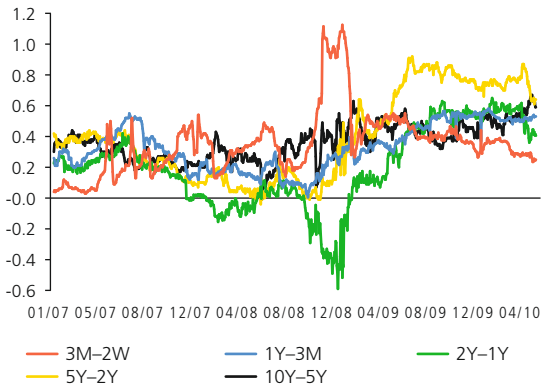
Open market operations and volume of overnight deposits
(CZK billions)



Source: Bloomberg LP, CNB, CNB calculation

Chart III.6

Yield curve slopes
(CZ; % p.a.)

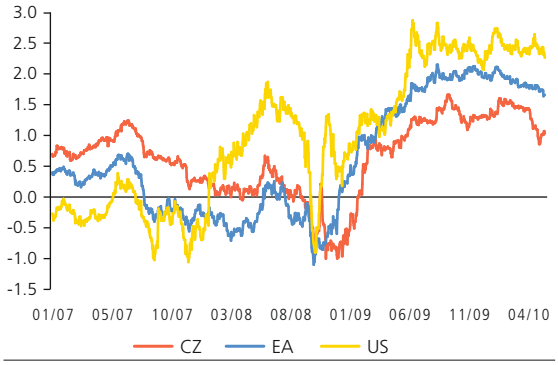


Source: Bloomberg LP, CNB calculation
Note: Differences in yields of 2W, 3M and 1Y PRIBOR and 1Y, 2Y, 5Y and 10Y IR SWAP.

Chart III.7

Term spreads for selected economies

(%)

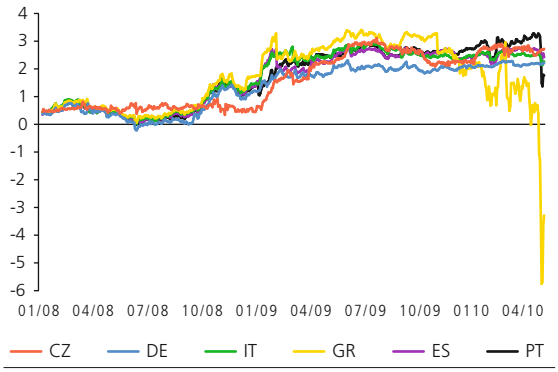


Source: Bloomberg LP, CNB calculation
Note: The term spread is the difference between the 5Y interest rate swap and the 3M interbank interest rate.

Chart III.8

Term spreads of government bond yields

(%)

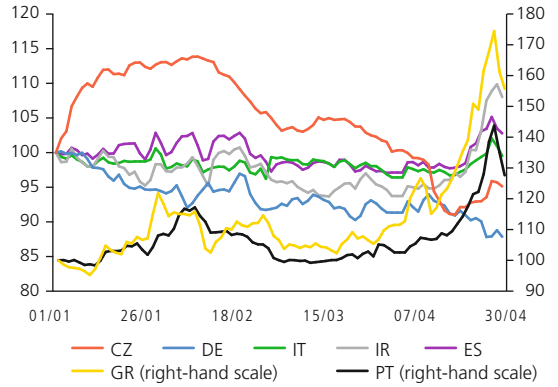


Source: Thomson Reuters, CNB calculation
Note: The term spread is the difference between the 10Y and 2Y benchmark government bond yields of the relevant country.

Chart III.9

Long-term rates in selected economies

(1 January 2010 = 100; 2010; 10Y benchmark bond yield)



Source: Thomson Reuters, CNB calculation

...mostly because of rising long-term rates

The aforementioned uncertainty regarding the economy going forward is also apparent in the government bond markets. The current government debt yield curve is "normal",[44] i.e. rising, but its slope has increased considerably, just like in the interbank market (see Chart III.8). The steepness of the yield curve is due mainly to growth in long-term rates since March this year (see Chart III.9). The ever-increasing credit premium being demanded by investors in return for holding the soaring volume of government bonds (see Charts III.10 and III.11) is a pessimistic explanation for the rise in long-term rates. Expectations of pronounced economic growth, rising inflation and a subsequent increase in short-term interest rates are an alternative explanation.

Long-term rates are being pushed up by rising government debts...

If the liabilities of indebted countries continue to grow markedly, a further rise in long-term interest rates can be expected over the medium term (see also section 2.1). This rise will be strongest in countries with high budget deficits and total government debts and a large difference between the yield on government debt and economic growth (e.g. Greece, Ireland and Portugal). A steeply sloping yield curve can create favourable conditions for the banking sector, which usually obtains funds at short-term interest rates and lends to corporations and households at long-term interest rates. However, excessively high long-term interest rates can also have an undesirable effect on banks' balance sheets. They can be reflected in lower demand for new loans from the banks' clients[45] and in a higher number of NPLs.

...which is making sources of financing more expensive

In all EU countries, due to the linkages between the government bond market and other financial markets a rise in sovereign funding costs can be transmitted relatively rapidly to other financial markets (interbank or credit). This means an increase in funding costs for other sectors (banks, corporations and households). Additional upward pressure on long-term rates may also stem from concerns regarding the sufficiency of sources of funding given the expected higher demand for these funds from both the public and the banking sector (see section 2.1). Moreover, the linkages between the fiscal sector and the financial sector (the main fiscal debt creditor) mean that sovereign credit risks can transform into liquidity and credit risks of the financial sector. Falling government security prices can generate losses from government debt holdings and create pressure in banks' balance sheets.

Rising debt service costs usually motivate issuers to shorten debt maturities. This can also happen if investors lose their appetite due to high sovereign risk to invest in government bonds as a long-term

44 An inverse yield curve, with short-term rates above long-term rates, usually appears just before the onset of recession. Longer-term interest rates fall because investors expect short-term rates to go down.

45 Demand for new loans usually falls if the cash flow generated from the assets purchased for a new loan is not sufficient to repay that loan.

investment. The adverse effects of investor nervousness are gaining momentum and, given shortening maturities, the upward pressure on rates may also impact on the shorter end of the debt yield curve. Fiscal policies focused on boosting demand may not stabilise the economic situation of the recession-hit countries. On the contrary, they may worsen it because of rising funding costs.

The Czech Republic is viewed as fiscally stable…

The Czech Republic is still viewed as being a macroeconomically stable and well-run economy. The financial markets' increased sensitivity to the government finance trend has so far affected Czech government bond yields only slightly. Government bond market liquidity is rising (see Chart III.3), the CNB's liquidity-providing repo operations are almost unused (see Chart III.5), government debt trading on the secondary market has not deviated significantly from previous periods[46] and government bond issues with long maturities still dominate the primary market (see section 2.1). The Czech financial system is sound and has required no fiscal support (see section 4.1), the Czech Republic's sovereign rating has been stable since 2005 (see Chart III.12) and the country's rating outlook has been increased twice since the start of the crisis (see Table III.1).

…but the Czech sovereign credit premium is not falling and could even rise

Unlike, for example, in Italy, Portugal, Greece and Spain, the Czech sovereign credit risk premium remains below the EU-27 level. However, it has not fallen to the pre-crisis level (see Chart III.10). In contrast to Greece or Portugal, whose CDS spreads on one-year government debt are the same as, or higher than, those on ten-year debt (hence flattening the curve slopes or even turning them negative), short-term CDS contracts for Czech government debt are stagnant and long-term ones are rising (see Chart III.13). The growth in CDS spreads on long-term Czech government debt may be connected with rollover risk, which is potentially relevant for the Czech Republic.[47] In the Czech case, higher yield spreads or CDS spreads on government bonds (see Chart III.10 and III.11) may be created by not only local, but also global risk factors. For example, concerns about a persisting worsening situation in the global financial system with pressure for a return to recession may create adverse expectations regarding the future Czech fiscal situation.

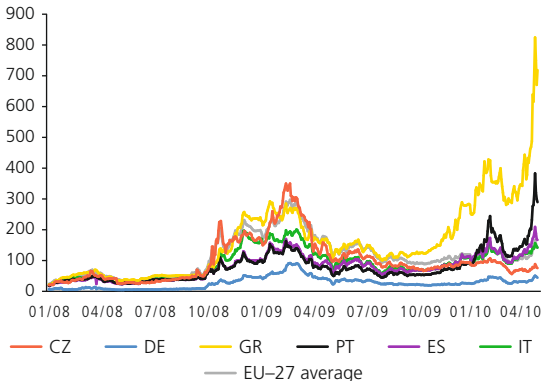
The Czech sovereign credit premium is likely to continue increasing if the rate of growth of debt remains at the current high level (see Chart II.2 Box). Increasing global risk aversion to countries with unfavourable fiscal outlooks may cause problems to spread from fiscally unstable countries such as Greece to much more stable economies such as the Czech Republic (see Box 4).

46 Bond trading on the PSE totalled almost CZK 600 billion last year and slightly exceeded the same figure in 2008.

47 However, greater tension can be expected in the Czech public bond market in autumn 2010, when four bond issues totalling CZK 52 billion and ten T-bill issues totalling CZK 75 billion are expected.

Chart III.10

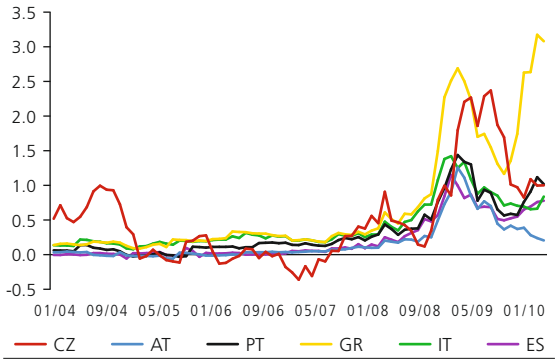
CDS spreads of selected European governments
(b.p.)



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

Chart III.11

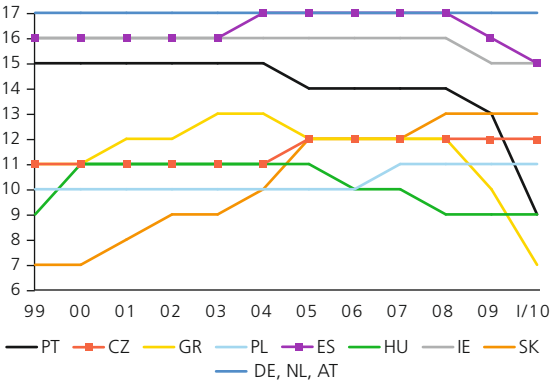
Yield spreads on ten-year government bonds
(%; monthly data)



Source: Thomson Reuters, CNB calculation
Note: Yield spreads on the 10Y benchmark government bonds of the selected countries relative to the German equivalent.

Chart III.12

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



Source: Standard & Poor's
Note: Long-term S&P rating conversion scale: 17 = AAA, 13 = A+, 10 = BBB+, 7 = BB+.

Table III.1

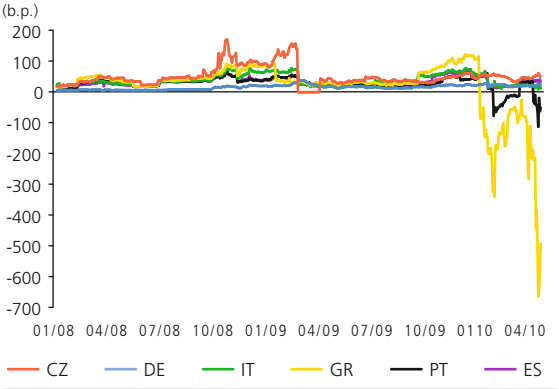
Sovereign rating volatility indicators for selected countries

	Notches above speculative grade	Outlook	Rating changes since 30 June 2007
Czech Rep.	5	stable	2 up/0 down
France	10	stable	none
Germany	10	stable	none
Greece	0	negative	0 up/10 down
Iceland	0	negative	0 up/11 down
Ireland	8	negative	0 up/7 down
Portugal	4	negative	0 up/6 down
Slovakia	6	stable	2 up/0 down
Spain	8	negative	0 up/3 down
UK	10	negative	0 up/1 down

Source: April 2010 Global Financial Stability Report and rating agency databases
Note: Based on the average of the long-term sovereign foreign currency ratings of Moody's, Fitch and Standard & Poor's. Outlook changes are included in rating changes.

Chart III.13

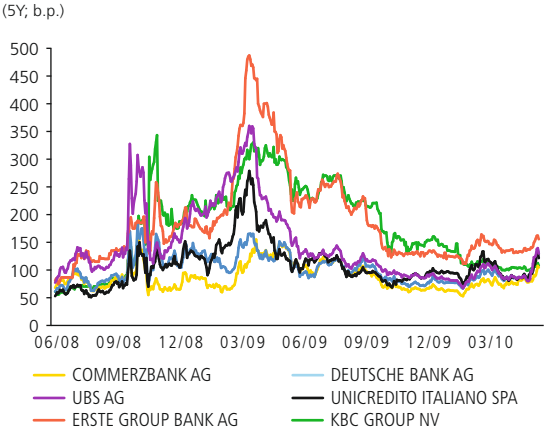
Curve slopes of sovereign CDS spreads



Source: Thomson Reuters, CNB calculation
Note: Difference between the 10Y and 1Y CDS spreads of the relevant country.

Chart III.1 box

CDS spreads of selected European banks



Source: Thomson Reuters

Box 4:

CREDIT DEFAULT SWAPS AS A CREDIT RISK INDICATOR[48]

Credit default swaps (CDS) are used quite often as aggregate credit risk indicators. The CDS spread is the price that the CDS buyer is willing to pay for protection against a reference entity's credit event to the seller of such protection. The CDS seller undertakes to cover the loss that the protection buyer would incur as a result of the credit event. On entering into the contract, both parties take on counterparty default risk. According to the basic approach, the value of the CDS spread is a function of the probability of default (PD) of the reference entity and the loss given default (LGD). However, the current crisis has shown that CDS spreads can also be made up of other premiums, such as a liquidity risk premium, a systemic risk premium or a jump-to-default risk premium. In quiet times, jump-to-default risk and systemic risk usually account for a negligible part of the CDS spread. But at times of heightened uncertainty, as in the case of the banking system after the collapse of Lehman Brothers, these two risks gain in importance (see Chart III.1 Box).[49] Additional premiums can also be a part of CDS spreads. These arise from the definition of credit event, which does not necessarily have to be of a credit nature.[50]

CDS derivatives were originally created for the purpose of hedging against credit risk. Over time, though, they started to be used for speculative transactions. Hedging against credit risk using CDS contracts is illustrated below on the example of government debt. Theoretically, the difference between the yield on a government bond of a certain country and that on a risk-free benchmark and the difference between their CDS should be the same, since both express the premium on sovereign credit risk. Although the correlation between the two markets is usually high because of arbitrage (see Chart III.2 Box, AT, BE, CZ, GR, IE, IT, NL, PT and ES), it can diverge in the short run – CDS spreads can overshoot the differences between government bond yields in the short run, and vice versa. Whereas an excess of underlying asset spreads over their CDS spreads is usually justified by the lower market liquidity of the underlying asset and therefore by a higher spread owing to liquidity risk (see Chart III.2 Box, FI and FR), an opposite excess can be caused by various factors, or CDS market anomalies, on both the demand and the supply sides.

48 Compared to the total derivatives market, the market for this type of derivative is relatively small (approximately 7%). However, the exact data on how big a credit default risk was transferred by these instruments do not yet exist (www.isda.org: 2009 Q1 estimate is USD 31 trillion).

49 The collapse of Lehman Brothers in September 2008 is an example of sudden default. Owing to growth in systemic risk due to the balance-sheet links of individual financial institutions, the risk of sudden default increased for most other banks after the collapse of this bank.

50 In the case of the banking system, nationalisation, for example, could be a credit event.

Part of the demand for sovereign CDS contracts is in reality due to hedging against the risk of another reference entity for which the credit event probability is highly correlated with the credit event of the state.[51] In such case, the overall demand for sovereign CDS can be much more sensitive to changes in various factors than demand on the real government bond market. Another possible reason for short-term overshooting of the CDS price is an insufficiently flexible response of the supply of CDS contracts to increased demand, since demand on the CDS market is relatively restricted and strongly concentrated around a few active global dealers.[52]

It could be disturbing if CDS market anomalies were to propagate to underlying asset markets or if an increased sovereign CDS spread were to increase the yield (reduce the price) on that bond without any negative fiscal change having been made. This contagion effect tends to be associated with the psychological transmission channel rather than the technical transmission channel. CDS spreads are used quite often as an indicator of a country's solvency regardless of the limiting factors of the CDS market. To a certain extent, therefore, an excessive change in CDS spreads can affect investors' perceptions of a country's credit risk. The technical realisation of contagion, however, is more or less limited. Several substantiating arguments can be proffered.

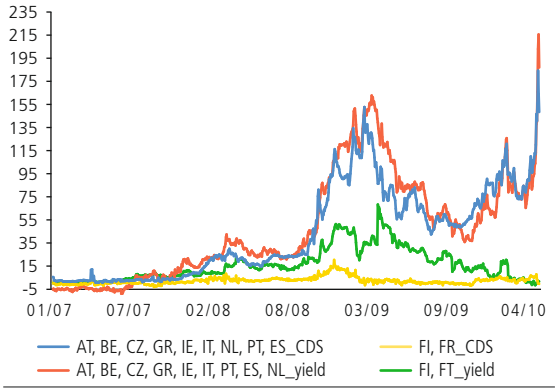
Owing to credit risk, the seller on the CDS market and the buyer on the underlying asset market are in the same situation. The supply of CDS contracts is usually low, which can exert upward pressure on CDS spreads (credit risk), whereas the demand for government debt is usually high, which, by contrast, can put downward pressure on the credit premium. Hence, contagion is more or less restricted.

Another possible argument is that anomalies from CDS markets might transmit to the underlying asset market if we assume the absence or very low participation of investors who assess the risks themselves on the basis of their own fundamental analyses.[53]

Another contagion effect is often associated with the speculative trading strategies of (a) CDS sellers hedging on the underlying asset market by means of speculative short selling, or (b)

CHART III.2 BOX

Sovereign risk premiums of selected countries
(average for selected country; b.p.)



Source: Thomson Reuters
Note: In the case of CDS the risk premium was calculated as the difference between 5Y sovereign CDS spreads of the relevant country and the German equivalent; in the case of yields it was calculated as the difference between the 5Y government benchmark bond of the relevant country and the German equivalent.

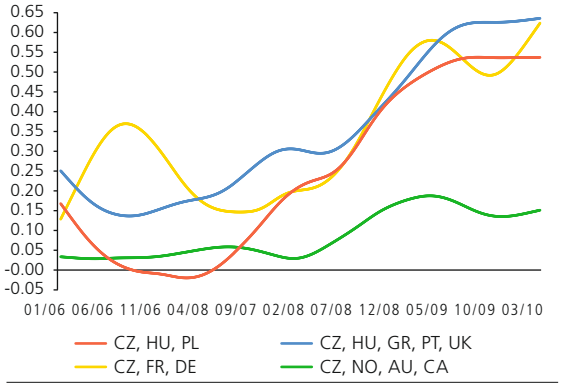
51 This may be due to the non-existence of relevant CDS or to their high price. Take, for example, the purchase of CDS for public debt where in reality the CDS buyer holds a bond issued by the bank of the relevant country or, say, by the state energy company.

52 Furthermore, the concentration can increase. If, for example, the link between the hedged risk (sovereign credit risk) and the counterparty risk (the credit risk of the bank as the seller) strengthens as a result of, for example, measures introduced to support the banking sector, demand can be concentrated into an even smaller group. This is because the protection buyer naturally rules out as a counterparty any institution to which such measures directly or indirectly relate.

53 In other words, if we admit the existence of the contagion effect, we simultaneously deny the existence of arbitrage.

CHART III.3 BOX

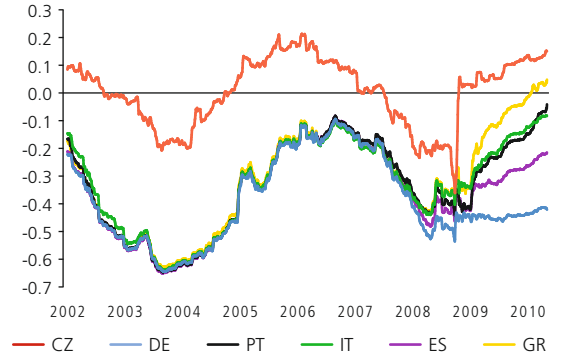
Average correlation between CDS spreads of selected economies



Source: Thomson Reuters
Note: The Dynamic Conditional Correlation GARCH was used to calculate the correlation of changes in 5Y CDS spreads. The average correlation expresses the unweighted mean of the correlations of the individual country pairs, which was subsequently smoothed using the HP filter.

CHART III.14

Correlation between weekly yields on government bonds and equities



Source: Thomson Reuters, CNB calculation
Note: Rolling correlation with a window of 500 observations. Correlation between stock index returns (DJ EURO STOXX, PX) and 10Y benchmark bond yields of the relevant countries.

CDS buyers trying to increase CDS prices[54] in order to hedge their existing short positions on the underlying asset market (naked CDS buying).[55] In this case, however, contagion would only be possible under the assumption of insufficient demand for the underlying asset and the possibility of a few buyers applying market power over sellers. Given that the CDS market is considerably smaller than the government bond market, this contagion channel is very limited.[56]

However debatable the contagion effect between the CDS market and the underlying asset market may be, the same effect has been observed across various CDS markets of single countries and across the same CDS markets of different countries. One can follow how sovereign CDS spreads grew in countries affected by the financial crisis. In these countries, credit risk transferred from the banking sector to the government sector. This was associated with the widespread awareness of the low probability of collapse of systemically significant institutions (see Chart III.1 Box and Chart III.10). Contagion of a psychological nature led to the transfer of risks even in countries whose financial systems were not affected, for example the Czech Republic (see Chart III.3 Box). In a simplified way one can observe some independence between the market and economic fundamentals of the selected countries, which often differ structurally.

From the practical point of view it is evident that the possibility of trading in credit risk can, for a while, be profitable to both creditor and debtor. If a government debt creditor has the option of hedging against the government debt position, it will remain willing to buy debt even if the government debt position deteriorates significantly. This can foster higher liquidity, activity and price stability on the government bond market.[57]

Country selection by investors persists

The growing sovereign credit risk increased the already strong selection by investors vis-à-vis individual EU states (see Charts III.10 and III.11). This selection is also evident from the negative correlation between government bond yields and euro area stock index returns

54 i.e. trying to influence investor perceptions of the reference entity's credit risk.
55 It is because of naked CDS that a debate is now going on about introducing regulation of the CDS market or completely prohibiting naked CDS. Naked CDS are often compared to taking out fire insurance on one's neighbour's house. The policyholder then profits from his neighbour's misfortune or even tries to get his neighbour's house to burn down. Naked short-selling transactions and naked CDS in government bonds of euro area were prohibited by the Federal Financial Supervisory Authority (BaFin), fox example.
56 The CDS market represents roughly 2% of government debt for Greece, approximately 1% for Spain and Italy and around 4% for Portugual (http://www.cnmv.es).
57 The argument that debt hedging will lead to an increase in the debt itself does not hold much water, since increased interest in hedging increases the hedging price, i.e. CDS spreads or the reference entity's PD.

(see Chart III.14).[58] Differences in long-term government bond yields indicate persisting "flight-to-quality" and "flight-to-liquidity" effects in the sense of a preference particularly for German government bond holdings. In the case of the Czech Republic, the negative correlation coefficient has started to turn positive again.[59] The current rise in the coefficient can be interpreted as a return of liquidity and confidence to these markets (see Chart III.3), as confirmed by growth in foreign assets in the investment position (see Chart II.20).[60]

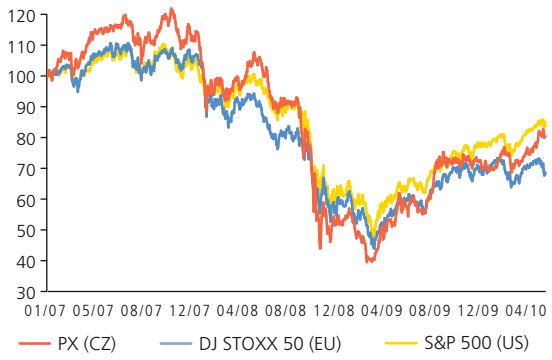
The stock market optimism may be temporary

The increased stock market optimism may be temporary to some extent (see Chart III.15). On the one hand, the growth in shares may be linked to the previous pronounced decline, or to a correction of undervalued assets and a return to their fundamental values, together with expectations of economic growth. On the other hand, the growth in shares may be being driven to a large extent by highly expansionary economic policy stimuli. If economic growth turns out to be slower than expected by the markets, share prices may prove to be too high (see Box 5). Conversely, if the stock market optimism turns out to be justified and the economic recovery proves to be sustained, authorities around the world will probably soon commence their exit strategies. The Czech stock market, which is significantly influenced by foreign investors (as evidenced by a close correlation relationship – see Chart III.15), is likely to experience the aforementioned scenarios.

CHART III.15

Stock indices

(1 January 2007 = 100)



Source: Thomson Reuters, CNB calculation

Box 5:

PRACTICAL APPROACHES TO THE IDENTIFICATION OF ASSET MARKET BUBBLES

Asset market bubbles are a popular term for the situation where the price of an asset (shares, real estate, exchange rates, commodities, etc.) moves far from its fundamental-based value.[61] Although the decomposition of an asset price into components arising from fundamental factors and components affected by "non-fundamental" factors (e.g. euphoria or over-optimistic investment sentiment) seems straightforward, empirical application associated with explicit expression of the values of individual

58 The correlation expresses the relationship between share prices and bond prices, which usually move in opposite directions. A rise in share prices is often interpreted as positive expectations regarding the economy. Growth in bond prices expresses investment in safer instruments as a result of expected adverse developments.

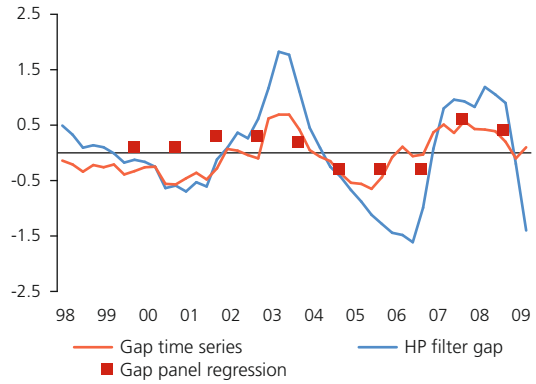
59 In the case of Central European economies the correlations are often positive, since investors still consider their shares and bonds to be similarly risky assets, which they sell or buy together (FSR 2005, p. 22).

60 The stock of securities issued by domestic entities and held by foreign portfolio investors was up by 28.6% year on year as of 31 December 2009 (equity securities by 16% and koruna bonds by 35%).

61 An asset price bubble is defined as an explosive and asymmetric deviation of the market price of an asset from its fundamental value, with the possibility of a sudden and significant correction.

CHART III.4 BOX

Apartment price gaps in the Czech Republic – devations of actual prices from estimates

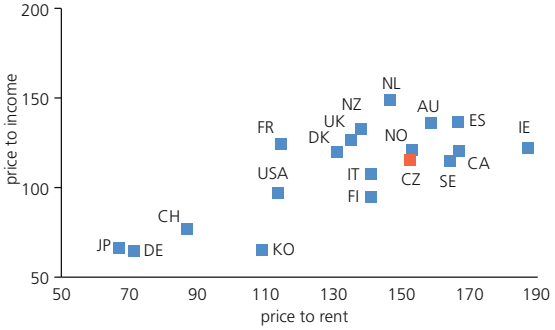


Source: CZSO, CNB calculation (WP 12/2009)

CHART III.5 BOX

Relationship between price-to-income and price-to-rent – international comparison

(data for 2009; long-run average = 100)



Source: Thomson Reuters, CZSO, IRI, CNB calculation

components is very limited. Where non-fundamental factors account for a major part of asset price growth, identifying a bubble is more complicated, since non-fundamental factors are not directly measurable. The emergence of bubbles can also be fostered by inappropriate policy of central banks (e.g. a policy of "cheap money") or governments (e.g. unsound deficit financing).

Why are asset price bubbles so "popular" and why are we interested in them? The first, whole-economy, perspective stems from the interest of the central bank and the government in the effects of bubbles on the real economy. The second, investor, perspective is based on the potential ability to use knowledge of the formation of bubbles to achieve higher-than-average returns. Although the two perspectives have different motivations, they share an intense effort to identify bubbles in advance. However, the practical results often show that standard methods are unable to identify bubbles not only ex ante, but also ex post (see, for example, Gurkaynak, 2005).[62]

Empirical research confirms the economic intuition that more serious impacts on the real economy stem from the bursting of property market bubbles than that of stock market bubbles (see, for example, Helbling and Terrones, 2003,[63] or Bordo and Jeanne, 2007).[64] The effects stemming from the sudden bursting of property market bubbles generate higher output losses and last longer on average (about 4 years) than in the case of stock market bubbles (around 1.5 years). The bursting of property market bubbles also poses a greater threat to the financial stability of a country/region if the banking sector is more exposed through loans secured by property (which is the situation in most European countries).

The basic practical techniques for identifying bubbles include: (a) trend curves and statistical filters, (b) ratios, (c) empirical models and specification tests, and (d) structurally rich theoretical models. These are illustrated below with priority application to the Czech property market.

Trend curves and statistical filters: the trend can be calculated using standard linear or non-linear fitting methods or using univariate filters – usually the HP filter with a suitable (depending on the time series periodicity) or arbitrarily selected smoothing coefficient. The main drawback with the HP filter is that it generates unreliable results for the beginning and end of the dataset. The estimation of a bubble for the Czech

62 Gurkaynak, R. S. (2005): *Econometric Tests of Asset Price Bubbles: Taking Stock,* Finance and Economics Discussion Series, Federal Reserve Board, Washington, D.C.
63 Helbling, T., Terrones, M. (2003): *Real and Financial Effects of Bursting Asset Price Bubbles*, International Monetary Fund.
64 Bordo, M., Jeanne, O. (2002): *Boom-busts in Asset Prices, Economic Instability, and Monetary Policy,* NBER Working Paper 8966.

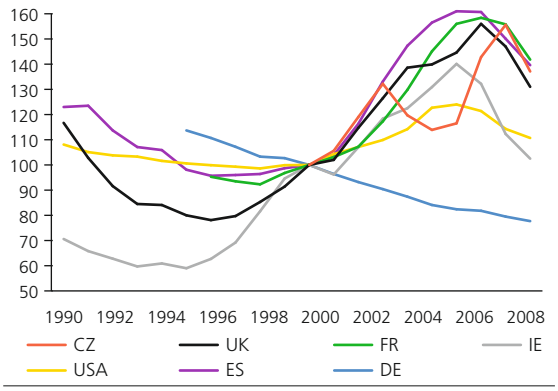
property market using the HP filter is shown in Chart III.4 Box. An application of the HP filter is given in Adalid and Detken (2009),[65] who define a property market boom as a persistent deviation of real property prices from HP trend with a relatively high smoothing parameter (λ = 100,000). A positive deviation of at least 5% for at least 12 quarters is regarded as a boom.

Ratios: these include the *price-to-income* and *price-to-rent* ratios (see Charts III.5 Box–III.7 Box, or section 3.2), which can also be used to get an initial idea of the possible emergence of bubbles (sometimes also by fitting to, for example, the HP trend). These ratios, like the aforementioned univariate filters, suffer from several drawbacks, for instance: (i) they produce high variability in the indication of non-equilibrium states; (ii) they do not directly take movements in interest rates and other fundamentals into consideration and (iii) their time series still have short histories, particularly in the case of transition economy property markets.[66] They are particularly popular with financial market practitioners. Himmelberg, Mayer and Sinai (2005)[67] provide an application to the US property market.

Empirical models and specification tests: specification tests rank among the so-called indirect tests (Salge, 1997),[68] i.e. the aim is to confirm or refute the existence of a bubble. However, these approaches do not directly specify the bubble formation process (see, for example, Levin and Wright[69] for an application to the UK property market). The information content of these models is affected by misspecification of the model and the problem of small data samples. Direct tests for the existence of bubbles identify the process of emergence of the bubble.[70] An advanced bubble identification technique is one that uses an econometric model to reveal the determinants of the asset price (preferably using both supply and demand factors) – see, for example, Hlaváček and Komárek (2009)[71] or Chart III.4 Box for the situation on the Czech property market.[72]

Chart III.6 box

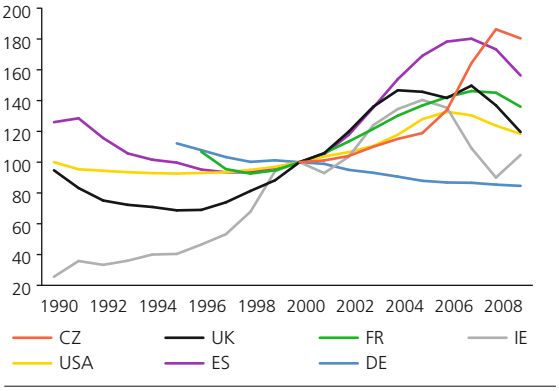
Price-to-income ratios – international comparison
(absolute index; 2000 = 100)



Source: Thomson Reuters

Chart III.7 box

Price-to-rent ratios – international comparison
(absolute index; 2000 = 100)



Source: Thomson Reuters

65 Adalid, R., Detken, C. (2009)*: Real Time Early Warning Indicators for Costly Asset Price Boom/Bust Cycles. A Role for Global Liquidity*, ECB Working Paper Series 732.
66 The relatively high value of the *price-to-rent* ratio for the Czech Republic (see Chart III.7 Box) is due, for example, to its very low value at the beginning of the period, linked, among other things, to relatively high nominal interest rates.
67 Himmelberg, C., Mayer, C., Sinai, T. (2005): *Assessing High House Prices: Bubbles, Fundamentals and Misperceptions,* The Journal of Economic Perspectives, Vol. 19, No. 4, pp. 67–92.
68 Salge, M. (1997): *Rational Bubbles: Theoretical Basis, Economic Relevance, and Empirical Evidence with a Special Emphasis on the German Stock Market,* Springer Verlag, 1997, ISBN 3540626298.
69 Levin, E. J., Wright, R. E. (1997): *The Impact of Speculation on House Prices in the United Kingdom*, Economic Modelling, Vol. 4, No. 4, pp. 567–585.
70 These tests pertain mainly to the stock market (often testing the relationship between dividends and share prices) and even direct tests are sensitive to misspecification of the model (e.g. the omission of an important determinant).
71 Hlaváček, M., Komárek, L. (2009): *Property Price Determinants in the Czech Regions*, CNB Working Paper No. 12/2009.
72 Both the econometric model (based on standard and panel regressions) and the HP filter identified two periods with overvalued property prices in the Czech Republic. However, the response at the end of the dataset is not realistic owing to the drawbacks of the HP filter.

To sum up, approximate identification of bubbles is possible ex post, but: (i) continuous asset price monitoring is a necessary condition for this; (ii) we recommend using the entire range of methods and models available, from the simplest (trend curves and filters) to the comprehensive (models taking into consideration supply and demand factors and other theoretical models); (iii) it is desirable to create structurally rich models (facilitating examination of the effects of asset market bubbles); (iv) it is vital to respect specifics across countries and markets (for example, large and growing deviations from trend in countries with undeveloped financial markets do not necessarily imply the existence of a bubble, owing to base effects).

3.2 THE PROPERTY MARKET

The Czech residential property market recorded a decline in apartment prices of roughly 14% in 2009. This decline was driven mainly by the economic downturn and labour market deterioration in the Czech Republic. Though the price decline in the Czech Republic was smaller than in some other economies, prices of apartments probably approached their equilibrium levels. This is indicated also by improving ratios of apartment prices to wages and rental returns. The number of housing starts declined in response to the falling prices. However, the high rate of apartments under construction persists and the time to sell apartments is getting longer. Developers' situation is also worsening because of a further fall in demand for commercial property combined with a rise in the vacancy rate.

RESIDENTIAL PROPERTY PRICES

Property prices fell in 2009…

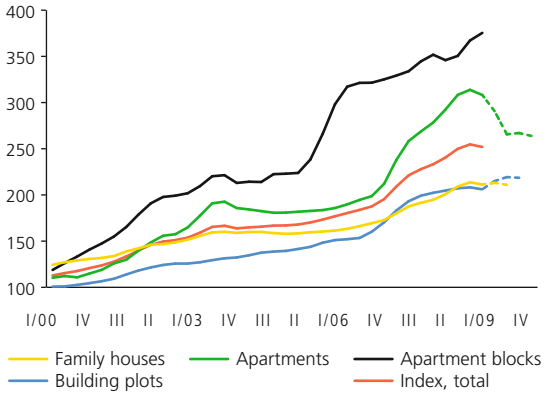
Between 2005 and 2008 property prices in the Czech Republic rose practically continuously in all segments, but since 2009 they have been declining. This decline relates primarily to apartment prices, which, according to preliminary estimates based on property transfer prices, were down by roughly 14% year on year at the end of 2009 H1 (see Chart III.16). Prices have not responded so strongly in property market segments where prices were rising more moderately in 2006–2008. Prices of family houses were flat year on year in mid-2009 and estimates of land prices based on supply prices even indicate modest growth (of around 5%). The latest available data on apartment block prices from the end of 2008 indicate continued growth, although the relatively low number of transfers in this segment of the property market deserves mention.

…while the decline in transfer prices was deeper than that in supply prices

Prices of apartments, for which data sources are the widest, are showing different growth rates for transfer prices and supply prices (see Chart III.17).

Chart III.16

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



Source: CZSO, CNB calculation
Note: 2009 data preliminary or calculated from supply prices (for prices of apartments and building plots).

Transfer prices showed the fastest growth in 2007 Q3, then their year-on-year growth rate slowed, whereas supply prices peaked around 2008 H1. Transfer prices recorded their subsequent year-on-year decline again rather earlier than supply prices. In the case of supply prices, a partial stabilisation of the situation can be observed at the end of 2009, with annual declines of just above 10%. Recently, then, the changes in transfer prices have been preceding those in supply prices and have also usually been more pronounced.[73] This suggests some anticyclicality in the difference between these prices, with a decline in demand on the property market leading first of all to a decline in the actually realised prices.

Together with the turnaround in property prices there were also changes in the cross-regional price growth structure. During the period of fast growth in apartment prices these prices rose faster in the other regions than in Prague, but the opposite is true now. The largest year-on-year declines are being recorded in regions which previously saw the largest increases in prices (year-on-year price declines of around 20% in the Moravia-Silesia and Hradec Králové regions, for example). Small price declines have been recorded in the Karlovy Vary and Ústí regions for example.

The decline in prices was linked with the worse overall economic situation in the Czech Republic…

The decline in property prices in 2009 was linked mainly with the worse overall economic situation. According to a CNB analysis,[74] property prices were previously largely driven by demand, in particular by demographic factors (natural population growth and net migration) and market factors (unemployment rate, number of vacancies and wage growth). Moreover, according to standard models of economic behaviour, part of the demand was also driven by speculation on further growth in property prices in the future. Most of these factors showed a significant year-on-year deterioration in 2009. Natural population growth decreased by one-quarter from its high 2008 levels, while net migration dropped by two-thirds compared to the record levels observed in 2007, reaching a five-year low. The registered unemployment rate increased by 3.3 p.p. year on year, coming close to the 10% level, while the number of vacancies fell by two-thirds year on year at the end of the year.[75] Such a rapid deterioration in the labour market situation is historically unprecedented (for more details on the labour market, see section 2.3). The deterioration in these demand-side factors explains most of the observed decline in apartment prices; only a small part corresponds to the bursting of the bubble observed in 2007 and 2008

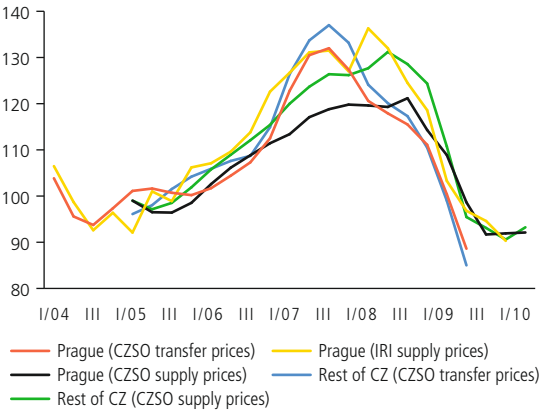
73 However, the fact that transfer prices are preceding supply prices cannot be used for analysing the current trend in flat prices, since these prices are published with a long lag and are usually revised relatively significantly.

74 Hlaváček, M., Komárek, L. (2009): *Property Price Determinants in the Czech Regions*, CNB Working Paper No. 12/2009.

75 Wage growth remained relatively high at the end of 2009 (according to the LFS, average wage growth rose by 4% year on year in 2009 and by 5.2% in 2010 Q1). However, the high growth in wages was due largely to one-off factors of a statistical nature, in particular a lower sickness rate and changes in the employment structure, with low-wage and high-sickness-rate employees being laid off first. See CNB (2010): *Inflation Report II/2010*, CNB.

CHART III.17

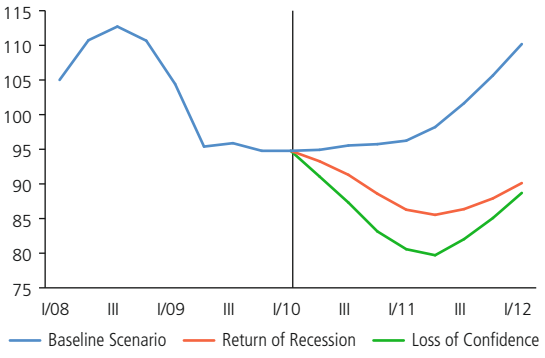
Property prices – transfer prices and supply prices
(y-o-y indices)



Source: CZSO, IRI

CHART III.18

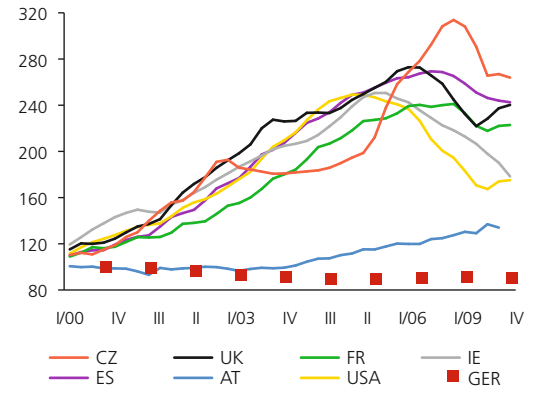
Property price scenarios
(absolute index; 2007 Q4 = 100)



Source: CZSO, CNB calculation

CHART III.19

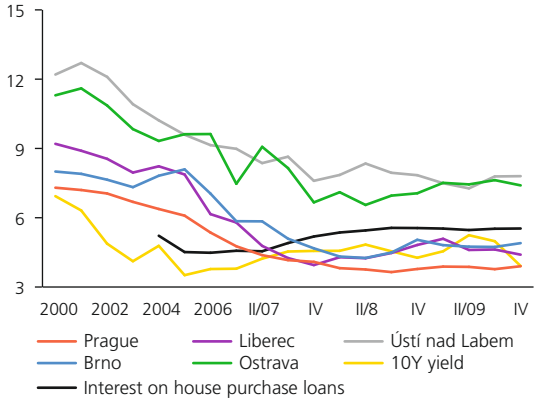
Property prices – international comparison
(absolute index; 1999 Q1 = 100)



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

CHART III.20

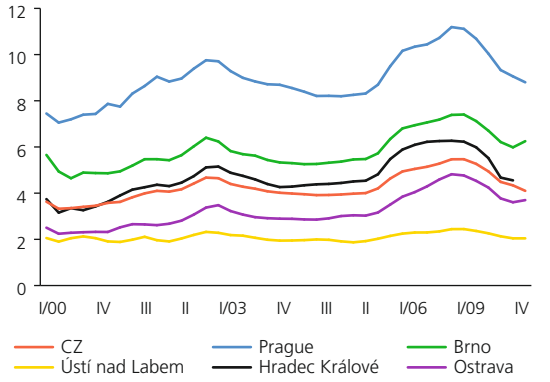
Rental returns
(averages for period in %; comparison with yields on 10Y government bond and house purchase loan rates)



Source: IRI, CNB

CHART III.21

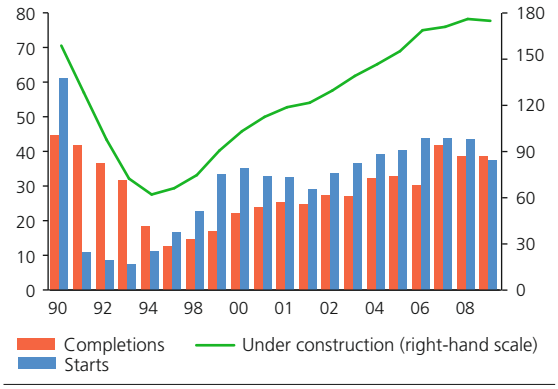
Price-to-income ratios
(ratio of price of 68 m² apartment to wage for last four quarters)



Source: CZSO, CNB calculation
Note: 2009 data preliminary or calculated from supply prices

CHART III.22

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



Source: CZSO

(about 15% of the price decline, see Chart III.4 Box). Chart III.4 Box also shows that according to the econometric model apartment prices are currently close to their equilibrium values, which were obtained on the basis of fundamentals.[76] Hence, if the aforementioned fundamental factors do not show any further significant deterioration, property prices should tend to remain flat in the near future. The most probable *Baseline Scenario* sees renewed price growth in mid-2011 (see Chart III.18). In the not very likely stress scenarios *Return of Recession* and *Loss of Confidence*, apartment prices may decrease further by about 8% and 16% respectively at the one-year horizon in response to worsening macroeconomic fundamentals.

...and followed the price decline abroad

The decline in property prices in the Czech Republic in 2009 followed declines in property prices abroad, which started to emerge in 2008 when apartment prices were still rising in the Czech Republic. For example, property prices in the USA fell by as much as 33% compared to the peak observed in 2006, those in the UK were down by as much as 19% in 2009 compared to their record levels, and those in Spain and France declined by about 10% (see Chart III.19). Some countries saw a slight recovery in 2009 H2, with prices rebounding by around 5% in the USA and the UK and by 2.4% in France. Although the overall increase in property prices in the Czech Republic in the last decade was higher than that abroad, the decline in property prices in 2009 might have been sufficient, since the price increase in 2006–2008 can be attributed partly to the converging nature of the Czech economy and the effect of convergence of prices towards those prevalent abroad.[77] On the other hand, in comparison with neighbouring advanced economies (Germany and Austria), which are the Czech Republic's major trading partners and where property prices were broadly flat in the last decade, the price growth in the Czech Republic seems rather high, particularly relative to the average wage.

Price sustainability ratios improved

The continuing rise in apartment prices in the Czech Republic in 2008 resulted in quite a significant deterioration in the indicators of sustainability of these prices to their worst-ever values, whereas in 2009 both the *apartment rental return* and the *price-to-income* ratio showed a slight improvement. Rental returns in the three largest cities (Prague, Brno and Ostrava) increased by 0.3–0.8 p.p. at the end of 2009 compared to the record low levels observed in mid-2008 (see Chart III.20). The rental return also mostly improved in the other regions

76 Of course, this conclusion applies only within the econometric models considered, taking into account the spreads of their estimates. Equilibrium prices, or price gaps, are calculated in two alternative ways in Chart III.4 Box: using a time series analysis on quarterly data for the Czech Republic as a whole and using panel regression across the Czech regions on annual data. For details see the above-mentioned paper by Hlaváček and Komárek (2009).

77 This can also be illustrated by the fact that the situation in the Czech Republic is comparable with that in other countries as regards *price-to-income* and *price-to-rent* ratios (see Charts III.5–III.7 Box).

compared to 2008, with the largest increase being recorded in Olomouc (1 p.p.). A pronounced decline in the rental return was recorded only in Karlovy Vary (-0.8 p.p. year on year). The rental return increased even though interest rates on house purchase loans were generally flat and long-term market interest rates were falling.

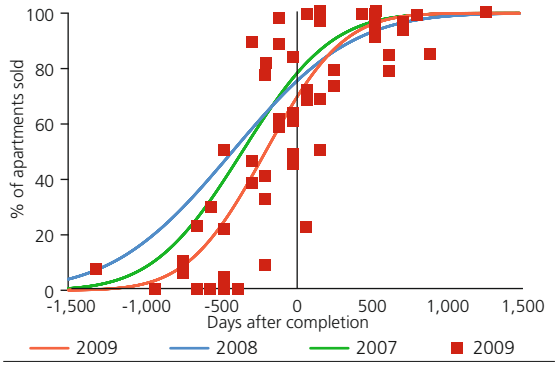
The estimated *price-to-income ratio* (see Chart III.21) improved considerably for all Czech regions (declines of 10–20% from the peaks observed in 2008 Q2 and Q3). However, on average it is slightly below the levels observed in mid-2003, when a bubble associated with the Czech Republic's accession to the EU emerged on the property market. According to both indicators, Prague seems to be the riskiest region, although it has much better values for other relevant indicators and has so far been less affected by the economic recession than the other Czech regions.

Housing construction declined and the time to sell new apartments increased

The decline in apartment prices in 2009 was also reflected in a decline in housing construction, which started in 2008 Q4. In particular, there was a sharp annual decline (of 14%) in the number of starts, while the number of completions was flat, as was the high number of dwellings under construction (see Chart III.22). The largest decline in the number of starts was observed for apartment blocks (down by 20% to a six-year low), which suggests a decrease in activity by developers. In parallel with the decline in the number of starts, the time to sell is getting longer (see Chart III.23). In the past developers were able to sell almost 80% of all the apartments in their projects before construction was completed, whereas in 2009 they managed to sell only 68%. There is also a relatively large differentiation between individual projects, with about one-third of projects lagging significantly behind the sales projection. Combined with the tightening of credit standards by banks, such delays in selling apartments may cause developers to incur additional unexpected costs, which, in turn, may lead to insolvency in some cases.

CHART III.23

Progress in selling of residential development projects in Prague

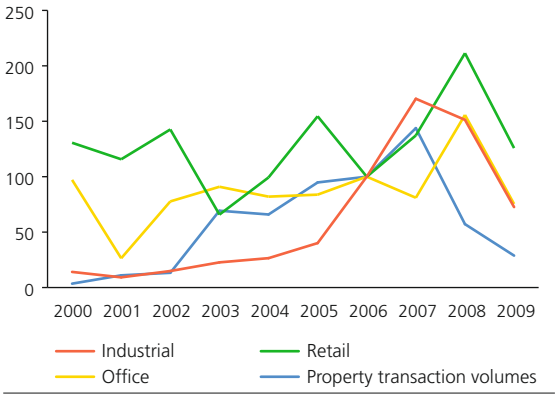


Source: Czech Technical University
Note: Red points show individual projects and progress with their sale.

CHART III.24

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.

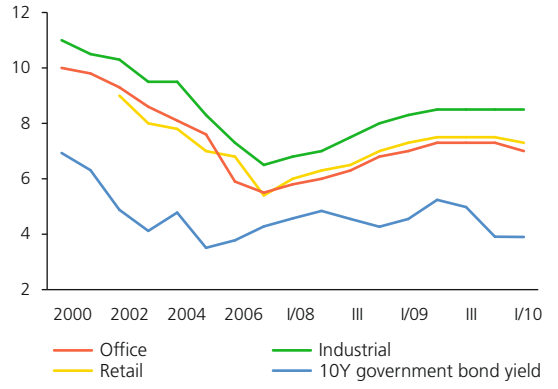
COMMERCIAL PROPERTY PRICES

The commercial property market faced a liquidity shortage…

The risks to the developer sector in 2009 were further increased by a none-too-good situation in the commercial property market, which faced a liquidity shortage in the first three quarters. The volume of investment transactions was very low, declining by a sizeable 80% from its 2007 peak to the levels seen at the start of the millennium, when the property market was still only developing (see Chart III.24). The Czech property investment market was virtually abandoned by foreign investors (only one German real estate fund was active), which withdrew to their domestic markets. The market was dominated by Czech and Slovak investors in 2009, which made 15 of the total 20 transactions and accounted for 52% of the market. Developers

CHART III.25

Yields on commercial property
(%)



Source: King Sturge
Note: The figures for industrial and office property are expert estimates.

CHART III.26

Vacancy rate and total stock of office property
(vacancy rate in %; stock in thousands of m²)

Source: King Sturge, Prague Research Forum

responded with a lag to the decline in liquidity in the market in 2009 with a similarly strong decline in planned construction of 40–50% depending on the type of property. A continuing strong decline in construction is expected for 2010. This decline started in 2009, when, for instance, no office construction projects were launched.

...which was reflected in an increase in required yields

The number of transactions in the property market was so low in 2009 that it was virtually impossible to determine prices and related primary yields (a higher yield means that the investor demands a lower price for any given rent) for some segments of the market.[78] In spite of this, it can be said that the decline in demand was reflected in a further decline in prices and a related rise in yields (see Chart III.25). Since 2007, the latter has grown by 1.8 p.p. for office buildings, 2.0 p.p. for industrial real estate and 2.1 p.p. for retail property. Yields have increased despite a decline in yields on alternative investment in long-term government bonds (of 0.4 p.p. year on year), which means that investment in commercial property has become relatively attractive. The market recovered somewhat at the end of 2009, as the volume of real estate transactions was more than three times higher in Q4 than in the other three quarters put together.

The vacancy rate also rose

The economic crisis was also reflected in the commercial property market in a significant increase in the vacancy rate for both the office market and the industrial market. The vacancy rate for the office market has doubled over the last two years, from 5.8% to 11.8% at the end of 2009 (see Chart III.26), despite a 10% year-on-year decline in rents in the centre of Prague and despite the aforementioned year-on-year fall of more than 50% in the supply of new offices. The vacancy rate for offices put on the market in 2008–2009 was even 31% at the end of 2009. The vacancy rate for industrial real estate has increased over the last two years from around 10% to 17.6%, again despite a decline in new supply of 50%.

The risks to developers were also reflected in growth in NPLs

The aforementioned risks to the developer sector can be illustrated by growth in the NPL ratio in this sector in 2009 (see Chart III.27). The NPL ratio of the developer sector has long been lower than that of the non-financial corporations sector. For a selected group of developers[79], however, the NPL ratio has risen significantly since mid-2009, exceeding the NPL ratio for non-financial corporations as a whole. At the same

78 As there were no significant sales in the industrial and retail segments, the return estimates are only expert estimates by real estate agents and investment consultants.

79 The NPL ratio in Chart III.27 is calculated in two ways; both use the CNB's Central Credit Register as the source of data. The first method is based on selected developers linked to the projects in Chart III.23 (about 400 entities including related companies). The second series shows loans granted to all corporations in the "real estate activities" sector (CZ-NACE 68) and the "development of building projects" sector (CZ-NACE 411). However, these sectors also include other real estate companies, such as estate agencies, property management companies and owners' associations and housing cooperatives. The last two were not included in the calculation.

time, the share of loans to developers in total loans to non-financial corporations rose from around 9% at the end of 2002 to a current level of about 23%. Developers also record a higher share of loans in foreign currency than other non-financial corporations (24.6% versus 18.4%). Some developers were forced to sell both commercial and residential projects towards the end of the year. The volume of these forced sales has so far been relatively small, but going forward they can be expected to exert downward pressure on prices on the one hand and to help get the overall property market moving on the other hand.

3.3 THE FINANCIAL INFRASTRUCTURE[80]

Under Act No. 6/1993 Coll., on the Czech National Bank, the Czech National Bank administers payments and clearing between banks, foreign bank branches and credit unions. It maintains the smoothness, security and reliability of the interbank payment system CERTIS and the short-term bond system SKD. These systems play a key role in financial stability, as they can become a channel for the propagation of shocks from one financial institution to the whole financial system. Given the stable situation in the Czech banking sector, however, no such propagation occurred in 2009.

Declines persist in both the value of transactions processed by SKD and the value of intraday credit

The value of the transactions processed by SKD rose continuously from 2000 to 2006. In 2007 there was a slight decline, which continued in the two following years and in the first few months of 2010. The decline was associated with lower volumes of repo operations and a downswing in the short-term bond market. An average of CZK 143 billion was processed daily in 2009, down by around 15% from a year earlier (see Chart III.28). SKD's turnover in roughly 25 days equalled annual nominal GDP.

The value of intraday credit also decreased.[81] The volume of intraday credit had been showing a gradual upward trend in previous years, but in 2008 it declined by 50% (see Chart III.29). In 2009 it decreased by a further 17% (to CZK 3,006 billion). The decline in the use of intraday credit may reflect slightly lower interbank payment turnovers and a downswing in 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 and thus have no need to use this instrument (see sections 3.1 and 4.1).[82]

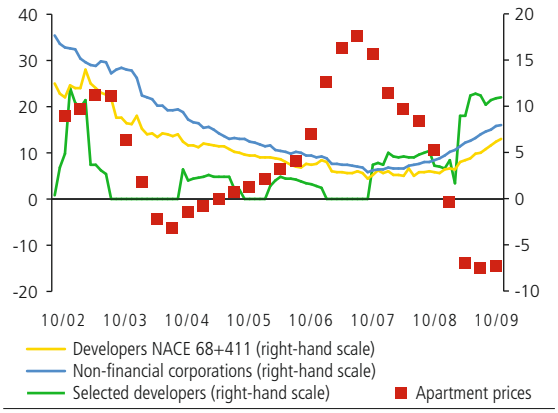
80 This section is devoted solely to the financial infrastructure systems administered by the CNB.

81 The use of intraday credit supports smooth and stable interbank settlements. Through SKD, the CNB provides CERTIS 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.

82 However, 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. Only four banks use of intraday credit regularly.

CHART III.27

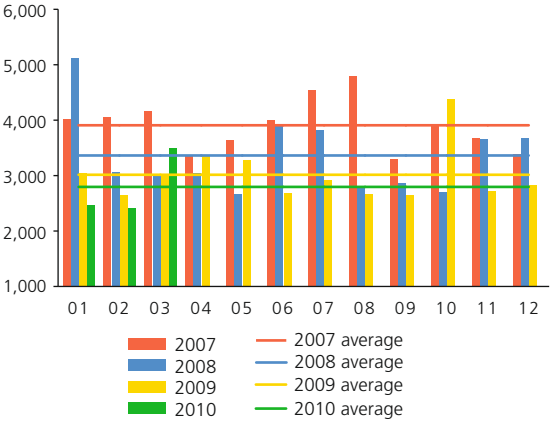
NPL rates versus apartment price growth
(%; year-on-year growth for apartment prices)



Source: CZSO, CNB[79]

CHART III.28

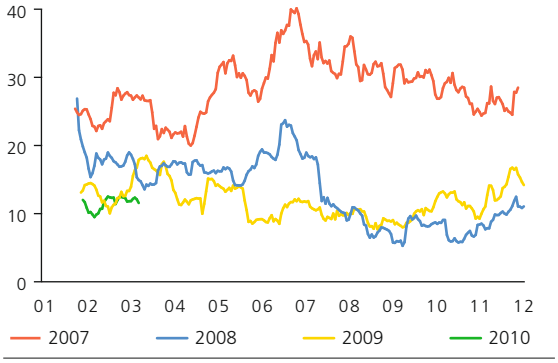
Total value of transactions processed by SKD in individual months of 2007, 2008, 2009 and 2010
(x-axis months; CZK billions)



Source: CNB

CHART III.29

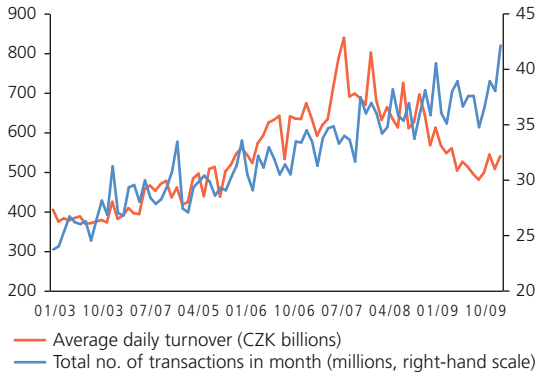
Comparison of intraday credit values in 2007, 2008, 2009 and 2010
(x-axis months; CZK billions; moving average/21)



Source: CNB

Chart III.30

CERTIS interbank payment system – number of transactions processed in 2003–2008



Source: CNB

Table III.2

CERTIS interbank payment system – statistical information

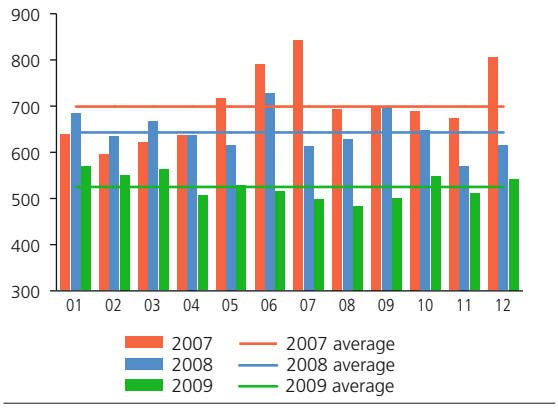
Period	Turnover (CZK billions)	Average daily turnover (CZK billions)	No. of transactions (millions)	Average daily no. of transactions (millions)	GDP/ Average daily turnover
2002	100,343	431	262	1.12	5.6
2003	96,938	385	317	1.26	6.6
2004	110,127	434	333	1.32	6.4
2005	123,354	488	356	1.40	6.0
2006	151,537	604	382	1.52	5.3
2007	174,854	697	411	1.64	5.1
2008	162,993	644	436	1.72	5.7
2009	131,679	525	450	1.79	6.9

Source: CNB

Chart III.31

Average daily turnovers in CERTIS in individual months of 2007, 2008 and 2009

(x-axis months; CZK billions)



Source: CNB

CERTIS ran smoothly

The economic slowdown also affected payment activity and thus led to a decline in the monitored characteristics of the CERTIS system. Although the upward trend in the number of payments settled continued into 2009, average daily turnover fell by 18% year-on-year (compared to 6% in 2008; see Charts III.30 and III.31). In 2009, CNB Clearing processed 450 million transactions totalling CZK 131,679 billion. The average daily value of the transactions was CZK 525 billion (see Table III.2). These figures reveal the extent of payment settlement in CERTIS and its significance for financial stability. It took roughly seven days to reach a turnover equal to annual nominal GDP.

The value of currency in circulation recorded an annual decline in 2009

The value of currency in circulation fell by CZK 11.9 billion in 2009, the first decrease since the introduction of the Czech currency in 1993. At the end of the year, it stood at CZK 387.3 billion (see Chart III.32). This decrease was due to the gradual dissolution of hoarded money[83] remaining after extraordinary amounts had been withdrawn from bank accounts in October 2008 in response to the global financial crisis.

A new payment system act has had impacts on private and public law banking practice

An amendment of the Payment System Act entered into force on 1 November 2009.[84] This statute, which transposes a relevant EU directive[85] into Czech law, introduces among other things numerous duties in respect of payment service contracts, which include current account agreements. In addition to the already regulated entities with banking licences, the new law subjects other entities providing payment services to certain regulatory and supervisory requirements.[86]

The new statute introduces two categories of previously unregulated payment service providers. The first category covers payment institutions authorised to provide payment services on the basis of authorisation by the CNB. To be granted such authorisation, a payment institution must comply with numerous regulatory requirements (capital adequacy, protection of funds intended for payment transactions, information duty to the CNB). Harmonisation of regulatory and supervisory requirements within the EEA will enable authorisations granted to payment institutions in one member state to be recognised in other member states (the so-called single passport). Provision of services in the host state will be subject only to a reporting duty to the home supervisory authority. This should enhance competition in the payment services market.

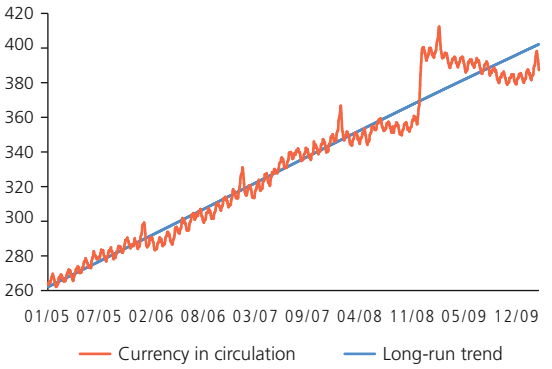
83 Hoarded money is money that people keep as cash at home rather than investing in financial products.
84 Act No. 284/2009 Coll., on the Payment System.
85 Directive 2007/64/EC of the European Parliament and of the Council of 13 November 2007 on payment services in the internal market.
86 This includes, for example, entities that carry on non-cash foreign exchange transactions (spot transactions).

The other category comprises small-scale payment service providers on the basis of registration with the CNB, for which the regulatory and supervisory regime is less strict. Nevertheless, the authorisation of such providers is limited to the home member state.

As regards the regulation of private law relationships, the law stipulates uniform standards for payments and the protection of payment services users. Although the duties stipulated by the new statute are not completely new for banks and other already regulated payment services providers, some duties, in particular the information duty, may necessitate changes in operating procedures and client documentation.

CHART III.32

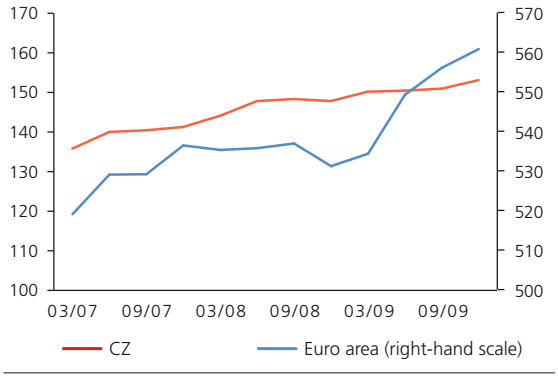
Currency in circulation 1995–2009
(CZK billions)



Source: CNB
Note: Trend curve calculated using HP filter.

CHART IV.1

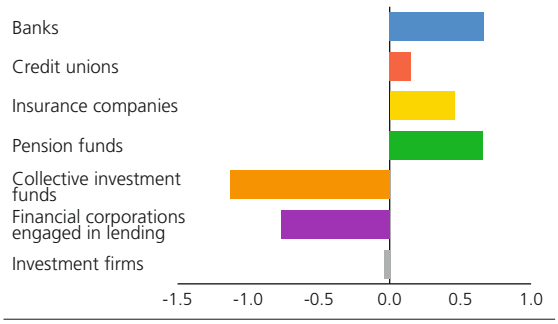
Depth of financial intermediation
(assets of financial corporations as % of GDP)



Source: CNB, ECB

CHART IV.2

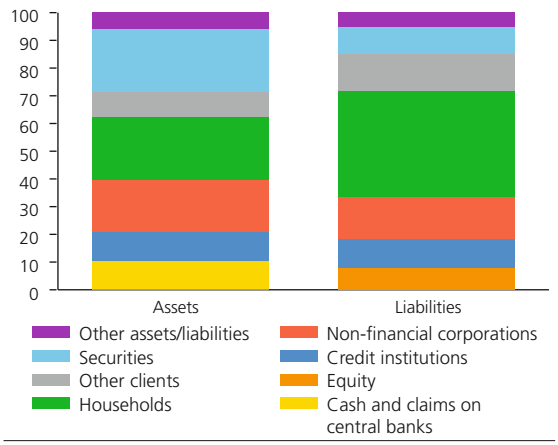
Change in shares in financial sector assets over the last two years
(p.p.; change between end-2009 and end-2007)



Source: CNB

CHART IV.3

Structure of banking sector assets and liabilities
(% of total assets/liabilities; 2009)



Source: CNB

4 THE FINANCIAL SECTOR

The Czech financial sector adapted very well to the adverse economic situation in 2009 and reported good economic results. At the same time, there was a halt in growth in total assets of financial institutions, which have been virtually flat since 2008 H2 (see Chart IV.1). The gradual deepening of financial intermediation in the Czech Republic, as measured by the ratio of assets of financial institutions to GDP, thus stopped just above the 150% level (compared to 560% of GDP in the euro area).

Thanks in part to active communication by the central bank and government institutions, general risk aversion towards countries classified by analysts and international institutions as the CEE region came to a halt. This aversion had peaked in the first few months of 2009. In the remainder of 2009 and at the start of 2010, however, a more differentiated approach to developments in financial sectors in individual EU countries was observed.

Future developments in the financial sector will depend on what happens in the real economy (see section 2) and in financial markets abroad (see section 3), but the domestic financial sector is currently relatively resilient to the risks identified.

4.1 FINANCIAL SECTOR DEVELOPMENTS

The main segments of the financial sector coped well with the adverse economic situation. The banking sector increased its capital adequacy amid a stagnant loan portfolio. Insurance companies, pension funds and mutual funds benefited from more favourable trends in the financial markets. The capitalisation of insurance companies and pension funds is assessed as sufficient. Non-bank financial corporations engaged in lending lost market share. Despite signals of a general improvement in the economic outlook and financial market situation, we identify the following risks to the financial sector. First, a more pronounced increase in NPLs (to both households and corporations) in the event of renewed economic recession, especially for banks that have more concentrated portfolios. Second, a decline in bond holdings due to a potential increase in the Czech Republic's risk premium connected with the risk of unsustainable developments in the fiscal area. Besides banks, this would significantly affect insurance companies, pension funds and mutual funds. Third, a decline in banks' operating profits due to a possible flattening-out of the yield curve in the near future and a decline in interest margins. Fourth, liquidity risk in the building societies subsector, which might be reflected in the reputational risk of parent banks if problems manifest themselves. Fifth, the so far unclear impact of international initiatives to reform the regulatory framework on the currently well-capitalised and liquid domestic banking sector.

The structure of the financial sector changed somewhat in 2008 and 2009. In particular, banks, insurance companies and pension funds increased their share in the sector's total assets at the expense

of collective investment funds and non-bank financial corporations engaged in lending (see Chart IV.2). With their share of 77%, banks remain the dominant subsector.

The banking sector recorded flat total assets

The banking sector has maintained its total assets at around the same level (just over CZK 4 trillion) since 2008 H2. Having previously increased dynamically, the credit portfolio thus remains flat due to weak economic output, declining demand for loans, particularly in the corporate sector, and partly also to a tightening of the credit conditions by banks themselves (see section 2.2).

Renewed growth in loans in the near future will depend on the rate of economic recovery, monetary and fiscal policies, the setting of credit conditions by banks (reflecting also credit risk), sufficient sources for loan financing, and the adequacy of the capital and liquidity buffer with regard to potential future changes in bank regulation (see Box 6). Compared to many European countries, the conditions for renewed loan growth in the banking sector are relatively favourable, while the extent of the economic recovery and its impact on demand for loans remain uncertain. In the *Baseline Scenario*, growth in client loans would amount to 6.3% in 2010 and rise to almost 8% in 2011. In the stress scenarios with weaker economic activity, however, the total credit portfolio could shrink by as much as 15% (see section 4.2).

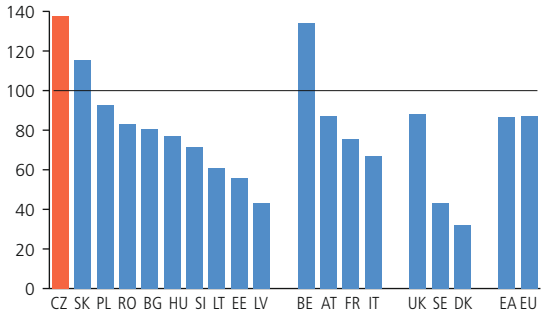
The conservative banking model in the Czech Republic has proved successful

The banking sector's asset and liability structure clearly shows the prevailing traditional conservative model of domestic banking business, which is based largely on providing loans and accepting deposits (see Chart IV.3). This banking business model, together with full coverage of the credit portfolio from domestic client deposits (see Chart IV.4), a virtually zero share of foreign currency loans to households and minimal activity of banks in the Czech Republic in investment in riskier financial products, contributed to the resilience of the Czech banking sector to the first phase of the global financial crisis in 2007–2008, which was marked by a sharp fall in prices of toxic assets and reduced liquidity in global markets. Temporary declines in the value of some financial assets and persisting low liquidity in the domestic money market had no major effect on the banking sector.

The Czech Republic was one of the EU countries where the situation required no capital injections from public sources or the use of any other instruments to support the banking sector (government guarantees for bank debt, purchases of problem assets or measures to support the balance-sheet liquidity of banks). The total support from public sources in EU countries forced to apply the aforementioned measures amounted on average to more than 20% of GDP. However, guarantees accounted for most of this support (17% of GDP), while capital injections represented only about 2% of GDP.

Chart IV.4

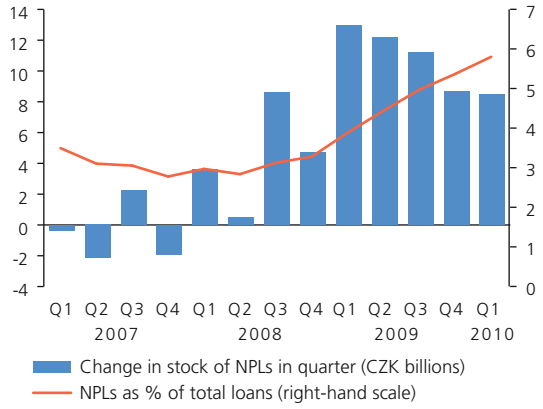
Ratio of deposits to loans granted in selected EU countries
(2009; %, deposits/loans to residents)



Source: ECB
Note: EA = euro area; EU = average for all EU countries.

Chart IV.5

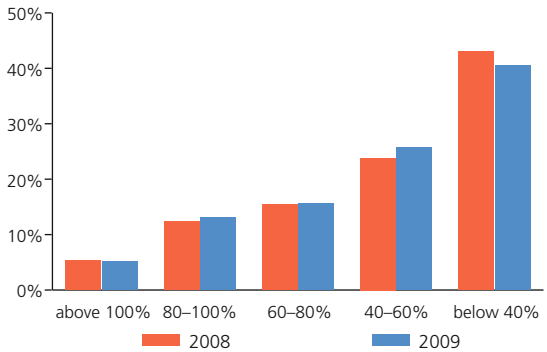
NPLs in the Czech banking sector
(client loans; %; CZK billions)



Source: CNB

Chart IV.6

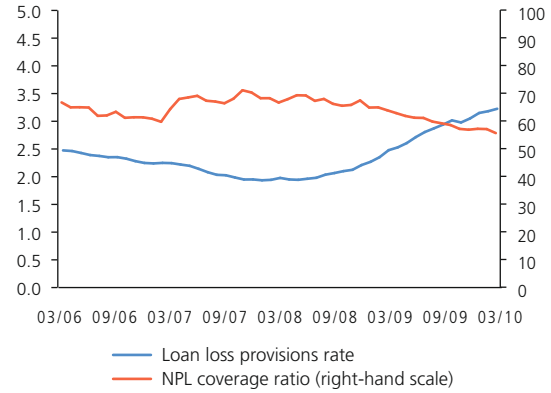
LTV ratio distribution for building societies
(%)



Source: CNB

Chart IV.7

Provisions and coverage of NPLs by provisions
(%)



Source: CNB

Table IV.1

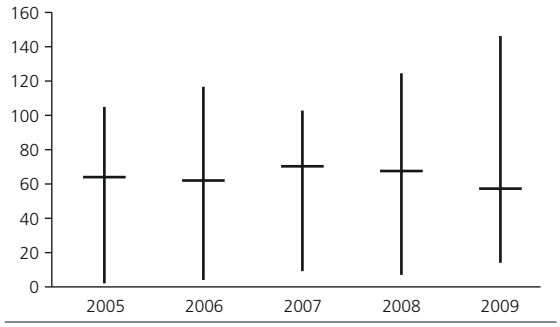
Structure of NPLs by collateral, category and time past due

	Collateralised loans to households and corporations	Non-collateralised loans to households and corporations	Other loans	NPLs, total
2007	26.5	63.2	10.3	100.0
2009	33.2	58.8	8.0	100.0
	Non-standard	Doubtful	Loss	NPLs, total
2007	31.5	16.8	51.7	100.0
2009	37.3	20.9	41.8	100.0
	Not past due	Up to 3M past due	More than 3M past due	NPLs, total
2007	47.7	7.8	44.5	100.0
2009	52.3	8.8	38.9	100.0

Source: CNB, CNB calculation
Note: Collateralised loans = loans for house purchase + loans to corporations backed by property and at least two other types of collateral (pledged receivables, movables, securities, sureties, guarantees, etc.).

Chart IV.8

Distribution of NPL coverage ratio in the Czech banking sector
(%; min, max and average)



Source: CNB

Credit risks are becoming a closely observed area…

The subsequent phase of the global financial crisis, combined with a strong, internationally synchronised economic recession in 2009, is generating concerns about the extent and impact of increased credit risks. This is a closely observed area in the European context, since the role of credit risk in total bank risks – as measured by the ratio of capital requirements for credit risk to total capital requirements – is around 85% on average in all EU countries (except the UK, where it stands at 60%; in the Czech Republic it is 88%).

The decline in economic activity in the Czech Republic since 2008 H2 resulted in an increase in NPLs in bank portfolios to 5.2% at the end of 2009 (see Chart IV.5) and 5.8% in March 2010. Although the inflow of new NPLs gradually decreased during 2009, uncertainty still prevails with regard to the intensity of their growth in 2010. In spite of the expected slight recovery, economic conditions may not be favourable enough for a more pronounced decline in credit risk (see section 2.1).

…especially in the segment of house purchase loans, which are being tested by economic recession for the first time

This mainly concerns the household segment, which is being affected by the recession with a lag, together with an increase in unemployment (see section 2.3). Moreover, this is the first time in the Czech Republic that the relatively large bank portfolio of loans to households – the volume of which exceeded loans to non-financial corporations at the end of 2009 – has undergone the test of economic recession.

There is particular uncertainty about NPL growth in the segment of house purchase loans. Attention is also being focused on building societies, which specialise in house purchase loans and whose credit portfolio now represents almost 40% of all house purchase loans granted. For several years, these specialised institutions, which form part of the banking sector, have recorded faster growth in house purchase loans than the average figure for the banking sector as a whole and increasingly grant loans of a bridging nature with nominal values exceeding CZK 500,000, whereby they aim to compete with mortgage loans offered by banks.[87]

However, credit risk in the building society sector can be assessed as low. Building societies recorded an average LTV ratio for mortgage loans of 54% at the end of 2009, while the figure for the banking sector as a whole was roughly 56%. Moreover, information about the distribution of the LTV ratio indicates a high proportion of well-secured loans with LTV ratios below 40% (see Chart IV.6). The NPL ratio has long been just below 2% and was exactly 2% at the end of 2009, while the figure for the banking sector as a whole in the house purchase loan segment was 2.6% in the same period.

87 A survey conducted among building societies in March 2010 revealed that loans exceeding CZK 500,000 currently account for around 52% of total loans granted by building societies, up by 4% on a year earlier. Building societies also increasingly refinance mortgage loans, but the share of such loans in total loans granted is just a few per cent.

The higher credit risk is being reflected in increased provisions

The volume of provisions for NPLs continued to grow in 2009 and at the beginning of 2010 in parallel with the increase in NPLs. The loan loss provision rate thus increased to 3% in December 2009 (see Chart IV.7). However, the rise in provisions lagged slightly behind the rise in NPLs in 2009. This was reflected in a decline in the NPL coverage ratio to 57% in December 2009 and 56% in March 2010.

The main reason for the decline in NPL coverage was a change in the NPL structure in terms of both collateral value and classification (substandard, doubtful and loss loans). The proportion of NPLs with relatively good collateral (house purchase loans secured by property and secured loans to corporations[88]) increased from 26.5% in 2007 to 33.2% in 2009 (see Table IV.1). The given volume of NPLs thus requires much lower provisions to cover potential losses, since provisions are created only for the unsecured part of the portfolio.

As regards the NPL classification structure, a comparison between 2007 and 2009 reveals that the largest growth in share was recorded by level-one NPLs, i.e. non-standard loans, which are defined mainly by a number of days past due in the range of 90–180 days (see Table IV.1). These are relatively "young" NPLs which require less provisioning than loans in worse categories.

Banks are acting very cautiously when classifying bad loans…

The available evidence suggests that many NPLs, especially in the substandard loans category, are being categorised on a prudential basis (i.e. on a voluntary basis by banks, without necessarily meeting the basic condition for them to be categorised as such, i.e. a past-due period of more than 90 days). Provisions are thus being created to a certain extent "in advance".

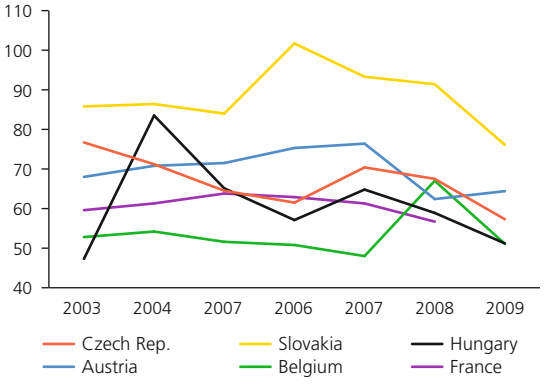
The hypothesis of prudential loan classification is supported by two observations. First, the structure of NPLs by days of default suggests that there has been an increase in the share of NPLs which are actually "being repaid", i.e. their repayments are not past due or the default period is shorter than 90 days (see Table IV.1). Particularly in 2009, banks classified a number of loans for prudential reasons as NPLs based on other factors than the number of days past due. Anecdotal evidence suggests that large and medium-sized banks in particular have invested a large amount of funds and effort in early warning systems which should be able to predict future defaults (for example on the basis of information on the sales and profits of corporate clients). Moreover, the adverse economic situation has led banks to set the default classification threshold at quite a conservative level, so many potentially good clients may have been classified as being "in default".

88 Information about the value of collateral for loans to non-financial corporations is not available on the aggregate level. The Central Credit Register maintained by the CNB contains only information about the existence of various types of collateral (property, claims, securities, guarantees, security, etc.). Loans secured by property plus two other types of collateral are considered loans with a relatively good collateral.

CHART IV.9

NPL coverage ratios – international comparison

(%)

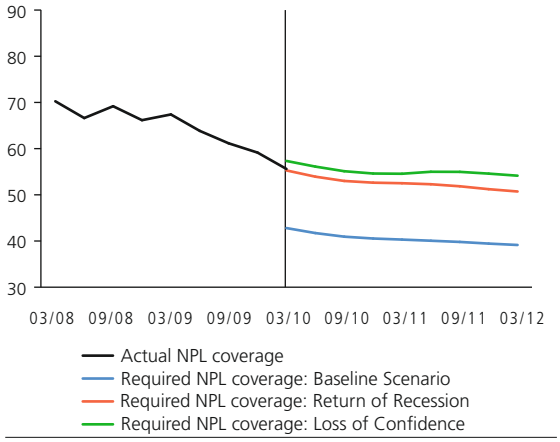


Source: IMF

CHART IV.10

Actual versus required NPL coverage

(NPL coverage ratio; %)

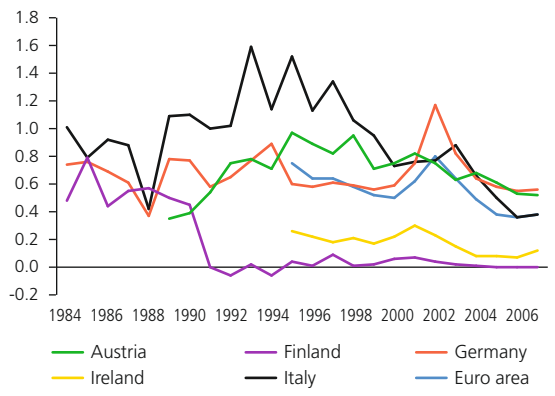


Source: CNB, CNB calculation

CHART IV.11

Loan loss provisioning rate

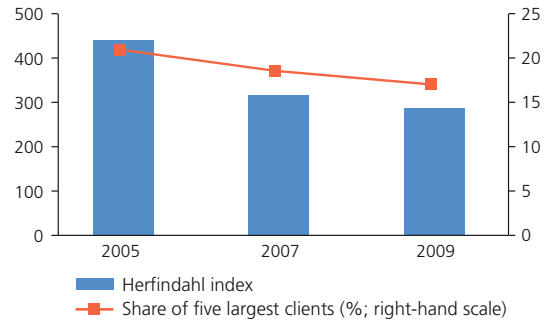
(% for selected countries)



Source: IMF

CHART IV.12

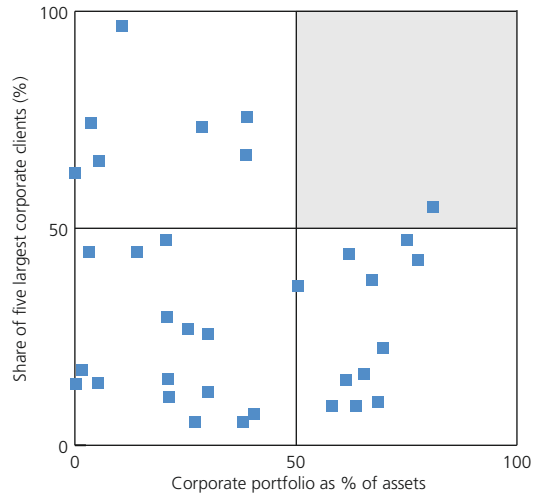
Concentration of corporate portfolios
(HHI index 0–10 000; share of five largest clients in %; loans to legal entities)



Source: CNB, CNB calculation
Note: Weighted average, with shares of individual banks in total portfolio of legal entities used as weights.

CHART IV.13

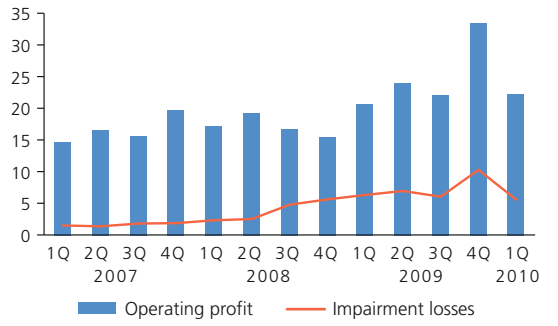
Concentration of corporate portfolios and relevance of corporate loans in assets
(%; as of end-2009)



Source: CNB, CNB calculation

CHART IV.14

Operating profit and impairment losses
(CZK billions; quarterly values)



Source: CNB

Second, the current regulatory rules force banks to classify restructured loans as NPLs, i.e. at least as substandard loans. Of course, the low economic activity has led to a rise in restructured loans. CZK 260 million in loans to non-financial corporations were restructured in 2008, while more than CZK 730 million were restructured in 2009, i.e. around 1% of the total portfolio. Restructured loans to households for house purchase rose from CZK 110 million to CZK 290 million (0.5% of the portfolio), while consumer credit surged from CZK 14 million to CZK 125 million (almost 1% of the portfolio). Although loan restructuring is de facto default, it involves a qualitatively different type of substandard loan than in the case of fully defaulting debtors with loans more than 90 days past due and a low repayment probability in the near future.

...and the NPL coverage can thus be regarded as sufficient

Despite a visible decline, the current NPL coverage ratio can be regarded as sufficient. The evidence regarding the distribution of banks in the Czech Republic by NPL coverage suggests that although this ratio has declined at the aggregate level, there has also been an increase in its maximum value (see Chart IV.8). An international comparison for the available countries reveals that declines were observed in most monitored countries last year (most probably for the same aforementioned reasons) and that values ranging between 50% and 60% are quite common (see Chart IV.9). Alternatively, the actual coverage ratio can be compared with the analytically constructed "required" coverage ratio. Various loss given default (LGD) rates were applied to each NPL segment. This creates expected loan losses for the individual segments and for the entire NPL portfolio, which should be fully covered by provisions. Given the uncertainty regarding the "correct" LGD rate, we conducted the analysis for the three different sets of LGD assumed in the alternative scenarios (see Chart IV.10). The results show that the current coverage ratio is more or less sufficient even for the stress scenario with extremely unfavourable LGD values.

The volume of new provisions, or its share in total gross loans (the provisioning rate), indicates the bank's risk costs. Given the flow nature of this indicator, it is an item which, adjusted for provisions released as unneeded, directly affects total profit in a form of loan impairment. The value of this indicator in relative terms increased in the Czech Republic from 1.5% in 2007 to 1.9% in 2009. Data available for international comparison (available only for the period before the global financial crisis) show that the figures for the Czech Republic are higher, although this may indirectly confirm the aforementioned hypothesis of a very prudential approach by banks to loan classification and thus of sufficient provisioning (see Chart IV.11).

Concentration of loan portfolios might be a risk

The advanced credit risk management systems, which banks currently use, require maximum portfolio "granularity", i.e. the smallest possible concentration of the loan portfolio. However, this is difficult to achieve, especially in smaller economies, where the relative size of banks is small

compared to large corporations. Although the regulatory framework in force restricts concentration by means of certain limits,[89] a non-linear increase in default in more concentrated portfolios cannot be ruled out if one of the adverse scenarios materialises.

Nevertheless, the available evidence suggests that the concentration of corporate loan portfolios has tended to decline in the past few years (see Chart IV.12). The average (weighted) share of the five largest clients (legal entities) was around 17% at the end of 2009, which is not a negligible figure. Since exposures to large (i.e. as a rule, credible) debtors are not only relatively large, but also less secured or entirely unsecured, banks might suffer large losses in this portfolio if several of their largest clients default (see section 4.2).

Concentration of the corporate portfolio could be a greater problem for banks where the corporate portfolio accounts for a significant share of total assets. Although the average concentration in the Czech banking sector has declined over time, there are banks whose corporate portfolios would be significantly affected by the collapse of their largest corporate debtors. These are mainly smaller banks or foreign bank branches focusing largely on corporate clients in their lending activities. However, the evidence suggests that there are almost no banks in the "critical quadrant" of a large share of corporate portfolios in assets and a high concentration of these portfolios (see Chart IV.13). The issue of concentration may thus affect individual institutions but should not pose systemic problems.

The good resilience of the banking sector is also illustrated by profitability in 2009

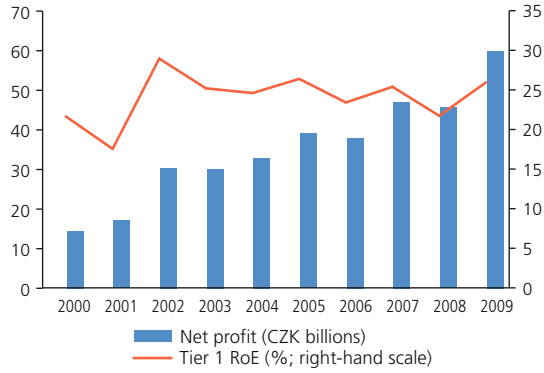
The conservative banking business model in the Czech Republic brings banks benefits in the form of relatively stable income on financial activities. Banks are able to generate sufficient income in the long run primarily through their portfolio of claims and to make net profits even in years when income on other financial activities declines or risk costs increase. The year 2009 was no exception in this regard. Despite an almost twofold increase in risk costs due to provisioning, profitability did not decline since operating profit gross of losses from impairment of loans and other assets recorded a sizeable increase (see Chart IV.14).

The banking sector ended 2009 with a net profit of CZK 60 billion, up by around 30% on 2008. This corresponds to a return on Tier 1 capital of 26.1% and a return on assets of 1.5% (see Chart IV.15). However, the increase in profits was affected by numerous one-off operations which influenced the results in both 2008 and 2009. The profit less these one-off transactions recorded in 2009 would be slightly below the 2008 level.

89 Loans and claims on clients or economically related groups may not as a rule exceed 20% of capital. In addition, there are other conditional limits on a bank's overall exposure.

CHART IV.15

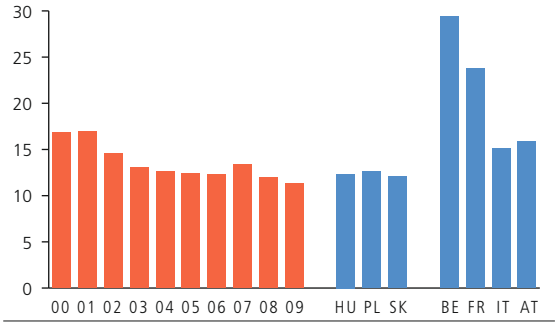
Net profit and return on equity
(CZK billions; %)



Source: CNB

CHART IV.16

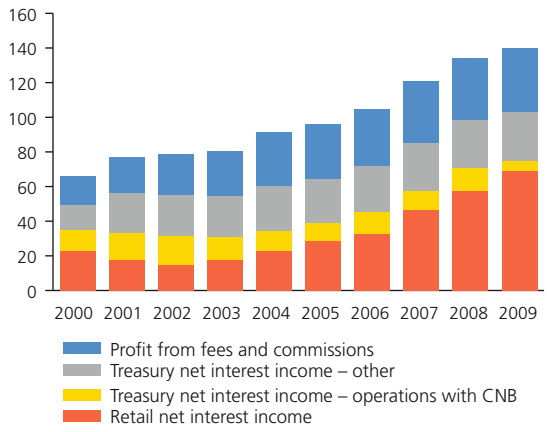
Leverage
(leverage multiple; assets as multiple of equity; CZ in 2000–2009; foreign data for 2008)



Source: CNB, ECB

CHART IV.17

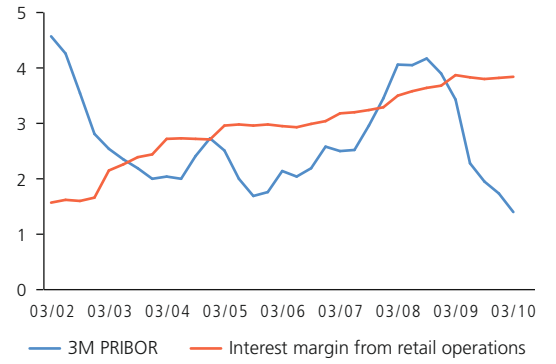
Key components of profit from financial activities
(CZK billions)



Source: CNB

CHART IV.18

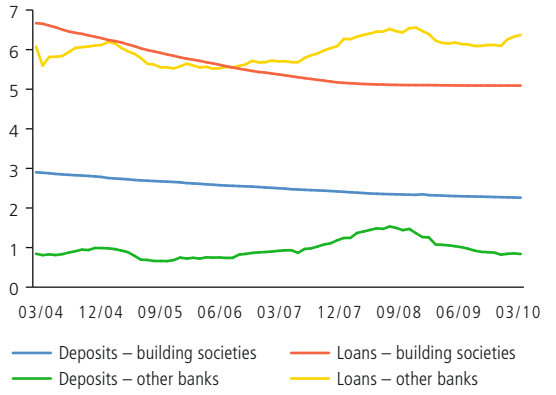
Interest margin from retail operations of banks
(%)



Source: CNB

CHART IV.19

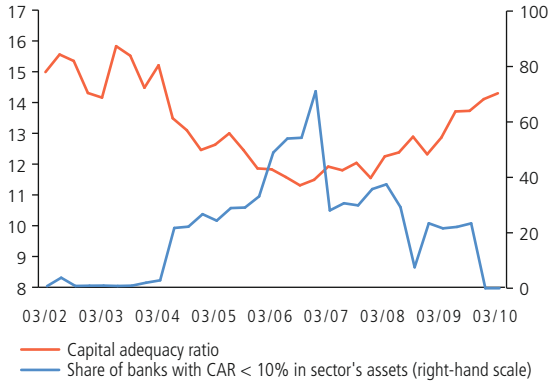
Average interest rates on assets and liabilities: building societies versus other banks
(%)



Source: CNB

CHART IV.20

Capital adequacy ratio
(%)



Source: CNB
Note: Assets of sector = assets of banks excluding branches of foreign banks.

Banks in the Czech Republic are able to maintain stable profitability despite slightly declining leverage

Since leverage (assets expressed as a multiple of equity) in the Czech banking sector has been generally declining over the past decade (see Chart IV.16), the sector's profitability has been driven not by the use of a larger volume of external funds compared to equity, but by a higher profit margin. The value of leverage for 2009 (12.5) is lower than in the banking sectors of some countries where parent banks of the largest Czech banking institutions are active. By contrast, Central European countries (Slovakia, Poland and Hungary) record very similar values of this indicator as the Czech Republic.

In 2009, banks benefited mainly from an increase in the interest margin, even in conditions of declining interbank rates…

Despite the reduced economic output, stagnant credit portfolios and declining market interest rates, the main components of profit from financial activities increased in 2009. A more detailed analysis reveals that the increase in net interest income was due mainly to a higher interest margin in the retail segment of client deposits and loans, as net interest income from the administration of securities and other financial operations (e.g. repo operations with the CNB) declined (see Chart IV.17).

The increase in the interest margin amid declining interbank rates (see Chart IV.18) was due to both a larger decrease in interest rates on deposits and the maintenance of relatively high average lending rates (see section 3.1). This pricing policy was banks' response to the higher existing and expected credit risk in the economy. The higher interest income is being used to cover losses from NPLs.

…but future developments will exert downward pressure on interest margins

The current interest margin can be assessed as being relatively high. In the near future the interest margin can be expected to decline as a result of factors associated with a slight economic recovery, a decline in credit risk and a possible flattening-out of the yield curve. The potential impact of regulatory requirements, e.g. for stable sources of financing, proposed as part of measures to support balance-sheet liquidity, also remains an open question (see Box 6).

The fact that building societies cannot lower interest rates for a significant proportion of their deposits as these rates are usually fixed contractually constitutes a risk to their net interest income. Owing to the set conditions for building savings schemes, the average rate on deposits is far higher in the current period of low interest rates than in the banking sector as a whole and the interest margin is smaller (see Chart IV.19). A longer period of low market interest rates – such as in the *Return of Recession* scenario – would thus exert pressure on their profitability.

The banking sector has sufficient capital adequacy and high-quality capital

The high profitability of Czech banks in recent years is directly reflected in satisfactory total capital adequacy and Tier 1 capital adequacy ratios (14.1% and 12.7% respectively at the end of 2009) thanks to increases in regulatory capital from retained earnings. Moreover, for the first time since 2002, all banks have total capital adequacy ratios above 10% (see Chart IV.20). The first months of 2010 suggest that although the ratio of dividends to profits in 2009 will increase slightly again (see Chart IV.21), regulatory capital will be significantly strengthened by retained earnings.

The total capital adequacy ratio of the Czech banking sector was at the European average in 2008. The quality of regulatory capital as measured by the ratio of Tier 1 capital to total regulatory capital is the second highest after Finland (see Chart IV.22). Although Tier 2 may equal up to half of Tier 1 according to the regulatory rules in force, in the case of Czech banks this share amounted to 16% on average at the end of 2009 and has shown no major change in the past four years, as both these components of capital are rising steadily. Retained earnings remain the largest component of Tier 1 capital (50% at the end of 2009). Subordinated debt is the main component of Tier 2, and was the only one at the end of 2009. At 18%, it ranks third in the structure of total regulatory capital, behind retained earnings (44%) and equity capital (27%). Retained earnings and subordinated debt rose in 2009 (see Chart IV.23).

The impact of international initiatives to improve capital quality remains an open issue

The high share of retained earnings in regulatory capital is often a source of debate regarding its "durability", as shareholders can easily withdraw this type of capital up to the permitted regulatory limits for Tier 1 capital or replace it to some extent with subordinated debt (i.e. Tier 2 capital). A comparison of EU countries suggests that in this respect, there is relatively large room for such capital adjustments in the Czech Republic. However, the existing international initiatives (see Box 6), which emphasise more than in the past that regulatory capital should be made up of components of the highest possible quality and be used to absorb potential losses, may increase the probability of the exchange of capital. The international banking groups to which Czech banks belong may be forced to a much greater extent to optimise their capitalisation not only on a consolidated basis, but also for individual subsidiaries. Countries in which subsidiaries of globally active banks have better quality capital (such as the Czech Republic) may thus be used as a source of funds to strengthen the group's capital in other countries, provided that the compliance with the regulatory limits is safeguarded.

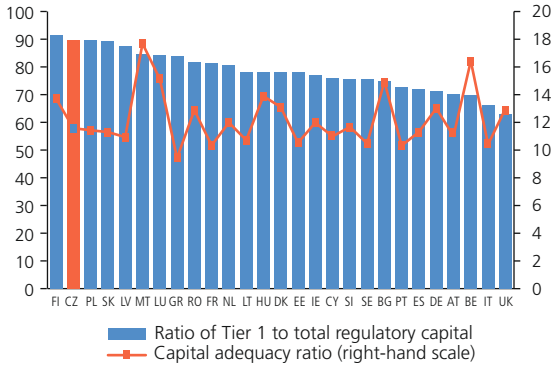
CHART IV.21

Ratio of dividends to net profit in given year
(%)

Source: CNB

CHART IV.22

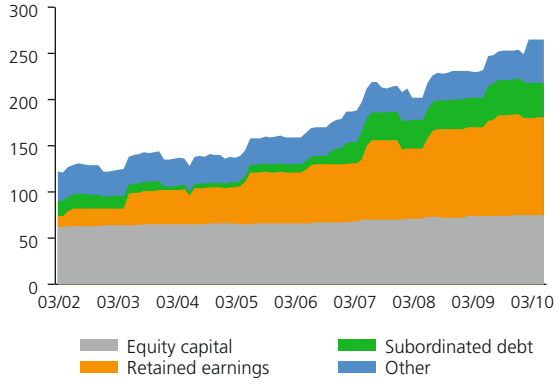
Quality of regulatory capital
(ratio of Tier 1 to total regulatory capital in %; 2008)



Source: ECB

CHART IV.23

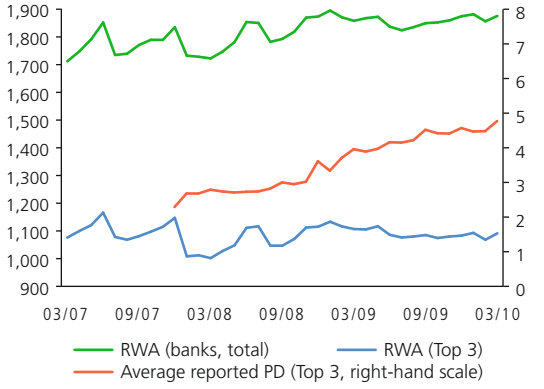
Structure of regulatory capital
(%)



Source: CNB

CHART IV.24

Risk-weighted assets
(stock in CZK billions; three largest banks (Top 3) versus banking sector as a whole; average PD in %)



Source: CNB, CNB calculation

Risk-weighted assets recorded no major rise despite an increase in risk parameters

Capital adequacy was not weakened by growth in risk-weighted assets, which remain broadly flat despite some slight volatility. The rise in credit risk, and thus also in the reported values of probability of default (PD), was not a source of excessive growth in risk-weighted assets (see Chart IV.24), as it was counteracted by a flat credit portfolio and a decline in exposures with a higher degree of risk.

Box 6:

KEY INTERNATIONAL ACTIVITIES IN THE REGULATION OF FINANCIAL INSTITUTIONS

In response to the global financial crisis, an agreement was reached at the level of global groups headed by the G20 on reform of the global financial infrastructure and the regulatory framework to prevent the emergence, or the potential very adverse impacts of, future financial crises. A specific vision for the reform of the bank regulatory framework newly incorporating macroprudential risks was published by the Basel Committee on Banking Supervision in December 2009 (the proposal is sometimes referred to as Basel III). The consultation documents propose a reform of the currently used Basel II framework in several areas, namely (a) capital adequacy; (b) liquidity; (c) new instruments for preventing systemic risk. The emphasis on limiting systemic risks, including reducing the procyclicality of regulation,[90] is a new element in the international debate on the reform of banking regulation. A breakthrough in the macroprudential area is a proposal to introduce a countercyclical capital buffer or even an additional capital requirement for "systemically important" institutions. Also worth mentioning is a proposal which would require banks at times of "excessive" expansion in lending to keep part of their profit as capital in the form of retained earnings.[91]

The changes in capital adequacy, which will be applied in EU countries in the form of an amendment to the CRD (known as CRD IV), include features for better risk assessment and harmonise certain concepts (e.g. items deductible from capital). The primary aim is to enhance the quality of capital. The introduction of a leverage ratio, intended to restrict excessive growth in balance sheet size without sufficient capitalisation, is under consideration. New, "safer" (i.e. higher) values are being considered for the standard capital ratios (CAR and Tier 1 CAR). An internationally endorsed set of indicators and formulas for calculating sufficient liquidity will be introduced in the liquidity

90 See the thematic article *Procyclicality of the Financial System and Simulation of the Feedback Effect* in this Report.
91 The Turner Review (2009): *A Regulatory Response to the Global Banking Crisis*, FSA UK, March 2009.

area. The aim is to enhance banks' liquidity and to motivate banks to minimise maturity mismatch. A more precise calibration of all the quantitative variables is the subject of an impact study being conducted in 2010 H1. It is thus not clear what the final overall impact on the financial system in the Czech Republic will be.

As regards macroprudential regulation, the macroeconomic variable on which the creation of the additional capital buffer would depend is now being discussed. Preliminary studies by Basel Committee experts suggest that this variable will be the constantly updated calculated deviation between private sector debt (in % of GDP) and its long-term trend computed using the HP filter on an at least a ten-year series with a high and pre-set lambda. For converging countries such as the Czech Republic (in contrast to the non-converging EU economies), a higher debt ratio would trigger creation of an additional buffer only in the case of accelerating credit growth, not higher growth alone. In the event of a crisis, the capital buffer would be released at the discretion of the regulator.

As regards the possible countercyclical capital buffer, a preliminary analysis for the Czech Republic conducted on the recommended period of the past ten years using the methodology defined by a Basel Committee working group indicates that banks in the Czech Republic would have needed to create a capital buffer as from the end of 2006 (if these rules had applied then; see Chart IV.1 Box).

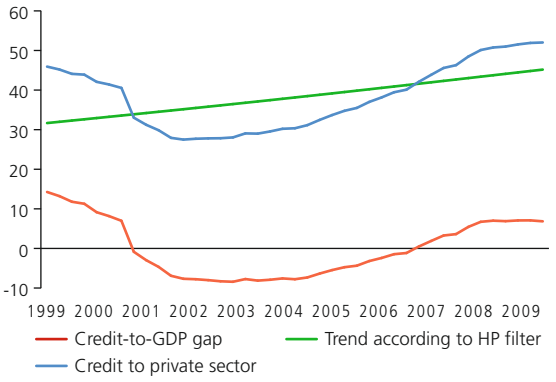
The liquidity situation of the banking sector is good

The liquidity buffer – in the form of quick assets (i.e. in particular government bonds, cash, claims on central banks and accounts receivable from banks on demand) expressed as a percentage of assets and client deposits – started to increase slightly in 2008 following a temporary decline (see Chart IV.25). Given the relatively high liquidity of the Czech banking sector, there should be no problem with potential implementation of the new liquidity requirements proposed by the Basel Committee (see Box 6).

Client deposits, which accounted for 67% of total liabilities at the end of 2009, are the main source of asset financing. They ensure sufficient liquidity, providing another reason why the business model of Czech banks can be regarded as safer than that in sectors that have significant exposures to the money and capital markets. The banking sector has surplus client financing, as client deposits currently exceed client loans by more than 30% (see Chart IV.26). This surplus was almost 100% at the start of 2003 and decreased over time until 2008 as the credit portfolio grew and alternative investment products with higher yields than those on bank deposits became more popular.

CHART IV.1 BOX

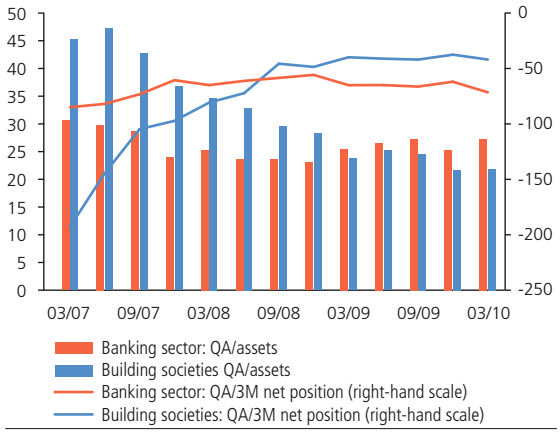
Gap between private sector debt and trend
(% of GDP)



Source: CNB, CNB calculation

CHART IV.25

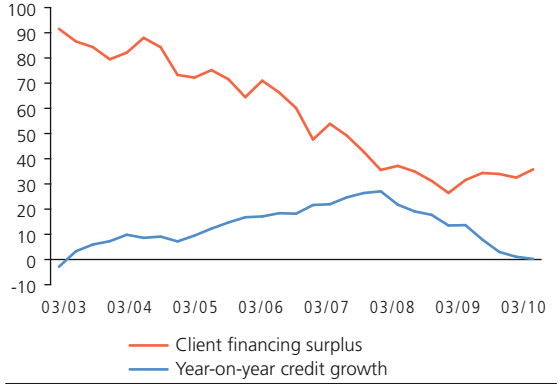
Liquidity situation in the banking sector and building society sector
(%; QA = quick assets)



Source: CNB

CHART IV.26

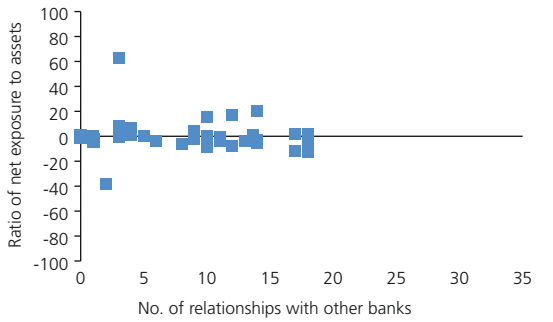
Client financing surplus and client credit portfolio growth for the Czech banking sector
(%)



Source: CNB

CHART IV.27

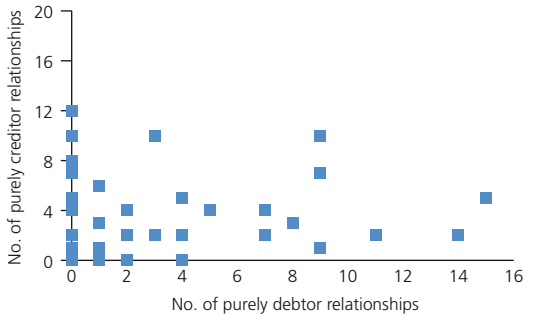
Interbank exposure ratio
(%; as of 31 Dec. 2009; points indicate individual banks)



Source: CNB, CNB calculation

CHART IV.28

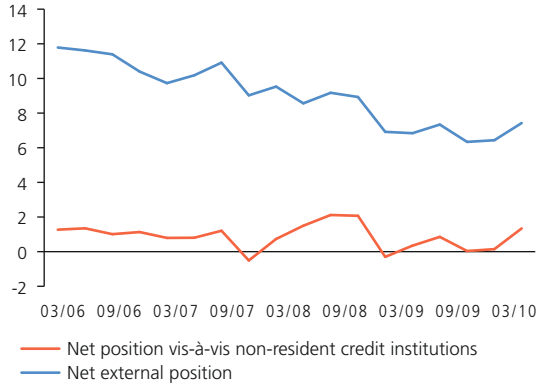
Debtor and creditor: the existence of both positions in banks
(points in the chart are individual banks as of 31 Dec. 2009)



Source: CNB, CNB calculation

CHART IV.29

Net external position of the Czech banking sector and net position vis-à-vis non-resident credit institutions
(% of GDP)



Source: CNB

Building society liquidity risk might affect banks' reputational risk

Building societies' liquidity situation is gradually deteriorating as the ratio of the credit portfolio to deposits increases and contracts "age". The share of quick assets in total assets has gradually been declining in recent years and is currently lower than in the banking sector as a whole. On the liabilities side the average maturity of deposits is falling, which increases the risk of a liquidity outflow. In 2006 the share of deposits with maturities of up to three months had been just 35%, but at the end of 2009 it was 70%. The volume of quick assets at the end of 2009 would cover only 40% of the (negative) cumulated net balance-sheet position of up to three months. This is lower than the coverage rate in the banking sector as a whole (about 60%) and contrasts with coverage exceeding 100% before 2007 (see Chart IV.25). However, despite the deterioration in the aforementioned indicators, this poses no major problem for building societies as a whole.

Nevertheless, building society liquidity risk might affect the reputational risk of banks that control building societies. It can be assumed that in the event of a liquidity shortage, shareholder banks would resolve the situations of their building societies by using their own resources. This, however, would have a potential impact on their own liquidity position.

But the risk of interbank contagion appears to be small

Most banks use the domestic interbank market not as a source of credit financing, but rather as a means of managing short-term liquidity. This is confirmed by the fact that activity is concentrated on exposures with very short maturity (see section 3.1).

Standard measures of connectivity in the interbank relationship network show that the interrelationship matrix is relatively "sparse".[92] The average number of relationships between a bank and other banks in the Czech Republic (referred to as the degree) was around 7.5 at the end of 2009 (minimum 0, maximum 20). This implies an average connectivity of 21% for the total of 36 banks analysed.[93] However, such figures are very difficult to compare internationally, as they are not generally available for banking sectors and those that are available contain different indicators.[94] The available evidence for Hungary, which is largely similar in terms of banking system size and structure, shows an average degree of 6 and an average connectivity of 20%. Indicators calculated for the Austrian sector on the basis of interbank payment flow indicators, which are not, however, fully comparable with the interbank exposure network indicators, indicate a higher degree (of around 15) but a very low connectivity (8%), due a to huge number of banks which are not interconnected.[95]

92 The interbank interrelationship matrix applied is not necessarily complete, as it is based on data sources which include only the 15 largest exposures to banks.
93 The connectivity for each bank is calculated as the number of relationships with the other banks relative to the maximum possible number of relationships (35 in our case). It thus ranges between 0 and 100%. The average connectivity is then the average for all banks.
94 OeNB, Financial Stability Report 7, pp. 77–87.
95 Puhr, C., Schmitz, S.W. (2009): *Structure and Stability in Payment Networks – A Panel Data Analysis of ARTIS Simulations*, OeNB, Vienna (http://ssrn.com/abstract=1400883).

A risk to banking system stability could arise in a situation where there were several banks in the sector that are net debtors and have a high number of relationships with other banks. Their collapse could then start a domino effect in a large part of the system, not least because interbank exposures are generally unsecured. However, the analysis of the connectivity of banks with other banks in terms of net creditor or net debtor position does not indicate that net creditor banks have a significantly different number of relationships with other banks than net debtor banks (see Chart IV.27). At the same time, most banks simultaneously have a net creditor position vis-à-vis some banks and a net debtor position vis-à-vis others (see Chart IV.28). The interbank contagion effect, moreover, is regularly tested as part of the bank stress tests (see section 4.2). Given the low connectivity, its effect is generally limited even in the highly adverse scenarios.[96]

The Czech banking sector maintains a net external creditor position and its exposure to parent banks is stable

The net external position of the Czech banking sector remains positive at around 7% of GDP. To a certain extent this is also true of the net position vis-à-vis non-resident credit institutions including foreign parent banks (see Chart IV.29). The exposures of the Czech banking sector to problem regions in the EU are minimal.[97] The exposure limit vis-à-vis parent groups (20% of regulatory capital) has long been observed by domestic banks; their exposure is currently about one-half of this figure, i.e. around 10%. However, the limit is applied to net, i.e. adjusted, exposures. For example, 80% of the exposure to credit institutions from EU Member States can be subtracted from the initial gross exposure (exposure to the parent group). The total (unadjusted) exposure of banks resident in the Czech Republic (i.e. excluding foreign bank branches) to parent groups in the last two years has been around CZK 100 billion, i.e. roughly 50% of regulatory capital, or 3% of GDP.

Given the majority foreign ownership of domestic banks and the potential propagation of risks between parent companies and their subsidiaries in the current relatively volatile period, it is important to monitor the key financial soundness indicators of the parent institutions of the largest Czech banks. Overall, 2009 saw an increase in credit risk and a decline in profitability, but no losses from transaction positions were recorded compared to 2008 (see Table IV.2). The available evidence suggests that the main foreign parent banks coped well with the global turbulence, although some of them received state support.

Table IV.2

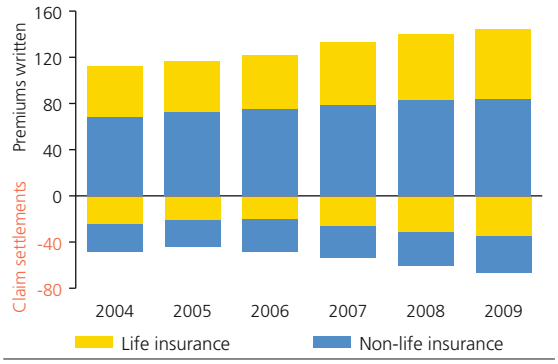
Key parent bank indicators
(consolidated data; unweighted average for Erste Bank, SG, KBC and UniCredit)

		2008	2009
Profitability			
	RoE	2.23%	-0.75%
	RoA	0.13%	0.01%
	Net interest income growth	69.43%	17.08%
	Impairment loss growth	291.44%	82.02%
	Net profit growth	-40.39%	-28.49%
Capital adequacy			
	CAR	11.71%	13.69%
	Tier 1 ratio	8.32%	10.07%
	Regulatory capital growth	15.19%	10.67%
Asset quality			
	Loan loss provisioning rate	0.72%	1.53%
	NPL ratio	2.96%	3.48%
Balance sheet indicators			
	Asset growth	2.05%	-7.30%
	Client loan growth	10.34%	-2.65%
	Loan-to-deposit ratio	125%	118%

Source: Annual reports of Erste Bank, SG, UniCredit and KBC.
Note: The NPL ratio is the average for Erste Bank and UniCredit only.

Chart IV.30

Premiums written and claim settlement costs
(CZK billions)



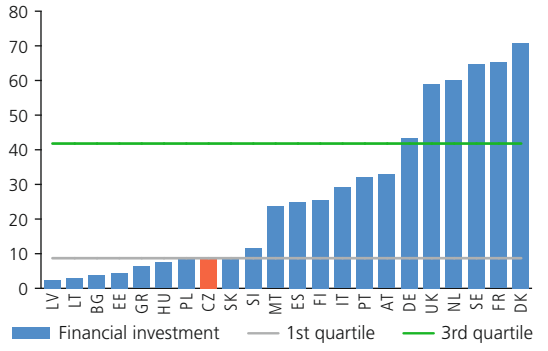
Source: CNB

96 However, the analysis of interbank contagion does not take account of the potential transmission of risks from abroad via links to the foreign banking groups to which Czech banks belong.

97 In March 2010 the banking sector's total exposure to Portugal, Italy, Greece and Spain was CZK 46.3 billion, i.e. 1.1% of assets. Bonds, especially government bonds, represent the overwhelming majority of this exposure (77%). Section 4.2 contains a sensitivity analysis of the impact of potential losses from these exposures on the Czech banking sector.

CHART IV.31

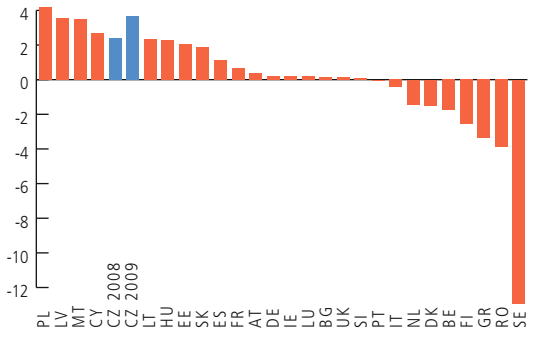
Insurance penetration by financial placement volume in EU economies
(% of GDP; 2008)



Source: CNB, ECB

CHART IV.32

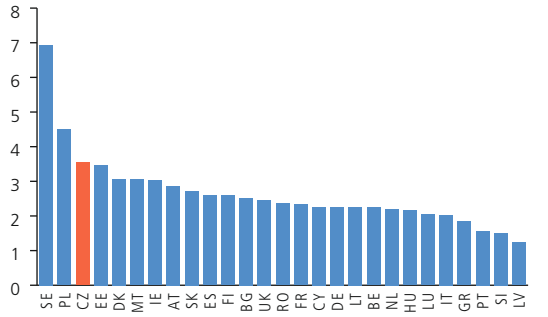
Returns on assets of the insurance company sector
(%, 2008)



Source: CNB, CEIOPS

CHART IV.33

Solvency of insurance companies
(available to required solvency ratio; 2008)



Source: CNB, CEIOPS

The insurance sector recorded stagnant premiums written in non-life insurance only

In 2009 the insurance sector recorded no extraordinary changes or events jeopardising its proper functioning and stability. The deterioration in the performance of the Czech economy during 2009 fostered a decrease in the growth rate of premiums written in the non-life insurance market. By contrast, premiums written in life insurance rose faster than in 2008, owing chiefly to an increase in single premium payments in investment life insurance (see Chart IV.30).

Total assets, financial placement and premiums written are rising gradually in the domestic insurance sector. By comparison with other European countries, however, insurance penetration is one of the lowest, indicating a still relatively underdeveloped market, especially in the area of life insurance. The ratio of financial placement to GDP for the Czech Republic only slightly exceeds the value of the lower quartile (see Chart IV.31). In the case of life insurance, however, a number of specific factors play a role, including tax privileges, private pension scheme type and competition from similar products.

Transitory losses on bond and share portfolios were balanced during 2009, so the sector achieved high profitability

At the end of 2008 and in 2009 Q1 many securities held, above all shares and bonds, were revalued because of the adverse market situation. However, these losses did not materialise in full in the performance of insurance companies, i.e. in their profits and losses, as insurance companies can now value a large portion of the government bond portfolio (held to maturity) at amortised cost. Moreover, the financial market situation started to improve considerably in 2009 Q2 (see section 3.1). Overall, the insurance sector ended 2009 with a high return on equity of 23% (compared to 16% in 2008) and its total profit reached an all-time high in 2009. An international comparison reveals that the profitability of insurance companies in the Czech Republic is relatively high in the European context (see Chart IV.32).

The capital and solvency of Czech insurance companies are sufficient...

The aggregate solvency of insurance companies operating in the Czech Republic (i.e. their ability to ensure that insurance claims can be settled at any time using their own funds) is very good. The ratio of disposable solvency to required (minimum regulatory) solvency in the domestic insurance sector is relatively high by European comparison (see Chart IV.33).[98] Good capitalisation is also indicated by the ratio of capital to total assets, which has long been around 17%, corresponding to a relatively small leverage multiple of 5.

98 The figure on the solvency of insurance companies in 2009 will not be released until June 2010, so it was not available at the time of preparation of this Report.

...and can be expected to remain so after the launch of the new Solvency II regulatory framework

Preparations are currently continuing for a new regulatory framework in the insurance sector requiring a systematic and comprehensive approach to risk management. The requirements of a new European directive[99] should guarantee that insurance companies have sufficient and more accurately calculated resources commensurate with the risks to which they are exposed. This should lead to an improvement in the risk management system and a strengthening of the sector's financial stability.

The fifth round of the quantitative impact study on the effects of the introduction of Solvency II will take place in 2010. According to the results of the last study, which was carried out in the EU in 2008, the capital requirements for Czech insurance companies can be expected to rise by around 150% following the introduction of the new regulatory framework. All 14 Czech insurance companies that participated in the study (representing roughly 90% of the sector's assets) would meet both the new capital requirements stipulated in the new directive.[100] Implementation of the new Solvency II framework is scheduled for the start of 2013.

Pension funds recorded similar security revaluation problems as insurance companies, but to a larger extent

An unfavourable environment for the pension funds sector prevailed in the first months of 2009, resulting in further losses due to revaluation of financial assets. Negative valuation differences thus deepened further from CZK 8 billion at the end of 2008 to CZK 13 billion at the end of March 2009. However, the rather more favourable situation in the financial markets starting in 2009 Q2 helped to minimise the losses. The valuation changes were only CZK -0.5 billion at the end of 2009 and turned slightly positive at the end of March 2010 (see Chart IV.34).

Unlike in 2008, capital was not strengthened by additional capital injections from shareholders

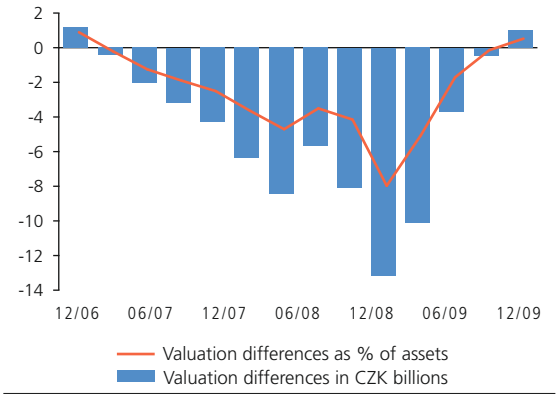
Shareholders' equity totalled 1.4% of assets in mid-2009 and 6.2% at the end of 2009. This is still less than in the insurance sector, but it represents a significant increase compared to 2008, when this ratio was only 1.7% (see Chart IV.35). The improvement in capitalisation in 2009 was due exclusively to lower valuation changes (as a component of equity). Capital injections from shareholders were minimal.

99 Directive of the European Parliament and of the Council of 25 November 2009 on the taking-up and pursuit of the business of insurance and reinsurance (Solvency II).

100 The minimum capital requirement (MCR) is the amount of primary capital (own funds) of an insurance company below which clients would be exposed to an unacceptable degree of risk if the insurance company stayed in operation. If an insurance company's own funds fall below the MCR, an immediate reaction of the supervisor follows, possibly resulting in revocation of its licence. The solvency capital requirement (SCR) comprises all risks facing the insurance company and represents the amount of own funds required to cover significant unexpected losses from the insurance company's activities over the next 12 months with a probability of 99.5%.

Chart IV.34

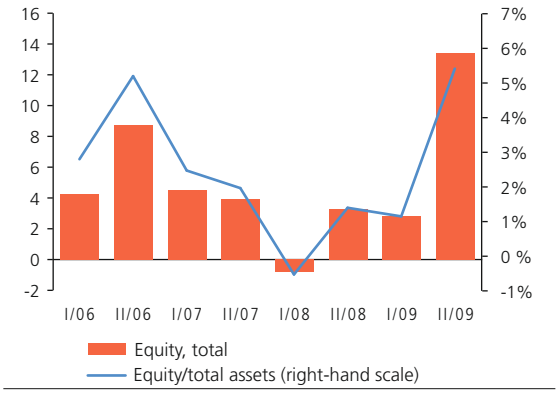
Losses from revaluation of financial assets in pension funds
(valuation differences in CZK billions and as % of assets)



Source: CNB

Chart IV.35

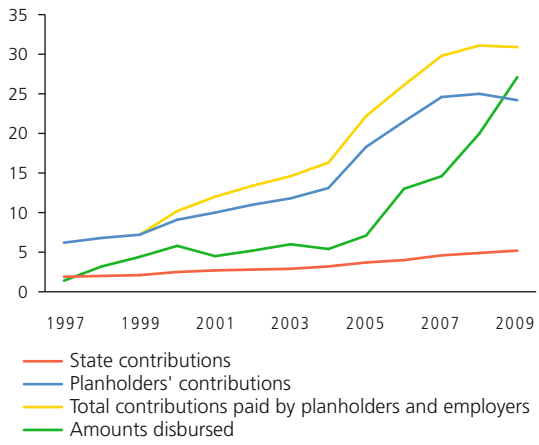
Capitalisation of pension funds
(CZK billions and %)



Source: CNB

Chart IV.36

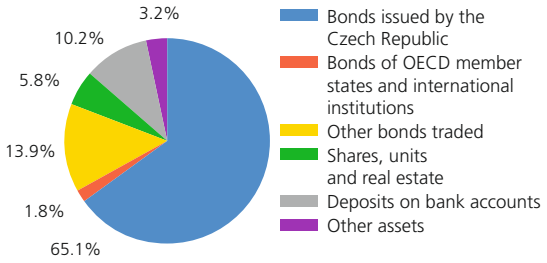
Pension fund sources and amounts disbursed in given year
(CZK billions)



Source: CNB
Note: Since 2005, planholders' contributions also include advances.

Chart IV.37

Structure of pension fund investment allocation
(%; 2009)



Source: CNB

An amendment to the Capital Market Undertakings Act, which introduced valuation of a portion of pension fund portfolios (a maximum of 30% of a fund's assets) at amortised cost effective from 1 August 2009, is also helping to strengthen the sector's financial stability and its resilience to adverse financial market developments.[101] Another new element is a "prudential mechanism" introduced on a voluntary basis during 2009 under an agreement between the CNB and the Association of Pension Funds. This mechanism will ensure that a process to increase a pension fund's equity is started if its regulatory capital falls below 50% of its risk exposure in the reference period. This mechanism has been in trial operation since 1 September 2009 and regulatory capital will continue to serve as an indicator for assessing a pension fund's financial situation.

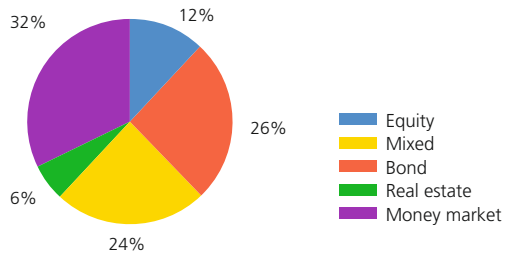
Households withdrew their savings from pension funds as well

As in 2008, the inflow of new planholder contributions continued to slow and, conversely, the outflow of funds relating to lump sum settlement and surrender value payments increased (by 35% year on year). The higher number of clients who made use of the option to withdraw their savings was probably associated with the economic situation of households, which are opting for more liquid funds or more profitable investments at this time of recession given the low returns this sector is currently offering. Overall, however, pension funds are continuing to record a net inflow of funds if one takes into account employers' contributions (see Chart IV.36). The total assets of the pension fund sector thus increased to almost CZK 216 billion in 2009.

The allocation of pension fund investments is conservative under the legislation in force, and its structure did not change significantly from 2008 (see Chart IV.37). Roughly 90% of investments went into bonds and bank deposits, while less than 6% was invested in the more volatile shares and units.

Chart IV.38

Collective investment fund structure
(% of total assets; 2009)



Source: CNB

The situation in the collective investment funds sector stabilised in 2009

The total assets of collective investment funds (CIFs)[102] continued to decline in 2009 Q1, reaching CZK 129 billion. However, the trend then reversed and total assets stood at almost CZK 150 billion at the close of the year.[103] The largest proportion of funds was again invested in money market funds, whose share in total assets is currently 32% (see Chart IV.38); however, this represents a year-on-year decline of 6 p.p. By contrast, the lower interest rates on the money market and the recovery of stock markets at home

101 The amendment of the Capital Market Undertakings Act should also foster lower growth of contract intermediation costs thanks to the introduction of fees for migration between pension funds. For more details on fees, see the CNB's 2009 Financial Market Supervision Report.

102 Collective investment funds comprise all investment and mutual funds, whether open to the public or limited to qualified investors. Open-ended mutual funds intended for the public dominate this sector, accounting for over 80% of its total assets.

103 For more information on the issue of collective investment funds, see the article *Regulation of Alternative Funds in the Czech Republic in the Context of the Debate on Their Potential Regulation in the European Union* in the thematic part of this report.

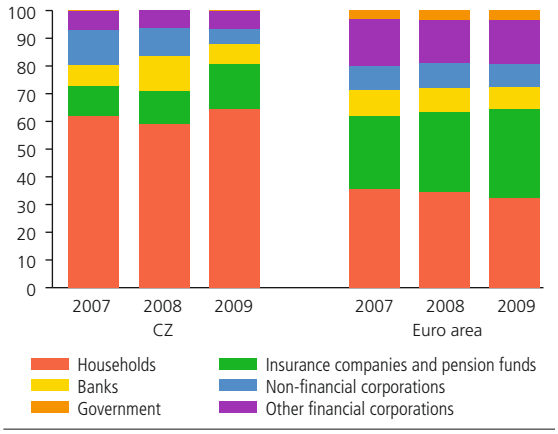
and abroad supported growth in the assets of equity funds, whose share rose from 7% to 12% by comparison with 2008.

The structure of investors in CIFs recorded only modest changes over the last two years (see Chart IV.39). A slight decline in the share of households in 2008 was reversed the following year, when it returned above 60%. The non-financial corporations sector lowered its exposure to collective investment funds from 10% at the end of 2008 to 5% at the end of 2009. This was linked with an increased need for cash in the last two years. An international comparison reveals a more balanced investor structure in the euro area. The volatility of fund returns thus affected not only households, but also other sectors, and to a larger extent than in the Czech Republic, as the exposures of the individual sectors in the euro area are higher than in the Czech Republic. In the Czech Republic, the worse financial results of CIFs manifested themselves mainly in a drop in household assets. Although the household sector accounts for the majority of total assets, the changes in CIF performance do not pose a large risk to households, as such investments represent only 6% of their financial assets in the Czech Republic compared to 8% in the euro area.

In the case of open-ended mutual funds intended for the public, unit redemptions again exceeded sales in 2009, albeit to a lesser extent than in 2008 (see Table IV.3). The full-year data are significantly influenced by the first half of 2009, as unit sales predominated in the second half of the year. This suggests that mutual funds were seen as a risky investment only in 2009 H1. By contrast, capital gains acted in the opposite direction due to the financial market recovery (see section 3.1) and led to an increase in net assets overall.[104]

Chart IV.39

Structure of investors in CIFs by sector
(% of total investment in CIFs)



Source: CNB, ECB

Table IV.3

Decomposition of change in net assets of open-ended mutual funds intended for the public
(CZK billions)

	Funds, total	Money market funds	Equity funds	Mixed funds	Bond funds	Funds of funds	Real estate funds
2008							
Income from net sales of units	-26,641	-20,148	638	-2,173	-4,105	-1,282	429
Profit from capital	-23,884	-1,646	-9,641	-5,679	-3,270	-3,718	70
Change in net assets	-50,525	-21,794	-9,002	-7,853	-7,375	-5,000	499
Net assets at end-2008	114,835	50,523	7,886	22,967	14,725	17,029	1,705
2009							
Income from net sales of units	-8,244	-4,253	875	-1,173	-950	-2,581	-162
Profit from capital	10,587	438	5,539	2,288	1,043	1,495	-215
Change in net assets	2,343	-3,815	6,414	1,116	92	-1,087	-377
Net assets at end-2009	117,178	46,708	14,299	24,083	14,817	15,942	1,328

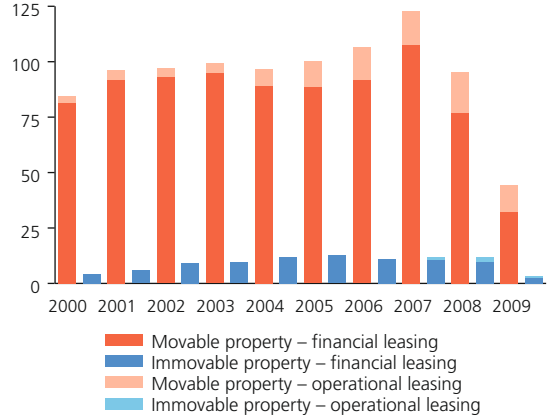
Source: CNB

104 Net assets represent the difference between funds' total assets and liabilities and are equal to shareholders' equity.

In the CIF sector the investor (the holder of the fund's units or shares) directly bears the risk of a decline in asset prices, whereas open-ended mutual funds can face liquidity risk. If unit redemptions were to exceed sales and market liquidity were to fall sharply in the relevant markets at the same time (as, for example, in the aftermath of the collapse of Lehman Brothers in 2008), funds would be forced either to sell assets at a considerable loss or stop issuing and redeeming units. While some European funds (especially money market funds) faced this problem during the first phase of the global financial crisis, the positive financial market developments since the second half of 2009 and the renewal of liquidity in corporate bond markets have minimised this liquidity risk in the Czech Republic as well. The fact that domestic mutual funds offered to the public are mostly managed by management companies from bank groups is also having a positive effect. It can be expected that they would be able to provide the necessary help to funds in the event of liquidity problems in order to reduce the potential reputational risk for banks, which are usually involved in the distribution of unit certificates to clients.

CHART IV.40

Movable and immovable property leasing volumes
(CZK billions)



Source: Czech Leasing and Financial Association

Non-bank financial corporations engaged in lending lost market share

The downturn in economic activity in 2009 was reflected in a slowdown not only in bank loans, but also in non-bank loans, which are used chiefly by corporations and households. The value of loans provided to residents by non-bank financial corporations engaged in lending was CZK 297 billion at the end of 2009, representing a year-on-year decrease of 16%. This can be partly explained by a drop in demand for loans in the case of non-financial corporations. In addition, a tightening of lending standards had a significant impact on the volume of loans provided. This effect was also predominant in factoring and forfaiting companies, whose services should tend to be used more at times of crisis. Financial leasing companies have the largest share on the non-bank asset financing intermediation market,[105] accounting for 68% of the sector's total assets. The volumes of financial leasing of movable and immovable assets provided by CLFA members recorded a marked decline of 60% year on year. This decline was due to a sharp fall in investment activity, for which financial leasing is normally used, and to a continuing trend of transferring the financing of some movable assets (cars) from financial leasing to bank loans or operational leasing.[106]

105 The non-bank asset financing intermediation market comprises financial leasing companies, factoring and forfaiting companies and other lending companies.

106 The ratio of operational to financial leasing for immovable assets started to be monitored in 2007. Operational leasing enables a movable or immovable asset to be used, but no subsequent transfer of ownership occurs. It therefore *de facto* represents renting, so it is not included in the CNB statistics on financial intermediation.

4.2 ASSESSMENT OF THE FINANCIAL SECTOR'S RESILIENCE

This section sets out to assess the resilience of the Czech financial sector using stress tests and supplementary analyses. The results of the stress tests[107] confirm that the Czech financial sector remains resilient to risks arising from potentially adverse macroeconomic developments in 2010–2011. Advanced stress tests of the banking sector's balance-sheet liquidity indicate that the sector is resilient to strong liquidity shocks.

The situation in 2009 was closest to the baseline scenario, with the exception of GDP, but the impact of the risks was lower in reality

In addition to the *Baseline Scenario* (called *Europe in Recession*), last year's 2008/2009 FSR included two other stress scenarios (*Market Nervousness* and *Economic Depression*). The macroeconomic developments in 2009 were broadly in line with the *Baseline Scenario*, i.e. in line with the CNB's official May 2009 forecast (see section 2.1). Interest rates and inflation decreased, while the exchange rate gradually returned to stronger levels following a temporary depreciation in early 2009. The only exception was GDP growth, which deviated significantly downwards from the predicted path and neared the values of both stress scenarios (see Chart IV.41).

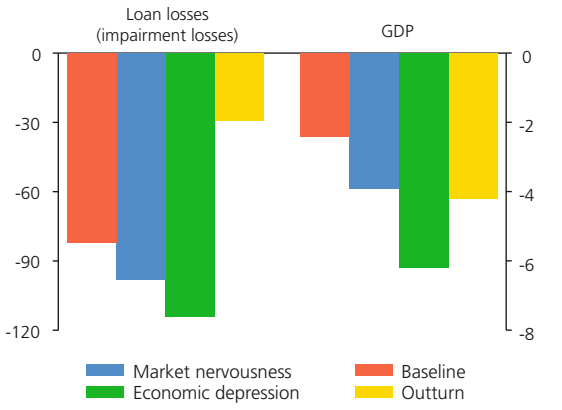
However, the less favourable evolution of economic output did not lead to larger loan losses in the banking sector than predicted in the *Baseline Scenario*. Both the loan losses (see Chart IV.41) and the NPL ratio were lower in reality in 2009 than predicted by all the scenarios (see Chart IV.42). This was due to intentional overestimation of the credit risk parameters in the conservatively calibrated model of NPL growth. At the end of 2009, the capital adequacy ratio was much higher than estimated in the individual scenarios. This was due above all to an increase in bank capitalisation from retained earnings of 2008. Similar favourable developments were also observed in the other sectors tested, i.e. insurance companies and pension funds.

The *Loss of Confidence* scenario has the greatest impact of the new alternative scenarios

Section 2.1 introduced three alternative scenarios (*Baseline Scenario, Return of Recession* and *Loss of Confidence*). While the Baseline Scenario corresponds to the current (May) CNB macroeconomic forecast, the two stress scenarios capture the most significant risks to financial stability in the Czech Republic.

CHART IV.41

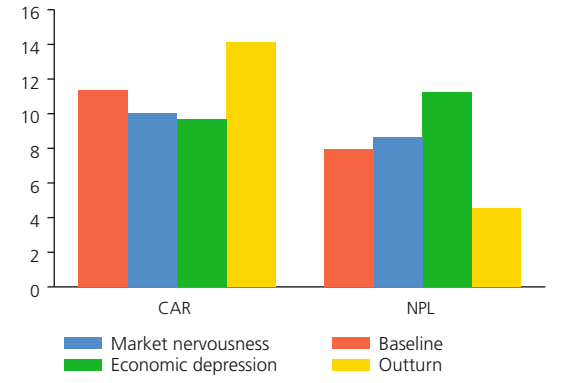
Loan loss forecasts and estimates: last year's scenarios versus 2009 outturns
(GDP in %, right-hand scale; loan losses in CZK billions, left-hand scale)



Source: CNB

CHART IV.42

Estimates of NPL ratio and capital adequacy ratio: last year's scenarios versus 2009 outturns
(%)



Source: CNB

107 In order to include the most up-to-date assessment of the potential risks to financial stability in this Report, which also covers the first few months of 2010, the stress tests were performed using the latest available data (March 2010 for the banking sector, end of 2009 for insurance companies and pension funds). This approach differs from previous years, when year-end test results were presented. The results of the banking sector stress tests conducted on the end-2009 portfolios are available on the CNB's website (http://www.cnb.cz/en/financial_stability/stress_testing/index.html).

Table IV.4

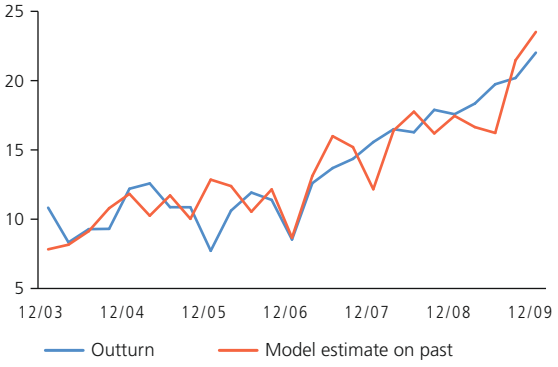
Assessment of the impact of the alternative scenarios on the financial sector as a whole

		Baseline Scenario	Return of Recession	Loss of Confidence
Total impact of shocks (CZK bn)	Banks*	-32.0	-53.4	-67.3
	Insurance companies	-0.1	-3.1	-7.6
	Pension funds	-0.4	-3.4	-8.1
	Total in CZK billions	**-32.5**	**-59.9**	**-82.9**
	Total in % of assets	**-0.7**	**-1.2**	**-1.7**
Change in capitalisation (between 2009 and 2010)	Banks (CAR in p.p.)	-1.4	-2.7	-2.6
	Insurance companies (solvency in p.p.)	-46.6	-61.3	-126.8
	Pension funds (capitalisation in p.p.)	1.5	0.2	-2.0
Need for capital injections	Banks	0.0	2.1	2.4
	Insurance companies	0.0	0.1	2.8
	Pension funds	0.0	0.0	0.0
	Total in CZK billions	**0.0**	**2.2**	**5.2**
	Total in % of GDP	**0.00**	**0.06**	**0.14**

Source: CNB, CNB calculation
* The figure for banks is the average for 2010 and 2011

Chart IV.2 box

Outturn versus model estimate of adjusted operating profit on the past
(quarterly values in CZK billions; seasonally adjusted)



Source: CNB, CNB calculation

Despite the differences in methodology of the tests of the individual sectors and the different shock impact horizons, it can be inferred that the *Loss of Confidence* scenario has the most severe impact on the financial sector as a whole. This scenario generates the greatest risk impacts in all the sectors tested, primarily in the form of loan losses and losses from revaluation of securities or property (see Table IV.4). The aggregate impact on the entire sector would be just under 2%. At the same time, this scenario leads to the largest decrease in solvency indicators (capital adequacy, solvency and capitalisation), taking into account the dampening effect of the expected returns in an adverse period. The *Loss of Confidence* scenario also predicts the largest capital injection into the sector as a whole, albeit a relatively small one of around CZK 5 billion (less than 0.15% of GDP).

In all scenarios, all the sectors as a whole remain resilient to the adverse developments. In no scenario would the aggregate solvency indicators fall below the regulatory thresholds (see below). Capital injections would be relatively small.

The banking sector tests apply an advanced methodology

Since the publication of FSR 2008/2009 last year, significant progress has been made in the banking sector stress test methodology towards test dynamisation, extension of the test horizon from one year to two years, greater use of modelling techniques and higher compatibility of testing practices at the CNB with commercial bank practices. This direction was outlined in FSR 2008/2009 (Box 8: *Dynamic stress tests for banks*, pp. 64–65). Several further refinements have been made by comparison with the thematic article describing the updated methodology:[108] the banking sector stress test results presented in this section already use a different methodology for calculating the default rate for the main segments, updated partial models for credit risk and loan growth, a change in the linkage between LGD and macroeconomic developments and above all a new banking sector income model (see Box 7).

Box 7:

BANKING SECTOR INCOME MODEL

One of the main factors limiting the impact of losses from adverse economic developments is the ability of banks to generate income even in bad times. The stress tests therefore introduce an analytical item of the profit and loss statement capturing key components of operating profit (adjusted operating profit, AOP).[109] This item is constructed as the sum of net interest

108 See the thematic article *Stress Test Verification as Part of an Advanced Stress Testing Framework* (Geršl and Seidler) in this Financial Stability Report.
109 This was referred to as net income in FSR 2008/2009; owing to misunderstandings arising from it being mistaken for net profit it has been renamed to better reflect the operating character of this item.

income, profit from fees and commissions and dividends received less administrative and other operating expenses. AOP excludes loan impairment losses (the impact of the credit shock) and the results of financial operations (revaluation of securities holdings and exchange rate gains or losses as the impact of market shocks).

The previous banking sector AOP estimation method for the individual alternative scenarios applied a very simplified expert assumption that they represent a fixed percentage of the average of this item for the last eight quarters.[110] In line with the strategy of further developing the banking sector stress tests, a model was developed for AOP estimation, which is used for the first time in this FSR to estimate this indicator of income for the individual alternative scenarios.

The current version of the model, estimated on data for 2002–2009, is as follows:

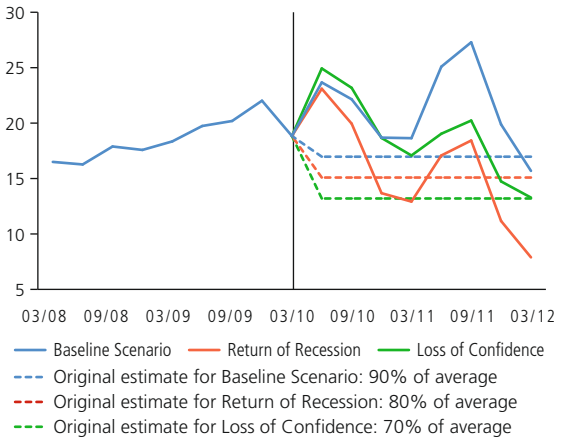
$$\Delta AOP_t = -1{,}3 + 0{,}07\Delta YC_{t-3} + 0{,}94\Delta NPL_{t-3} + 8{,}0MA\_GDP_t + 0{,}08CAR_{t-1}$$

where ΔAOP is annual growth in quarterly AOP volumes, ΔYC is the annual change in the slope of the yield curve (5Y-3M), ΔNPL is annual growth in the volume of NPLs, MA_GDP is average nominal GDP growth for the last six quarters and CAR is the capital adequacy ratio. These explanatory variables appear to be economically the most important determinants of interest income (yield curve slope, NPL growth as a proxy for risk margins) and non-interest income (nominal GDP growth as a proxy for the volume of financial intermediation). The lagged capital adequacy ratio appears to be significant in the context of the time series used, as banks had higher capital buffers to prepare for loan portfolio growth in subsequent periods and related growth in interest and non-interest income.[111] The estimated model captures the evolution of AOP in the past relatively well (see Chart IV.2 Box).

A conservative strategy was applied to the final AOP estimate for the period ahead in the individual scenarios. It consisted in a downward revision of the AOP growth prediction of one standard deviation of growth volatility for 2002–2009, i.e. 0.24. This conservative revision aims to underestimate the prediction of income slightly. As the estimated coefficients and linkages can change unfavourably, especially in the stress scenarios, this is a way of estimating future income that is consistent with

CHART IV.3 BOX

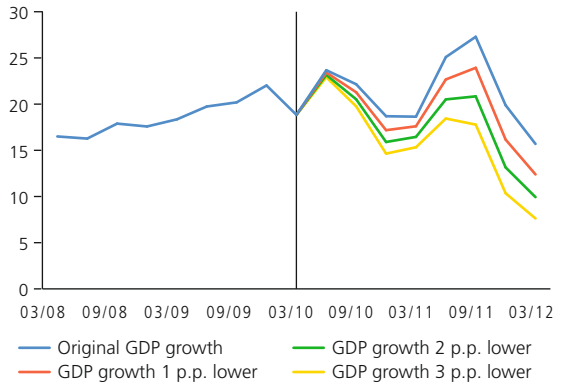
Estimate of adjusted operating profit for each scenario
(CZK billions; seasonally adjusted)



Source: CNB, CNB calculation

CHART IV.4 BOX

Sensitivity of estimate of adjusted operating profit to GDP for Baseline Scenario
(CZK billions; seasonally adjusted)



Source: CNB, CNB calculation

110 For example, in FSR 2008/2009, adjusted operating profit was assumed to be 90% of the average for the previous two years in the *Europe in Recession* scenario, while the assumptions for the other adverse scenarios were 80% and 70% of the average.

111 Growth in capital adequacy can have a positive effect on a bank's profitability also because it is a proxy for the overall soundness of a bank, which can afford to have a riskier – and therefore more profitable – banking business profile if it has higher capitalisation.

Table IV.5

Key variables in the individual scenarios
(average for given years)

	Baseline Scenario		Return of Recession		Loss of Confidence	
	2010	2011	2010	2011	2010	2011
Macroeconomic variables						
GDP	1.4	1.8	-1.1	-0.7	-0.2	-2.1
Exchange rate	25.3	24.8	25.6	25.8	27.5	27.8
Inflation	1.4	1.8	1.4	1.3	1.9	3.1
Unemployment	9.7	9.9	10.4	12.1	10.1	11.6
Nominal wage growth	3.7	3.8	3.0	1.6	3.3	3.1
Effective GDP growth in euro area	1.4	1.8	-0.2	-2.4	1.0	1.1
Credit growth						
Total	5.6	15.2	4.4	4.0	4.1	-3.7
Corporations	0.5	9.8	-1.1	-3.7	-1.7	-11.2
Households	13.0	21.3	12.3	13.8	12.6	6.4
Default rate (PD)						
Corporations	5.0	1.9	7.0	3.8	7.9	5.8
Loans for house purchase	6.2	5.0	6.7	6.8	6.8	6.1
Consumer credit	8.5	6.8	9.2	9.3	9.3	8.4
Loss given default (LGD)						
Corporations	44.9	45.0	57.7	57.3	53.3	64.8
Loans for house purchase	20.0	20.0	23.1	29.1	26.3	34.5
Consumer credit	57.7	58.7	60.9	69.6	59.3	67.0
Financial markets and property market						
3M PRIBOR	1.2	1.9	1.0	0.8	4.3	4.3
1Y PRIBOR	1.5	2.2	1.3	1.1	4.6	4.3
5Y yield	2.3	2.4	2.8	3.2	4.7	6.0
3M EURIBOR	0.9	1.6	0.9	1.6	0.9	1.6
1Y EURIBOR	1.2	1.9	1.2	2.0	1.2	2.0
5Y EUR yield	2.5	2.5	2.5	2.5	2.5	2.5
Change in res. property prices	-2.4	5.4	-5.8	-5.9	-8.9	-7.8
Change in share prices	0.0		-20.0		-30.0	
Banking sector earnings						
Adjusted operating profit (y-o-y)	13.8	2.8	3.5	-35.3	14.3	-36.3
Insurance sector						
Risk growth in LI*	3.0		3.0		3.0	
Risk growth in NLI**	50.0		50.0		50.0	

Source: CNB, CNB calculation
* growth in gross claim settlement costs
** increase in insurance reserves, premiums written or gross technical provisions

the prudential principle applied in the stress tests. The prediction for the individual scenarios prepared in this way is to a large extent similar to the expert setting of AOP using a percentage of the average for the previous two years, which was applied in the past (see Chart IV.3 Box). However, the model estimate is more realistic and better shows the dynamics over time in relation to the evolution of the economic environment.

The most important item affecting the AOP estimate is of course real GDP growth, which enters the model indirectly through the MA_GDP variable. A simple analysis of the dependence of AOP on alternative assumptions of real GDP growth shows that a decline in growth of 1 p.p. leads to a decline in AOP of about 10% (see Chart IV.4 Box).

The risk parameters for credit risk are now better linked to macroeconomic developments and asset price movements

The scenarios are defined using the quarterly evolution of key macroeconomic variables (GDP, inflation, etc.) over the next eight quarters (see Table IV.5). The key risk parameters for credit risk, i.e. PD and LGD for the main credit segments of bank portfolios, are derived using submodels. While this was also the case for PD in FSR 2008/2009, the LGD parameter is now linked to GDP (loans to corporations), unemployment (consumer credit to households) and residential property prices (house purchase loans to households) using estimated elasticities. Each percentage point of decline in GDP growth compared to the *Baseline Scenario* generates an increase in LGD of 5 p.p. above the initial value of 45%. A rise in unemployment of 1 p.p. generates an increase in LGD for consumer credit of 5 p.p. above the initial value of 55%.

LGD for house purchase loans is linked to the estimated trend in residential property prices in the individual scenarios (see section 3.2). Although banks report a very conservative LTV (loan-to-value) ratio for mortgage loans of around 55%, the initial ("benchmark") LGD value for this segment is roughly 20%. The main reason for loan losses even in a situation where the value of collateral is significantly higher than the volume of loans is the high cost associated with selling property, which can reach 40–60% of the property value.[112] Each percentage point of decline in property prices is thus directly reflected in an equal increase in LGD above the initial value of 20% (see Chart IV.43). As a conservative safeguard, LGD was fixed at this value for the case of growth in property prices. The initial values of these three main segments of the loan portfolio were derived from the values reported by selected banks in the joint stress-testing project of the CNB and the largest banks (see Box 8).

112 See, for example, Moody's (2009): *Moody's Approach to Estimating Czech Banks' Credit Losses*, Moody's Global Credit Research, July 2009.

Box 8:

JOINT STRESS TESTING BY THE CNB AND THE BANKING SECTOR

Based on an agreement with the largest banks in the Czech Republic, the CNB introduced joint (bottom-up) stress testing in 2009 aimed at assessing the effects of negative economic scenarios on the quality of the loan portfolios of selected banks and thereby further refining the impacts of adverse shocks on the domestic banking sector. This box briefly summarises the results of the second round of joint stress testing, which took place at the beginning of 2010.[113]

Like the CNB's aggregate stress tests, which test the entire Czech banking sector, the joint stress tests performed with selected banks are based on different scenarios expressing risks in relation to the macroeconomic cycle. For the given scenarios, banks are provided with information on the changes in PD for the individual categories of corporate and retail exposures.[114] On the basis of this information, banks carry out stress tests of these portfolios at the one-year horizon and report the principal data on the estimated impacts of the scenarios on the individual loan segments back to the CNB.

The second round of joint stress tests used data as of 31 December 2009. The aggregated PD and LGD values for the individual loan portfolios of banks and the changes thereto stemming from the baseline scenario and the adverse scenario are presented in Table IV.1 Box. The higher PD values in both scenarios lead to expected loan losses in all tested credit segments and to higher capital requirements. If the capital requirements for other, non-stress tested segments (institutions, government and central bank), the capital requirements for other types of risk and the volume of regulatory capital remained unchanged, the aggregate capital adequacy ratio as of 31 December 2010 would fall from 14.3% to 12.9% under the baseline scenario and to 11.8% under the adverse scenario (see Table IV.2 Box).

In the calculation of the capital adequacy ratio the assumption of constant regulatory capital was subsequently relaxed. In this case, the regulatory capital of each bank in 2010 is lowered by the difference between expected losses as of 31 December 2009 and expected losses at the one-year horizon, i.e. as of 31 December 2010, in the individual scenarios. Although this calculation is based on a simplifying assumption of unchanged provisions and reserves at the end of 2009, its goal is to subject

113 Further information on the project, including the results of the first pilot round, is available in the CNB's 2009 Financial Market Supervision Report.
114 The LGD risk parameter is not currently stress-tested.

CHART IV.43

Property price index and LGD for house purchase loans: Loss of Confidence scenario
(2007 Q4 = 100; LGD in %)

Source: CNB, CZSO, CNB calculation

TABLE IV.1 BOX

APPROXIMATE RISE IN PD FOR INDIVIDUAL PORTFOLIOS
(EAD weighted; %)

	Actual situation as of 31 Dec. 2009		Baseline scenario	Adverse scenario
	PD (%)	LGD (%)	PD (%)	PD (%)
Corporate exposure categories	2.65	41.34	3.62	5.62
Large enterprises	1.77	41.19	2.42	3.76
Small and medium-sized enterprises (SMEs)	3.54	40.66	4.81	7.43
Specialised lending	2.95	44.00	4.12	6.48
Retail exposure categories	3.00	33.08	3.54	4.48
Retail-assessed SMEs	3.49	45.78	4.89	7.60
Loans for house purchase	2.15	19.76	2.36	2.80
Other loans to individuals	4.48	53.93	5.29	6.48

Source: CNB

TABLE IV.2 BOX

CAPITAL ADEQUACY FOR CONSTANT REGULATORY CAPITAL LEVEL
(CZK millions)

		Capital requirement			
	31 Dec. 2009	Baseline scenario	Change (%)	Adverse scenario	Change (%)
Capital requirements, total (including other risks)	123,147	136,368	10.74	149,917	21.74
Regulatory capital	220,630	220,630	0	220,630	0
Capital adequacy ratio (%)	14.33	12.94	-1.39 p.p.	11.77	-2.56 p.p.

Source: CNB, CNB calculation

TABLE IV.3 BOX

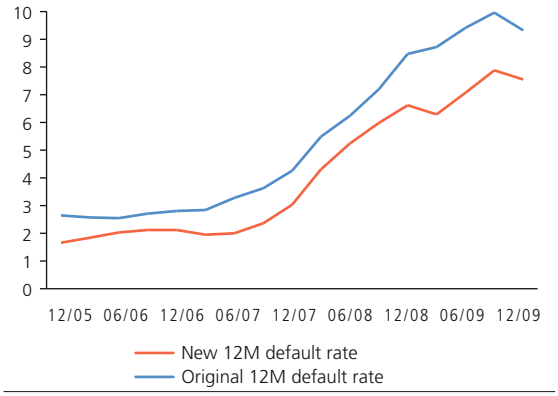
CAPITAL ADEQUACY FOR MODIFIED REGULATORY CAPITAL LEVEL
(CZK millions)

		Capital requirement			
	31 Dec. 2009	Baseline scenario	Change (%)	Adverse scenario	Change (%)
Capital requirements, total (including other risks)	123,147	136,368	10.74	149,917	21.74
Change in capital due to change in EL	0	-7,714	0	-18,896	0
Regulatory capital	220,630	212,917	-3.50	201,734	-8.56
Capital adequacy ratio (%)	14.33	12.49	-1.84 p.p.	10.77	-3.57 p.p.

Source: CNB, CNB calculation

CHART IV.44

Difference between original and new 12M default rate of non-financial corporations
(%)



Source: CNB, CNB calculation

TABLE IV.6

IMPACT OF THE ALTERNATIVE SCENARIOS ON THE BANKING SECTOR

	Baseline Scenario		Return of Recession		Loss of Confidence	
	2010	2011	2010	2011	2010	2011
Expected credit losses						
CZK billions	-40.6	-26.1	-56.1	-48.2	-48.1	-68.8
% of assets	-1.0	-0.6	-1.3	-1.1	-1.1	-1.7
Profit/loss from market risks						
CZK billions	4.8	-1.8	0.6	-1.5	-17.9	2.3
% of assets	0.1	0.0	0.0	0.0	-0.4	0.1
Interbank contagion						
CZK billions	-0.1	0.0	-0.4	-1.3	-0.3	-1.6
% of assets	0.0	0.0	0.0	0.0	0.0	0.0
Earnings for covering losses (adjusted operating profit)						
CZK billions	83.3	90.6	75.3	59.2	85.5	70.8
% of assets	2.0	1.9	1.8	1.4	2.0	1.7
Pre-tax profit/loss						
CZK billions	**47.3**	**62.6**	**19.4**	**8.3**	**19.1**	**2.6**
% of assets	**1.1**	**1.3**	**0.5**	**0.2**	**0.5**	**0.1**

Source: CNB, CNB calculation

banks to additional stress.[115] Even in this case, however, the aggregate capital adequacy ratio did not fall below the 10% threshold (see Table IV.3 Box).

The project of joint stress testing by the CNB and selected commercial banks indicates sufficient resilience of the participating banks to adverse macroeconomic shocks. The CNB's aggregate stress tests, discussed in more detail in this section of the report, arrive at the same conclusion.

In addition to information about the sector's resilience, the joint stress-testing project provides the CNB with a great deal of useful information on the levels and evolution of some risk parameters, which are being used to refine the CNB's aggregate stress tests on an ongoing basis.[116] The project also provides value added by encouraging more intensive communication between the CNB and the participating banks regarding potential risks and the appropriate configuration of the stress testing methodology.

The new PD calculation methodology for non-financial corporations takes into account the values reported by banks

The PD values for the non-financial corporations segment reported by banks under the joint stress test project were significantly below those previously used in the CNB's aggregate stress tests, which were derived from observed and model-estimated default rates calculated from data in the CNB's credit register. Given uncertainty about the default rate, the original methodology was very conservative in the sense that it regarded loans 30 days or more past due as non-performing (whereas the standard definition is 90 days or more past due) and, moreover, slightly overestimated the volume of NPLs defined in this way.

The methodology has been changed because of considerable overestimation of loan losses compared to actual outcomes, due chiefly to an excessively high default rate. The new methodology only takes into account loans 90 days or more past due and leads to a lower default rate (see Chart IV.44), but it maintains some margin of overestimation by comparison with the values reported by the largest banks.

The stress scenarios would lead to an increase in credit risk and loan losses in the banking sector

The new two-year test horizon allows us to estimate the loan and other losses of the banking sector in the individual scenarios over the next

115 This version of the calculation can be interpreted as the influence of unexpected loss (represented by capital requirements) and expected loss on the bank's capital adequacy if an adequate increase in provisions and reserves on the stress-tested portfolios failed to occur.

116 See the thematic article *Stress Test Verification as Part of an Advanced Stress Testing Framework* in this Report.

eight quarters. However, for the sake of greater clarity and easier comparison with developments in the sector and the results of the tests of other sectors, the results are presented as values for the whole calendar years 2010 and 2011 (see Table IV.6). Increases in PD and partly also LGD contribute to loan losses, resulting in an obligation to create higher provisions. The risk costs of the banking sector, as measured by the volume of new provisions divided by total gross loans (the loan loss provisioning rate), could rise from 1.9% in 2009 to more than 3% (see Chart IV.45).

The banking sector as a whole does not record an accounting loss under the stress scenarios and maintains a positive return on assets of between 0.1% and 0.5% (see Table IV.6). The impact of the shocks is the largest in the *Loss of Confidence* scenario, where additional losses arise as a result of market risks (especially a decrease in bond prices) compared to the other scenarios. The role of interbank contagion remains limited in all the scenarios, owing to the relatively low connectivity between domestic banks (see section 4.1). Hence, the aggregate impacts of the shocks with and without interbank contagion do not differ much.

Non-financial corporations account for a large proportion of the loan losses in 2010, but the share of households would increase in 2011 in all the scenarios (see Chart IV.46).

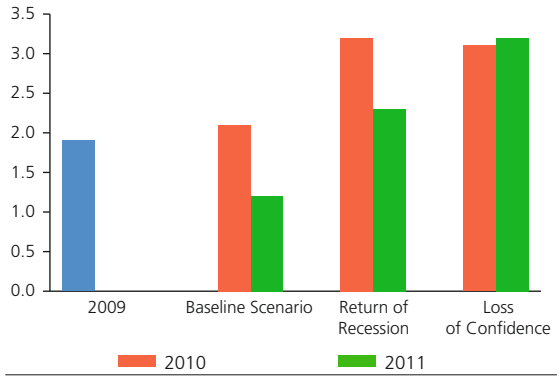
Capital adequacy exceeds the regulatory minimum in all the scenarios

The capital adequacy ratio exceeds the regulatory minimum of 8% in all the scenarios (see Chart IV.47). Tier 1 capital adequacy is roughly 1 p.p. lower than total capital adequacy.

Although the sector as a whole will maintain a capital adequacy ratio above the regulatory limit, this indicator might drop below 8% for several banks due to losses in the stress scenarios, and the shareholders of such banks would be forced to increase their capital. However, even in the worst scenario, the topping-up of the capital adequacy of all banks resident in the Czech Republic to the required minimum would require smaller capital injections than suggested by the bank stress test results published in FSR 2008/2009. According to the current stress tests, the necessary increases in regulatory capital in the most pessimistic scenario are estimated at only CZK 3 billion, i.e. less than 1% of the existing bank regulatory capital and less than 0.1% of GDP. In last year's Financial Stability Report, the capital injections necessary in the worst stress scenario were calculated at CZK 15.7 billion. Although this indicator is not fully comparable between the current and previous FSR owing to the changes in testing methodology, it indicates an increased resilience to shocks. The main reason for the lower need for capital injections even in the worst scenario in the current tests is a higher initial capital adequacy ratio, which is 14.3% (compared to 12.3% in last year's FSR).

CHART IV.45

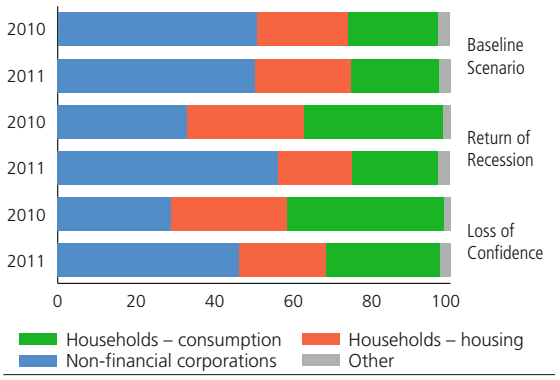
Risk costs of the banking sector in each scenario
(provisioning as % of gross loans for given year)



Source: CNB, CNB calculation

CHART IV.46

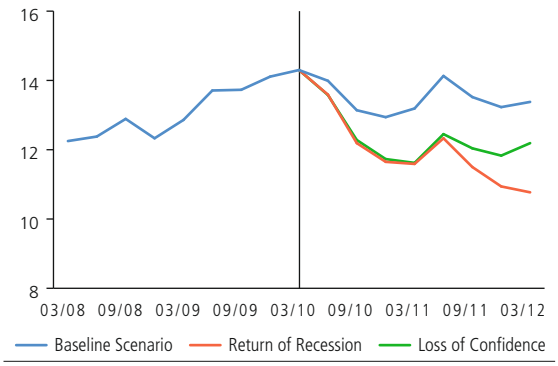
Contributions of individual segments to total loan losses
(%)



Source: CNB, CNB calculation

CHART IV.47

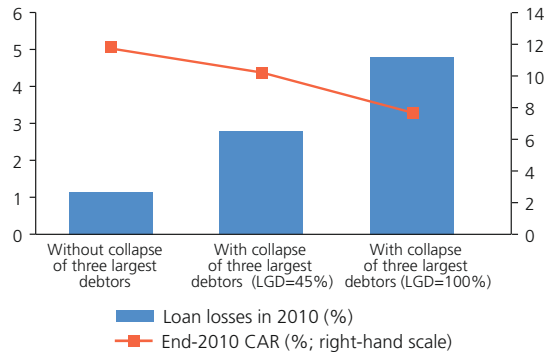
Capital adequacy ratios in each scenario
(%)



Source: CNB, CNB calculation

CHART IV.48

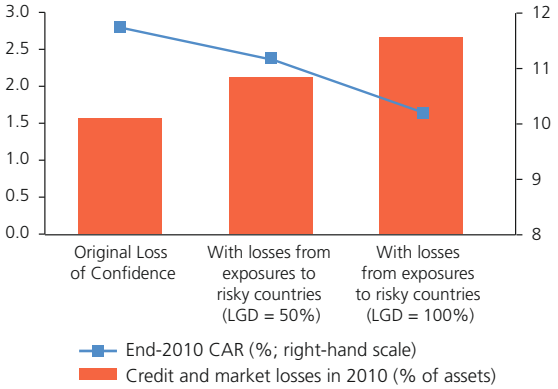
Impact of the collapse of the three largest debtors of each bank in the Loss of Confidence scenario
(%)



Source: CNB

CHART IV.49

Impact of the ad-hoc "propagation of Greek crisis" test in the Loss of Confidence scenario
(%)



Source: CNB, CNB calculation

An ad-hoc test of portfolio concentration indicates significant impacts of potential bankruptcy of the largest debtors

One of the more important risks is the possibility of a non-linear increase in credit risk, especially if the largest debtors of the individual banks, i.e. the largest corporations, defaulted on their debt. This could occur, for example, at the peak of the adverse phase of the credit cycle. The *Loss of Confidence* scenario involves the highest default rate of around 9%, occurring at the end of 2010 (see section 2.2). Under this scenario, losses from the bankruptcy of three largest debtors of each bank were added to the standard loan losses for this period.

The impact of such an ad-hoc shock would depend critically on the LGD value. As the largest corporations are rated by banks as high-quality debtors, the loans provided to them are usually unsecured, implying an LGD of 100%. On the other hand, many larger companies have assets that could at least partly reduce banks' loan losses in the event of bankruptcy. The test was eventually performed in two alternatives, for LGD = 100% and LGD = 45%; both these values can be viewed as extremes.

The impacts of such an ad-hoc test would be dramatic if LGD was 100% (see Chart IV.48). The sector's capital adequacy ratio falls towards the regulatory threshold of 8% at the end of 2010 and the capital injections necessary to keep each bank at least at 8% would be CZK 47 billion in 2010, i.e. roughly 18% of the current volume of regulatory capital and around 1.5% of GDP. At the same time, however, it must be taken into account that the bankruptcy of the three largest debtors of each bank is an extremely implausible scenario with a probability several times, or many times, lower than even the crisis in the Czech Republic in the late 1990s. The probability of this scenario is very low even by comparison with the normally used very unlikely adverse stress scenarios.

The Czech banking sector is able to withstand the potential losses from propagation of the Greek crisis

Under the *Loss of Confidence* scenario, we carried out an additional sensitivity analysis assuming propagation of the Greek crisis to other risky countries in the southern part of the EU (Spain, Portugal and Italy) and a marked decline in exposures to these countries. At the end of March 2010, the exposures of the Czech banking sector to all four countries totalled CZK 46.3 billion, consisting mostly (77%) of bonds, especially government bonds.

Assuming a 50% loss (LGD) on these exposures, banks would have to write off CZK 23.1 billion (0.5% of assets); under the very extreme assumption of a 100% loss the figure would be CZK 46.3 billion (1% of assets). In both these very improbable cases the capital adequacy of the banking sector would not fall below the regulatory minimum (see Chart IV.49). However, the necessary capital injections would rise to almost CZK 16 billion (i.e. 6% of regulatory capital and around 0.5% of GDP) compared to the original *Loss of Confidence* scenario.

An additional reverse stress test shows that only an extremely unlikely decline in GDP could reduce the sector's capital adequacy ratio below 8%

One of the ways of supplementing stress test results is to perform a reverse stress test (i.e. a stress test using reverse logic). Such a test answers the question how much a macroeconomic, market or other variable, or combination thereof, would have to change for a situation of insufficient capital adequacy (i.e. effectively a CAR below 8%) to arise in the banking sector. Given the stress test methodology used, which combines the effects of numerous variables, it is apparent that many such combinations exist.

For simplicity, only the two variables with the most important impact on the banking sector via credit risk and income were used, namely GDP and unemployment. One limitation of this approach is that modifying these variables without simultaneously modifying the other macroeconomic variables (inflation, the exchange rate, interest rates) disrupts the scenario's macroeconomic consistency. The Return of *Recession scenario*, which already assumes a significant drop in GDP, was chosen as the baseline scenario. The aim was to find the GDP growth path (i.e. to lower the expected GDP growth figures by X p.p.) that generates a decline in the banking sector's CAR below 8% in at least one of the eight quarters.[117]

The results show that the growth path would be at least 2.5 p.p. lower in the *Return of Recession* scenario (see Chart IV.50). Only in this case does the banking sector as a whole fall slightly below 8% at the end of the test period, i.e. as of 31 December 2011. Such low GDP growth, temporarily reaching almost -7%, can be regarded as relatively unlikely.

Banks' financial soundness is confirmed by the current values of the banking stability index

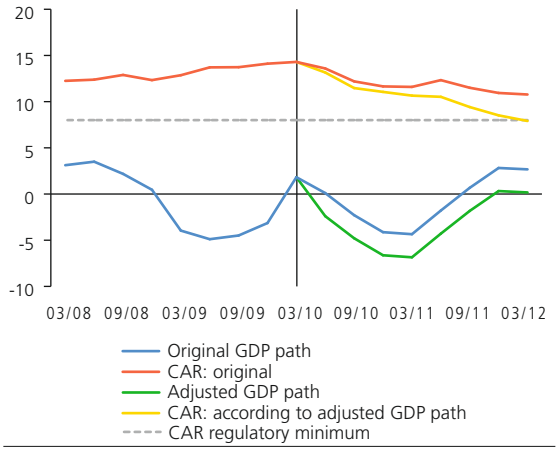
The regularly calculated banking stability index, constructed as a weighted average of the key indicators of banking sector soundness (profitability, asset quality, liquidity, capital adequacy and credit and currency risk indicators), deteriorated slightly in 2009 H2 (see Chart IV.51).[118] This was due mainly to lower asset quality, which has a relatively large weight (one-quarter) in the overall index. However, better profitability and an increase in capital adequacy partly offset the deterioration in asset quality.

117 Unemployment was linked to GDP in accordance with Okun's law (the following relationship was used: change in unemployment rate = -0.4 times change in real GDP growth).

118 The methodology underlying the index is described in detail in Geršl, A., Heřmánek, J. (2007): *Financial Stability Indicators: Advantages and Disadvantages of Their Use in the Assessment of Financial System Stability,* Financial Stability Report 2006, CNB, pp. 69–79.

CHART IV.50

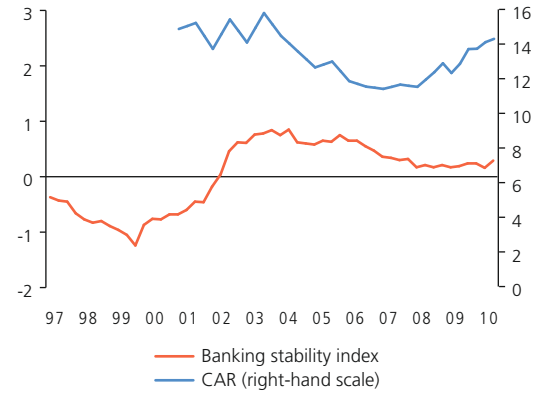
Results of reverse stress test
(%; for Return of Recession scenario)



Source: CNB, CNB calculation

CHART IV.51

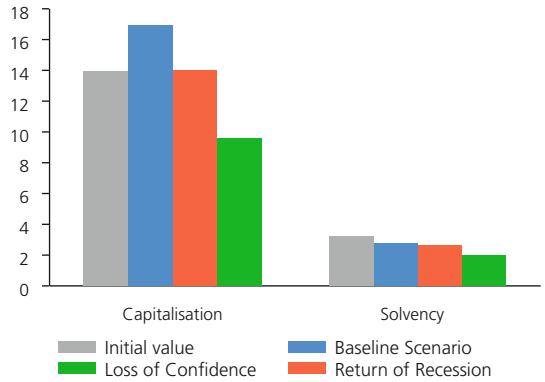
Banking stability index
(standard deviations from historical average; CAR in %)



Source: CNB, CNB calculation

CHART IV.52

Solvency and capitalisation indicators of insurance companies in each scenario
(solvency: ratio of available to required solvency ratio; capitalisation in %)



Source: CNB, CNB calculation
Note: Assuming zero dividends.

Table IV.7

Results of insurance company stress tests

	Baseline Scenario	Return of Recession	Loss of Confidence
Market risks			
Bond revaluation gains/losses			
CZK billions	0.14	-4.59	-18.72
% of assets	0.04	-1.28	-5.22
Exchange rate gains/losses			
CZK billions	-0.39	-0.26	1.00
% of assets	-0.11	-0.07	0.28
Gains/losses from changes in share value			
CZK billions	0.00	-6.11	-9.17
% of assets	0.00	-1.70	-2.56
Gains/losses from changes in property value			
CZK billions	0.00	-0.15	-0.33
% of assets	0.00	-0.04	-0.09
Credit risk			
Losses from unpaid claims			
CZK billions	-0.52	-0.63	-0.95
% of assets	-0.15	-0.18	-0.27
Specific insurance risk			
Claim settlement costs in LI			
CZK billions	-0.20	-0.20	-0.20
% of assets	-0.06	-0.06	-0.06
Claim settlement costs in NLI			
CZK billions	-1.28	-1.28	-1.28
% of assets	-0.36	-0.36	-0.36
Projected earnings			
CZK billions	12.45	12.45	12.45
% of assets	3.47	3.47	3.47
Total impact on equity			
CZK billions	10.19	-0.78	-17.20
% of assets	2.84	-0.22	-4.79

Source: CNB, CNB calculation

Table IV.8

Results of pension fund stress tests

		Baseline Scenario	Return of Recession	Loss of Confidence
Market risks				
Bond revaluation gains/losses	CZK billions	0.06	-1.77	-7.47
	% of assets	0.03	-0.82	-3.46
Exchange rate gains/losses	CZK billions	-0.50	-0.33	1.30
	% of assets	-0.23	-0.15	0.60
Gains/losses from changes in share value	CZK billions	0.00	-1.15	-1.73
	% of assets	0.00	-0.53	-0.80
Gains/losses from changes in property value	CZK billions	0.00	-0.11	-0.24
	% of assets	0.00	-0.05	-0.11
Allocation of earnings	CZK billions	3.68	3.68	3.68
	% of assets	1.70	1.70	1.70
Total impact on equity	CZK billions	3.23	0.32	-4.46
	% of assets	1.50	0.15	-2.06

Source: CNB, CNB calculation

Stress tests of insurance companies confirm good resilience of this sector

The insurance company stress-testing methodology remained unchanged from FSR 2008/2009. Again, the tests focus mostly on market risks, with the biggest impact being assigned to the risk of revaluation of long-term bonds and losses from declines in stock prices. However, shocks specific to the insurance sector were also considered. After taking into account the effect of equalisation provisions in non-life insurance and the earnings insurance companies would generate during the stress test period (set to 90% of last year's profit net of asset revaluation gains/losses), the total impact of the stress scenarios would range from CZK 1 billion to CZK 18 billion, or from 0.2% to 4.8% of assets (see Table IV.7).

The insurance sector can be regarded as stable despite these losses. The estimated solvency indicator for the individual scenarios, expressed as the ratio of disposable to required solvency, suggests that risk coverage is sufficient. The sector can even withstand the impact of the *Loss of Confidence* scenario equalling almost 5% of assets, which would cause a decrease in capitalisation (defined as the ratio of equity to assets) to around 10% (see Chart IV.52). However, some insurance companies could fall below the regulatory solvency threshold of 100% in the stress scenarios. The capital injections necessary to keep all insurance companies above the regulatory minimum would run to about CZK 0.1 billion in the *Return of Recession* scenario and CZK 2.8 billion in the *Loss of Confidence* scenario.

Pension funds are resilient to an increase in market risks

The stress tests of pension funds focus on market risks. The structure of the portfolios (see section 4.1) implies that this sector is sensitive above all to movements in long-term interest rates, which are reflected in bond revaluation losses, and to declines in stock prices. Such losses are the highest in the *Loss of Confidence* scenario; however, pension funds partly benefit from exchange rate gains due to the koruna's depreciation in this scenario (see Table IV.8). This reflects the currency structure of pension fund balance sheets, where almost all liabilities are in koruna, while assets include securities in foreign currency. The overall impact following the inclusion of income generated in the adverse period (set, as in the case of insurance companies, to 90% of last year's profit net of asset revaluation gains/losses) would be up to CZK 4.5 billion (*Loss of Confidence*), i.e. roughly 2% of assets. Capitalisation, as expressed by equity as a percentage of assets, would remain roughly unchanged (*Return of Recession*) or decrease to 4.2% in the *Loss of Confidence* scenario (see Chart IV.53). The sector's resilience is also illustrated by the fact that no pension fund would get into a negative capital situation in any scenario, implying a zero need for capital injections.

A new balance-sheet liquidity test for banks confirms good resilience to liquidity shocks

A macro-stress-testing model was used to test banks' liquidity risk. By comparison with the methodology presented in FSR 2008/2009, the currently used model has a greater number of different liquidity shocks (in addition to a run on the bank and a decline in the prices of securities holdings it includes, for example, realisation of credit facilities and various degrees of uncollectibility of some short-term claims) and better reflects banks' response to shocks, including their negative feedback effect on bank balance sheets.

Banks were tested under two new scenarios at the one-month horizon for a combination of idiosyncratic and market risks. The combination of shocks generates a positive liquidity gap, i.e. an asset financing requirement which banks must fulfil by reacting subject to pre-defined constraints.[119] On the one hand, the response of banks in the form of sales of liquid securities or other assets mitigates the impact of the initial shock on the balance-sheet liquidity of individual banks, but on the other hand it increases the reputational risk of each responding bank and systemic risk in the sector as a whole.[120] The bank's reputational risk and the increase in systemic risk feed back in the form of another shock to banks' balance sheets through a decline in the market prices of some assets. It is therefore crucial for each bank to have a sufficient liquidity buffer[121] which it can use to cover sudden and unexpected fluctuations on its balance sheet caused by its own activity or market activity.

The aim of the test was to reveal the potential insufficient resilience of a financial institution (i) which is too dependent on a single source of financing (and for which a shortfall in that source of financing would significantly disrupt its operations), (ii) whose assets are too sensitive to market risk, and (iii) which has only a very small liquidity buffer in place for the case of unexpected adverse conditions.

Both selected scenarios assume (see Table IV.9) a rise in loans provided,[122] an inability to transfer funds within the banking group, an inability to issue new securities, losses from sales of claims before maturity, reduced liquidity of security holdings, a higher haircut (financial collateral ratio) on selected collateral accepted by the central bank and unavailability of claims on credit institutions and other clients maturing within one month. In addition, the first scenario assumes 80% drawdown of credit facilities and constant deposits in nominal terms, unlike the second

119 The limiting assumptions in the currently used model do not allow a bank to close the liquidity gap by obtaining (e.g. more expensive) additional funds. The bank can thus react only by selling some of its assets.

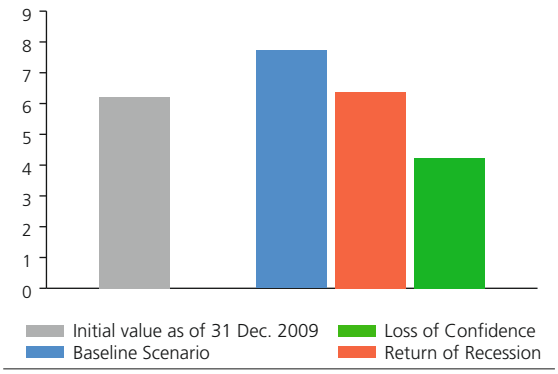
120 The simultaneous response by banks will result in an additional decline in the prices of the securities or other assets being sold in the financial market.

121 The liquidity buffer (LB) consists of quick assets, securities and claims due within one month (including claims payable on demand), with quick assets defined as the sum of cash, claims on central banks, bonds issued by governments or central banks and claims on other financial institutions payable on demand.

122 The scenarios assume this even though it is likely that banks will not provide loans if they are unable to fund them. However, given the horizon of the test together with bank's efforts to maintain market share, this assumption was not considered completely implausible.

CHART IV.53

Estimate of capitalisation of pension funds in each scenario
(%)



Source: CNB, CNB calculation
Note: For the scenarios the values are those before distribution of profits to planholders.

TABLE IV.9

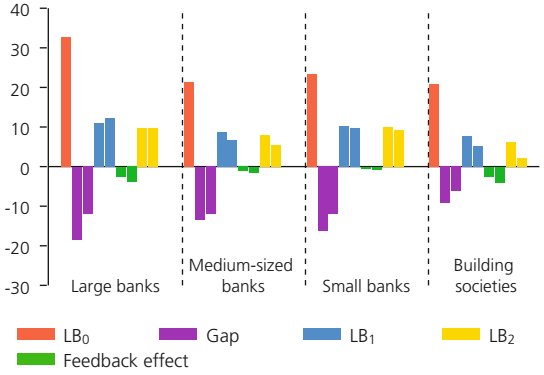
SCENARIO TYPE AND SHOCK SIZE IN BANK LIQUIDITY STRESS TEST

Scenario type	Scenario 1	Scenario 2
Credit growth (%)	10	10
Bank run (%)	0	10
Drawdown of credit facilities (credit lines, % of volume)	80	0
Share of short-term claims on banks that will become unavailable (%)	100	50
Share of short-term claims on other clients that will become unavailable (%)	20	20
Reduction in value of government bonds eligible as collateral in CNB liquidity-providing operations (%)	20	50
Reduction in value of other securities (%)	20	20
Reduction in value of assets sold before maturity (%)	50	50

Source: CNB, CNB calculation

CHART IV.54

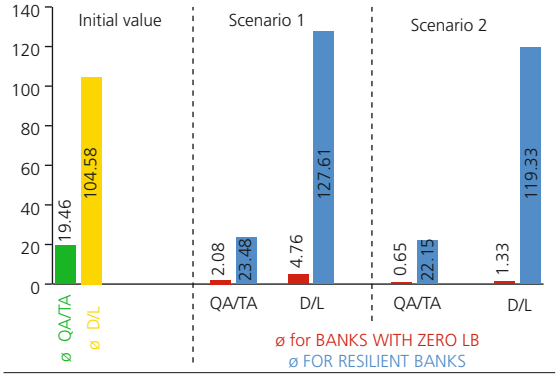
Result of the liquidity test
(%; share in total assets)



Source: CNB, CNB calculation
Note: The first column of each pair of identically coloured columns expresses the value for Scenario 1 and the second expresses that for Scenario 2. Gap = liquidity gap. Feedback effect = additional stress caused by banks' reactions on markets.

Chart IV.55

Differences in bank liquidity indicators by scenario impacts
(%)



Source: CNB, CNB calculation
Note: QA/TA = quick assets/total assets; D/L = deposits/loans, i.e. coverage by primary funds; ø = average; initial value for 21 banks; in Scenario 1 there are three banks with a zero LB and in Scenario 2 there are two.

scenario, where credit facilities are not used but an outflow of 10% of deposits payable within one month (including demand deposits) occurs. Both scenarios were applied individually to 21 banks operating in the Czech Republic.[123]

Although the set-up of the scenarios was very strict, the tested banks withstood the simulated stress and would be able to close the potential liquidity gap within one month even under worsened market conditions (see Chart IV.54). Nevertheless, three banks in the first scenario and two banks in the second scenario would fully exhaust their liquidity buffers by their response to the liquidity shock.[124] To be able to close the liquidity gap, they would be forced to obtain additional funds by selling assets with maturities of over one month; however, they would sell them at a considerable loss.

The main reason for the low resilience of banks with exhausted liquidity buffers is the low initial values of their buffers (see Chart IV.55). For easier explanation, two liquidity indicators were used, namely the ratio of quick assets to total assets (QA/TA) and the ratio of deposits to loans (D/L).[125] By comparison with less resilient banks, resilient banks create much higher quick assets (around 22% of total assets in both scenarios, compared to 2% and 0.5% for the less resilient banks), which they can use quickly if needed. At the same time, it turns out that unlike their less resilient counterparts, resilient banks can largely cover loans provided to non-financial clients from primary funds.

123 The test was not carried out for foreign bank branches.
124 The business models of less resilient banks are configured in such a way that by definition they practically cannot withstand the way the test and its scenarios are calibrated. However, this does not mean that their business models are inappropriate from the point of view of liquidity management. Rather, they are specific. Moreover, business models can be changed in the longer term. These scenarios do not take this fact into account.
125 This indicator characterises the coverage of a bank's credit activities vis-à-vis non-bank clients by primary funds.

PART II – THEMATIC ARTICLES

STRESS TEST VERIFICATION AS PART OF AN ADVANCED STRESS-TESTING FRAMEWORK

Adam Geršl and Jakub Seidler

This article summarises the CNB's updated banking sector stress-testing methodology and presents the results of a verification of that methodology. The verification, conducted at the end of 2009, is based on a comparison of the actual values of key banking sector variables – in particular the capital adequacy ratio – with predictions generated by the stress-testing models. The objective of the verification is to examine to what extent the assumptions of the CNB's stress tests and the settings of the sub-models used are in line with reality. The results show that the current stress tests err on the right – i.e. pessimistic – side and slightly overestimate the risks. This leads on average to capital adequacy ratio estimates that are lower (more conservative) than the actual values. The article also identifies some areas of further development of the banking sector stress tests, for instance the use of verification as a standard part of the stress-testing framework in order to refine the stress tests.

1. INTRODUCTION

Stress tests are used by central banks, regulators and commercial financial institutions as a means of testing the resilience of institutions or the entire sector to adverse changes in the economic environment. The global financial crisis uncovered the deficiencies of the stress-testing methodologies used in many countries. Before the crisis, many tests were wrongly indicating that the sector would remain stable even in the event of sizeable shocks (Haldane, 2009). These deficiencies related not only to the configuration of the adverse scenarios used, which had initially seemed implausibly strong but were often exceeded in reality, but also to the shock combination assumed, which had not been adequately anticipated in the scenarios (Čihák et al., 2009; Breuer et al., 2009). A role was also played by deficiencies in model calibration and in the assumed behaviour of banks and markets, and by the absence of testing of liquidity risk alongside traditional financial risks (in particular credit risk and interest rate risk).

Consequently, the assumptions and parameters used in stress tests are gradually being re-examined so that the tests can better analyse the impacts of strong shocks to the financial system. In defence of stress testing, however, it should be mentioned that this is a relatively new tool[1] and hence it still requires ongoing methodological development and refinement[2].

The CNB has been performing bank stress tests since 2003 and has significantly expanded its methodology over the past few years. The most recent major update was in mid-2009 (see section 2). On this occasion, a verification of the overall stress-testing methodology was conducted in the context of the aforementioned international debate on the reliability of the predictions of the impacts of shocks to the banking sector. The aims were to demonstrate whether the stress test assumptions were correctly configured and to identify any deficiencies in those assumptions. The verification results were used to further develop the stress tests.

This article discusses the process and results of the aforementioned verification conducted on the updated stress-testing methodology in late 2009 and presents further challenges for the development of the stress-testing framework. The analysis reveals that the current stress-testing system generally errs on the right – i.e. pessimistic – side and slightly overestimates the risks. This leads on average to estimates of key financial soundness indicators (in particular capital adequacy) that are lower (more conservative) than the actual values. Some of the minor deficiencies detected in the verification have already been rectified in the current version of the stress tests used in this Financial Stability Report.

The article is structured as follows. Section 2 briefly describes the CNB's current stress-testing methodology. Section 3 summarises the verification methodology and presents summary conclusions of the verification for capital adequacy (including its two main constituents, i.e. regulatory capital and risk-weighted assets, RWA) and some other key banking sector variables used in the stress tests. This section also

1 Tools based on various types of financial soundness indicators have traditionally been used to assess the resilience of financial institutions (Geršl and Heřmánek, 2007).

2 The formal obligation of commercial banks to conduct stress tests on their own portfolios was only introduced by Basel II (for banks using advanced methods for calculating capital requirements), which was implemented in the EU in 2006–2007.

contains a summary of the main improvements introduced following the verification (and other processes described above) and a brief description of the next steps planned for the development of the banking sector stress tests. The conclusion summarises the verification results and proposes a medium-term plan for further developing the tests.

2. CURRENT BANKING SECTOR STRESS-TESTING METHODOLOGY

The original banking sector stress-testing methodology applied at the CNB was based on the IMF methodology used for FSAP missions (Čihák, 2005; Čihák and Heřmánek, 2005). The CNB later switched from testing historical ad-hoc scenarios defined by a combination of shocks (e.g. a 20% rise in non-performing loans, a 15% exchange rate depreciation) to using consistent macroeconomic scenarios generated by the CNB's prediction model and related credit risk and credit growth sub-models (Čihák, Heřmánek and Hlaváček, 2007; Jakubík and Schmieder, 2008; Jakubík and Heřmánek, 2008). This framework was used for the previous Financial Stability Report 2008/2009 (CNB, 2009).

In the second half of 2009, the CNB significantly updated the banking sector stress-testing methodology in three respects. First, the tests were "dynamised", in the sense of switching to quarterly modelling of shocks and their impacts on banks' portfolios. This change was described in a box in Financial Stability Report 2008/2009 (CNB, 2009, pp. 63–64). Second, in the credit risk area there was a changeover to "Basel II terminology", i.e. to capturing the credit risk of several separate portfolios using the standard parameters PD, LGD and EAD and relating risk-weighted assets to those parameters using procedures specified in the IRB approach to calculating capital requirements.[3] The final major innovation was the extension of the shock impact horizon from one to two years (or eight subsequent quarters).

Alternative macroeconomic scenarios

Alternative macroeconomic scenarios still serve as the starting point for stress testing in the updated methodological framework. The scenarios are designed using the CNB's official prediction model supplemented with an estimate of the evolution of some additional variables which are not directly generated by the model. "Stress scenarios" are constructed based on the identification of risks to the Czech economy in the near future. To compare the stress outcome with the most probable outcome, the stress tests use a baseline scenario, i.e. the current official macroeconomic prediction of the CNB.

The predictions for GDP growth, inflation and other macroeconomic variables enter credit risk and credit growth models. They were developed to capture changes in banks' credit portfolios and credit risk. The stress tests work explicitly with the four main loan portfolio segments by debtor and/or credit type (non-financial corporations, loans to households for house purchase, consumer credit and other loans), to which the sub-models are also adjusted. The credit risk models are used to predict PD for the individual loan segments, whereas the credit growth models are used to estimate the growth in bank portfolios in relation to the macroeconomic situation and (after certain adjustments) to estimate the evolution of risk-weighted assets.

In the stress tests, the prediction for macroeconomic and financial variables for individual quarters is reflected directly in the prediction for the main balance-sheet and flow indicators of banks. The tests are dynamic, i.e. for each item of assets, liabilities, income and expenditure there is an initial (the last actually known) stock, to which the impact of the shock in one quarter is added/deducted, and this final stock is then used as the initial stock for the following quarter. This logic is repeated in all eight quarters for which the prediction is being prepared.

Credit risk

Credit risk testing is the most important area of stress testing. This testing is based on the use of PD for each of the four main segments of the loan portfolio. The second credit risk parameter is LGD, which is currently determined by expert judgement, with different amounts being set for different scenarios and different credit segments in line with the regulatory rules, commercial bank practices, the approaches applied by some rating agencies (Moody's, 2009) and existing estimates based on market data (Seidler and Jakubík, 2009). The third parameter is EAD, which is determined as the volume of the non-default part of the portfolio (i.e. excluding non-performing loans).

3 PD – probability of default; LGD – loss given default; EAD – exposure at default; IRB – internal ratings based.

An increase in PD and LGD has two main effects on individual banks.

First, the expected loan losses (in CZK millions), against which banks will create new provisions of an equal amount and record them on the expenses side of the profit and loss statement as impairment losses, are calculated as the product of PD, LGD and EAD for each credit segment and quarter.[4] Total assets are then symmetrically reduced by the amount of these expenses.

The product of PD and the volume of the non-default portfolio forms the volume of new non-performing loans (NPLs) for each quarter. This allows us to generate the volume of total NPLs in the following eight quarters for each bank, and subsequently for the banking sector as a whole, according to the following equation:

$$(1) \quad NPL_{t+1} = NPL_t + \sum_{i=1}^{4} PD_{t+1,i} NP_{ti} - aNPL_t$$

where *NPL* are non-performing loans, *PD* is the probability of default, *NP* is the non-default portfolio in the four segments defined above and a is an NPL outflow parameter (i.e. write-offs or sales of existing NPLs, i.e. the default part of the portfolio). Parameter a is set by expert judgement at 15% for all segments, i.e. 15% of NPLs are written off/sold each quarter and subsequently disappear from the total volume of NPLs and (gross) assets of the bank. This calibration was chosen on the basis of discussions with commercial banks and estimates conducted as part of the verification, which are described in more detail at the end of the next section.

The credit growth model leads to an estimate of the gross volume of loans in individual segments. Using relation (1) for NPL modelling, this allows us to determine for each bank, and subsequently for the banking sector as a whole, the NPL/total loans ratio, a standard indicator of the banking sector's health.

Second, in the case of banks applying the Basel II IRB approach to the calculation of capital requirements for credit risk, the capital requirements (or risk-weighted assets, RWA[5]) for credit risk are a function of PD, LGD and EAD. Given that the largest banks in the Czech Republic apply this approach, this relation is applied to all banks for the sake of simplicity. Given a constant non-default portfolio volume, i.e. EAD, an increase in PD and LGD thus generally results in an increase in RWA and therefore a decrease in capital adequacy.[6]

Interest rate and currency risk

The macroeconomic scenarios contain a prediction of the evolution of the simplified koruna and euro yield curves (rates with 3M, 1Y and 5Y maturities). A change in interest rates has a direct effect on bank balance sheets in two main items, namely interest profit and the value of bond holdings.[7] A rise in short-term rates thus reduces the interest rate profit of those banks which have an excess of short-term liabilities over short-term assets. However, the calculation is adjusted by expert judgement to take account of the business policies of commercial banks, which respond relatively little to market interest rate changes on the deposit side.

The prediction for long-term interest rates is used to estimate profits/losses from the revaluation of bond holdings (except for bonds held to maturity and bonds with a variable coupon dependent on interest rates). The calculation is based on the estimated duration of the bond portfolios, which is calculated by expert judgement on the basis of a more detailed knowledge of the maturity structure. Account is also taken of bond portfolio hedging using IRS (interest rate swaps), which for some banks lessens the impact of interest rate changes.

The quarter-on-quarter change in the CZK/EUR exchange rate is applied to the net open foreign currency position (including off-balance-sheet items), generating either a loss or a profit depending on the sign of the net open position and the direction of the exchange rate change.[8]

4 According the relevant CNB decree and IFRS, banks are not required immediately to create provisions exactly equal to expected losses, but rather they must create provisions equal to realised losses, i.e. for new NPLs. However, if the loans are gradually reclassified during the quarter into the NPL (i.e. default) category to the extent predicted by PD, banks will ultimately create these provisions in the originally estimated amount.

5 Risk-weighted assets = capital requirements (in CZK millions) × 12.5.

6 This channel of the impact of increased PD and/or LGD on banks is one of the main sources of the much-criticised procyclicality of Basel II (see the thematic article *Procyclicality of the Financial System and Simulation of the Feedback Effect* in this Report).

7 At the same time, however, interest rate changes have an indirect effect on credit risk via their effect on the PD estimate.

8 For example, a positive open foreign currency position and appreciation of the koruna leads to losses.

Interbank contagion risk

Interbank contagion risk is modelled in two selected periods (in the fourth and eighth quarters). The test uses data on interbank exposures, with the capital adequacy of individual banks being used to determine their probability of default (PD).[9] As interbank exposures are mostly unsecured, LGD is assumed to be 100%. The expected losses due to interbank exposures are calculated for each bank according to the formula PD×LGD×EAD, where EAD is the net interbank exposure. If these losses are relatively high and will lead to a reduction in the bank's capital adequacy and thus an increase in its PD, there follows another iteration of the transmission of the negative effects to other banks through an increase in the expected losses. These iterations are performed until this "domino effect" of interbank contagion stops, i.e. until the rise in PD induced in one bank or group of banks does not lead to a rise in the PD of other banks.

Profit, regulatory capital and capital adequacy

ZThe stress test assumes that banks will continue to generate revenues even in the stress period, particularly net interest income (interest profit) and net fee income. For these purposes, an analytical item of the profit and loss account called "adjusted operating profit" has been constructed. This consists of interest profit (+), fee profit (+), administrative expenses (–) and some other (non-shock) items.[10] The volume of adjusted operating profit was determined by expert judgment for the individual scenarios. The model estimate from this Financial Stability Report is used (see Box 7 in section 4.2).

Regulatory capital is modelled in accordance with the applicable CNB regulations. Each bank enters the first predicted quarter with initial capital equal to that recorded in the last known quarter. If a bank generates a profit in the first predicted quarter (i.e. its adjusted operating profit is higher than its losses due to the shocks), its regulatory capital remains at the same level (is not increased). If, however, it generates a loss, its regulatory capital is reduced by the amount of that loss. The impacts of the shocks are thus reflected in a reduction of capital only if they exceed adjusted operating profit and the bank generates a loss.

It is assumed that those banks which generate a profit for the entire financial year will decide on profit distribution and dividend payments in the second quarter of the following year. Here we assume that each bank, when increasing its capital from retained earnings of the previous financial year, will try to get to its initial capital adequacy ratio if its previous year's profits are sufficient.[11] Depending on the change in RWA, several scenarios are thus possible:

(a) the bank distributes the entire profit and does not strengthen its regulatory capital (in the event of unchanged RWA);
(b) the bank uses part of its profit to strengthen its capital and distributes the remainder (in the event of an increase in RWA; however, the entire retained earnings of the previous year will not be needed to reach the initial level of capital);
(c) the bank uses the entire profit to strengthen its capital (in the event of a relatively sizeable increase in RWA); depending on the size of the increase in RWA, however, it may not reach the original capital adequacy ratio;
(d) the bank pays dividends that exceed the profit generated (in the event of a decrease in RWA) and thereby also distributes part of retained earnings of previous years.

Total capital adequacy is then calculated for the individual quarters as the ratio of regulatory capital to total RWA. The portion of RWA relating to credit risk is modelled on the basis of the credit risk parameters (see above), while the other components of RWA (or of the capital requirements for other risks) for the individual quarters are determined by expert judgement.

9 The PD values in relation to capital adequacy ratios (CAR) are set by expert judgement as follows: PD = 100% for negative CAR; PD = 25% for CAR between 0% and 5%; PD = 15% for CAR between 5% and 8%; PD = 5% for CAR between 8% and 10%; PD = 0.5% for CAR greater than 10%.

10 In previous Financial Stability Reports this adjusted operating profit was called "net income". Adjusted operating profit is broadly equivalent to the item "pre-provision profit", i.e. operating profit gross of losses on non-performing loans, but differs in that it does not include the impacts of other (interest rate and exchange rate) shocks, whereas pre-provision profit does.

11 This assumption may not be very realistic at certain times, as banks may decide to pay higher dividends and reduce their capital adequacy ratio below the initial level.

3. VERIFICATION OF THE STRESS TESTS

The objective of the verification is to examine to what extent the assumptions and sub-models used are in line with reality. A problematic aspect of the verification is that the tests use stress – i.e. unlikely – scenarios, which may not occur in reality. Hence, we cannot subsequently compare predictions based on adverse scenarios with reality. For this reason, only the scenario that represents the most likely evolution of the economic environment, i.e. the no-stress baseline scenario of the CNB forecast, could be used for the verification.[12]

The verification was conducted on quarterly data in the period 2004 Q4–2009 Q2, i.e. for 19 periods in all. The actual values of key variables for the banking sector as a whole are compared with the predictions generated by the current stress-testing methodology for the individual quarters using the relevant baseline scenario of the forecast. As the updated stress-testing methodology allows us to create a prediction for the next eight quarters, it was necessary to choose a prediction horizon. The results presented in this article are based on a one-year prediction.[13] The predictions for past quarters were therefore created subsequently using the updated stress-testing methodology in order to verify that methodology and do not match the values published in past Financial Stability Reports.

Two statistics based on the mean prediction errors were used to verify the selected variables: the mean absolute error (MAE) defined by equation (2):

$$(2) \quad \frac{1}{n}\sum_{t=1}^{n}\left|P_t - A_t\right|$$

and the mean error in direction (MED) defined as:

$$(3) \quad \frac{1}{n}\sum_{t=1}^{n}\frac{P_t - A_t}{\left|A_t\right|} \quad ,$$

where P_t denotes the value of the prediction of the estimated variable for the given quarter, A_t denotes the actual value and t represents the quarter for which the prediction is being made.[14]

MAE serves for simple presentation of the mean prediction error in the units in which the given variable is expressed, while MED expresses whether the given variable was overestimated or underestimated on average.

The prediction using the baseline (i.e. likely) scenario should indicate slightly higher risks than those that occur in reality. This is because the whole system should have a "conservative" buffer to offset the uncertainty associated with estimating losses given adverse economic developments, when relations (for example between GDP growth and risk parameters such as PD) can change suddenly for the worse. This requirement implies that stress test prediction errors should be evaluated differently from the errors of standard macroeconomic predictions, where deviations in either direction are regarded as "equally bad". In verifications using baseline scenarios, it is appropriate to apply an asymmetric view in the stress tests and tolerate prediction errors towards modest overestimation of the risks. The MED statistic is used for this evaluation.

The prediction error of the capital adequacy ratio and other key banking sector variables can be split into two main factors. The first is the potential prediction error caused by inaccuracy in the estimates of the macroeconomic variables entering the stress-testing mechanism (interest rates and the exchange rate), and the second concerns the assumptions and sub-models used in the stress test itself (e.g. the assumptions about how the bank raises its regulatory capital, what interest and non-interest yields it achieves and how sensitive it is to interest rate risk). The macroeconomic prediction error can be eliminated in the verification by using the actual (ex post) values of macroeconomic variables. The residual error is then due to inaccuracies in the assumptions and sub-models of the stress-testing framework.

The most important output variable of the tests is the estimate of the capital adequacy ratio (CAR). The mean absolute error (MAE) for CAR equates to roughly 1.6 p.p. of the capital adequacy ratio (see Table 1). This means, for example, that the test predicts CAR of 11.4% instead of 13%.

12 The first attempt to verify the stress tests using the baseline forecast scenario was made back in 2007 (Hlaváček et al., 2007), when the capital adequacy ratio and NPL growth predictions generated by the 2006 stress-testing methodology were compared with their real counterparts.

13 This means, for example, that the actual outcome in 2007 Q4 was compared with the prediction for that quarter made one year earlier, i.e. on bank portfolios as of 2006 Q4 using the January 2007 baseline scenario. Internally, however, the verification was performed for all prediction horizons and the results are qualitatively similar.

14 As part of the verification we also computed other prediction error statistics, e.g. the mean percentage error, the mean weighted percentage error, the mean quadratic error and the mean percentage quadratic error. The verification results using these statistics, however, did not differ significantly from the results using MAE and MED, which are easier to interpret.

Table 1

DEVIATION OF CAPITAL ADEQUACY RATIO ESTIMATE
Estimate for 1-year horizon

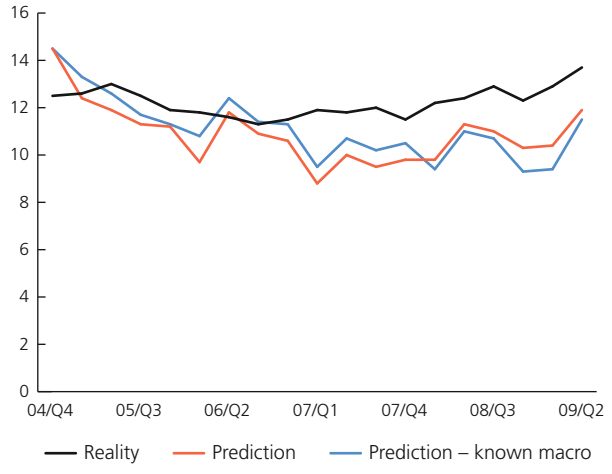
Mean absolute error (MAE)	2004–2009	2004–2005	2005–2006	2006–2007	2007–2008	2008–2009
Prediction – stress test	1.6	1.0	0.8	1.6	2.1	1.9
Prediction – known macro	1.5	0.9	0.6	1.1	2.0	2.5
Mean error in direction (MED) in %						
Prediction – stress test	-10.8	-1.7	-6.5	-13.1	-17.2	-15.3
Prediction – known macro	-8.8	1.9	-1.3	-7.1	-16.3	-20.0

This prediction error equates to roughly 1.8 standard deviations. In the individual shorter periods this error gradually shrinks to 0.8 p.p. (i.e. 1 standard deviation) but then grows again slightly from 2007 onwards. Only a small part of the error is due to errors in the macroeconomic forecast, as the MAE statistic decreases only modestly with knowledge of actual macroeconomic developments.

The negative MED statistic of -10.8% shows that the real values were higher on average in the period as a whole and the stress tests thus tended to generate overvalued CAR estimates (see Table 1). This fact is also demonstrated by Chart 1, which reveals that a lower-than-actual CAR is predicted from the end of 2006 onwards. The resulting CAR was thus underestimated for most periods, in line with the conservative design of the tests. This conclusion remains valid even when the predictions are adjusted for the error in the prediction of macroeconomic variables.

Chart 1

VERIFICATION OF CAR ESTIMATE
(CAR in %; estimate for 1-year horizon)



The estimate of a lower-than-actual CAR is due to inaccuracy in the estimate of both RWA and regulatory capital. With few exceptions the stress test overestimated RWA (see Chart 2) and simultaneously tended to underestimate regulatory capital (see Chart 3). The decomposition of the error in the CAR estimate into the part caused by inaccurate prediction of RWA and the part caused by inaccurate prediction of regulatory capital shows that the contributions of the two items to the error are balanced on average.

Regulatory capital is regularly increased out of after-tax profits, so the estimate of profits is an important parameter for the evolution of capital. Profits are calculated as the difference between adjusted operating profit and losses due to the individual shocks tested (see section 2). The verification of this variable revealed that the stress test systematically underestimates after-tax profit. This is due to two factors. First, the test systematically underestimates adjusted operating profit directly through the assumption about its level (for the baseline it was assumed that adjusted operating profit will be 90% of the average for the previous two years). This is also in line with the more conservative approach to risk assessment. The second cause is that the stress test tends to overestimate the impact of the main risk tested, i.e. credit risk, in the form of higher-than-actual PD and related higher provisioning for NPLs (recorded in the "losses from impairment" category).

The NPL ratio is a closely monitored financial stability indicator. We therefore present detailed verification results for this variable as well. A comparison of the actual NPL ratios with their predicted values reveals overshooting of the estimates, especially since the end of 2007, for both non-financial corporations (see Chart 4) and households (see Chart 5).

CHART 2

VERIFICATION OF RWA ESTIMATE

(RWA in CZK billions; estimate for 1-year horizon)

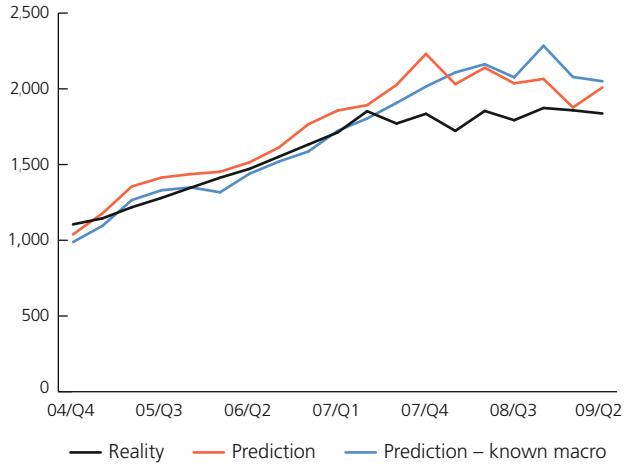


CHART 3

VERIFICATION OF REGULATORY CAPITAL ESTIMATE

(in CZK billions; estimate for 1-year horizon)

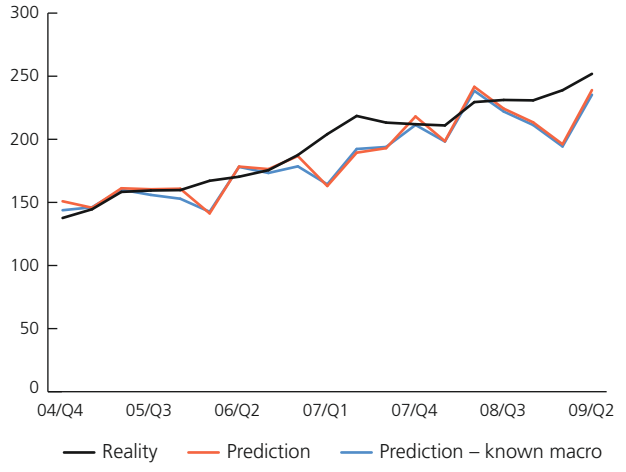


CHART 4

VERIFICATION OF NPL RATIO – CORPORATIONS

(in %; estimate for 1-year horizon)

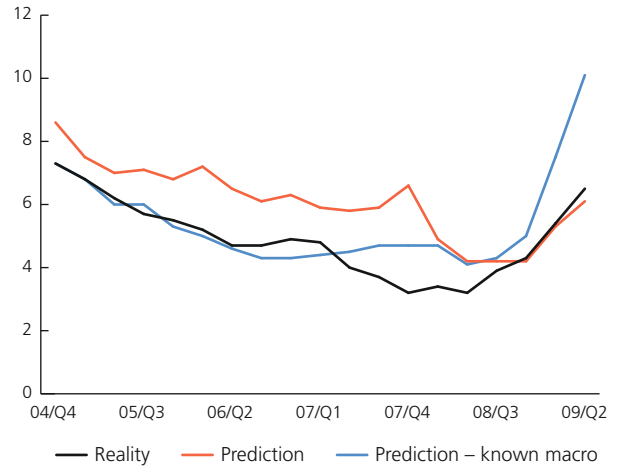


CHART 5

VERIFICATION OF NPL RATIO – HOUSEHOLDS

(in %; estimate for 1-year horizon)

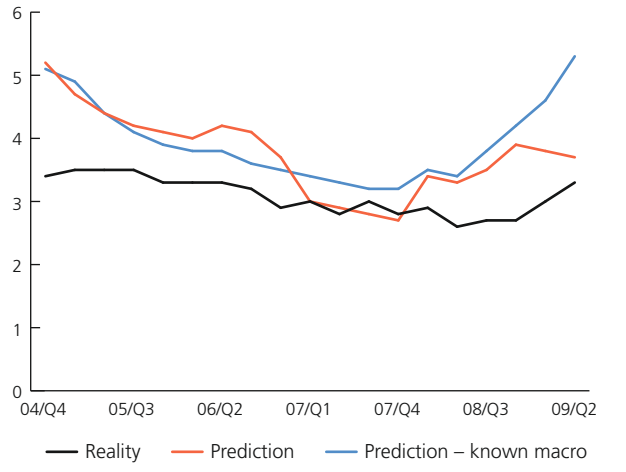


Table 2 shows that MAE was around 1.3 p.p. for non-financial corporations and 0.7 p.p. for households. While the NPL estimates for corporations improve significantly with knowledge of the macroeconomic environment, the opposite is true for households in some periods. In overall comparison, however, the household NPL estimate is more accurate.

The overestimation of the NPL ratio is due both to the aforementioned conservative calibration of the PD risk parameter and, to some extent, to underestimation of outflow parameter a from equation (1). To determined the optimum value of a, numerical minimisation of the MAE error statistic was performed in various time intervals of

Table 2

DEVIATION OF NPL RATIO ESTIMATE FOR CORPORATIONS AND HOUSEHOLDS
Estimate for 1-year horizon

NPL ratio – corporations

Mean absolute error (MAE)	2004–2009	2004–2005	2005–2006	2006–2007	2007–2008	2008–2009
Prediction – stress test	1.3	1.1	1.4	1.9	1.4	0.6
Prediction – known macro	0.8	0.1	0.2	0.6	0.8	1.5
Mean error in direction (MED) in %						
Prediction – stress test	27.8	18.3	26.2	45.5	38.5	12.1
Prediction – known macro	12.3	-0.1	-3.2	6.1	20.6	31.0

NPL ratio – households

Mean absolute error (MAE)	2004–2009	2004–2005	2005–2006	2006–2007	2007–2008	2008–2009
Prediction – stress test	0.7	1.1	0.8	0.5	0.4	0.8
Predikce – known macro	0.9	1.1	0.7	0.4	0.7	1.3
Mean error in direction (MED) in %						
Prediction – stress test	21.6	30.7	25.6	12.1	13.9	26.7
Prediction – known macro	27.7	30.5	21.0	14.2	24.1	43.5

2004–2009. The optimum outflow a for the entire period under review was 20% on average. Owing to the deliberate overestimation of the potential risks this parameter was set at 15% in the tests.[15]

Despite the relatively positive message of the verification results, further gradual refinement of the predictions is desirable. The main problem in the credit risk area is with the sub-models used, as they excessively overestimate the impact of credit risk in the form of losses on impaired loans. The planned modifications in the credit risk area should also contain potential linkage of LGD to the macroeconomic situation. The final deficiency in this area is the calculation of risk-weighted assets (or capital requirements), which should better capture the potential evolution of EAD in individual scenarios and the effect of client risk distribution in the portfolio on the change in the total capital requirements for credit risk.

Creating a suitable bank income model linking adjusted operating profit to developments in the macroeconomic environment remains the main challenge in the profit area. Box 7 in section 4.2 of the main part of this Report presents the first, relatively simple attempt to create such a model. However, refinements are also needed in modelling the impacts of other shocks, in particular interest rate and exchange rate shocks. Market risk testing could be extended to include some bank-relevant market variables.

The further development of the stress tests should be based on regular verification. This should become an integral part of the banking sector stress-testing framework to enable ongoing assessment of whether the assumptions are realistic and a conservative buffer is being maintained in the risk predictions.[16]

15 The sensitivity of the NPL ratio estimate to change in a reveals that an increase in a of 5 p.p. (i.e. from the 15% used to the optimum value of 20%) – i.e. a faster outflow of NPLs from banks' balance sheets – causes on average a decline in the NPL ratio of one-tenth (e.g. from 10% to 9%).

16 Regular verification – i.e. retrospective assessment of prediction performance – is also routinely performed as part of the creation of predictions for monetary policy purposes – see CNB (2008).

The updated testing framework also allows us to compare the assumptions and calculated impacts with the results of tests conducted by commercial banks themselves. This can be used as another source of information for refining the CNB's tests, especially in the context of the parallel joint stress-testing project with selected banks in the Czech Republic (see box 8 in section 4 of the main part of this Report). The pilot stage of this project took place in summer 2009 on data as of 30 June 2009 and provided significant value added in terms of improving the CNB's stress-testing methodology in two main areas. First, a comparison of PDs revealed that the internal PD calculations are significantly overestimated, especially for non-financial corporations, and need to be revised to bring them more into line with the figures reported by individual banks. Second, the joint stress tests yielded information on average LGDs in the largest banks, which were subsequently incorporated into the CNB's tests.

4. CONCLUSION

This article set out to present the CNB's updated banking sector stress-testing methodology and to present the results of a verification of that methodology. Such verification is a tool that should be used regularly as a guide for refining the assumptions and models used. The results of the verification, conducted at the end of 2009, reveal that the current stress tests err on the right – i.e. pessimistic – side and slightly overestimate the risks. This leads on average to capital adequacy estimates that are lower (more conservative) than the actual values. This is consistent with the design of the stress tests, which should be built on conservative assumptions. However, account should be taken of the fact that the level of conservatism, i.e. the degree of overestimation of the risks, in the methodology can only be fully assessed after the effects of the current recession disappear.

The verification results also indicate areas where further refinement of the stress tests is desirable. The main such areas are credit risk (more accurate estimates of PD and LGD), modelling of bank income in relation to the macroeconomic scenario, better estimation of risk-weighted assets, and certain enhancements in calculating the impacts of market risks. These areas are current under development and some have already been implemented in the stress tests used in section 4 of this Financial Stability Report.

There remain three medium-term challenges for the development of the current banking sector stress-testing framework which were not discussed in detail in the article. The first challenge is to incorporate the feedback effect of a weakened banking sector on the economy in the form of a radical decline in the supply of loans – known as deleveraging – and the related impact on the economy.[17] The second challenge is to integrate the existing advanced test of bank balance-sheet liquidity, ideally in parallel with the interbank contagion test. And the third challenge – stemming from the dynamic nature of the 8-quarter-horizon tests – is how to treat banks that fall below the 8% capital adequacy threshold in the course of that horizon. In the present version of the tests, such banks stay in the sector and stay in business, which may not be entirely realistic.

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FINANCIAL INTEGRATION AT TIMES OF FINANCIAL (IN)STABILITY

Jan Babecký, Luboš Komárek and Zlatuše Komárková

This article analyses the phenomenon of financial integration on both the theoretical and empirical level, focusing primarily on assessing the impacts of the current financial crisis. In the theoretical section we first look at the definition of financial integration and summarise the benefits and costs associated with this process. We go on to examine the relationship between financial integration and financial (in)stability, emphasising the priority role of financial innovation. The subsequent empirical section provides an analysis of the speed and level of integration of the Czech financial market and the markets of selected inflation-targeting Central European economies (Hungary and Poland) and advanced Western European economies (Sweden and the UK) with the euro area. The results for the Czech Republic reveal that a process of increasing financial integration has been going on steadily since the end of the 1990s and also that the financial crisis caused only temporary price divergence of the Czech financial market from the euro area market.

1. INTRODUCTION

Structural changes in the economic environment, such as real synchronisation of economies or advanced financial integration, affect economic agents and institutions[1] both individually and systematically. Integration can increase the investment opportunities of individual financial institutions, allowing them to make higher returns at the same level of risk. On the other hand, if individual financial institutions are exposed to the same risks[2], the risks of their portfolios as a whole are not necessarily diversified at all and the positive effect of market integration may thus be reduced. Moreover, the financial sector as a whole may be more vulnerable to systemic risk and contagion risk in conditions of high geographical and sectoral integration of the banking and other financial markets. Whether the benefits of deepening financial integration outweigh the risks, and whether this process will lead to increasing financial stability, depends largely on the resilience and flexibility of the financial system itself, which national and international authorities should be working to enhance.

This article primarily analyses the financial integration of the Czech financial market (the money, foreign exchange, government bond and equity markets) with the financial market of the euro area (or Germany for the government bond market) at times of financial (in)stability. The article also includes analogous results for selected inflation-targeting Central European economies (Hungary and Poland) and advanced Western economies (Sweden and the UK). The article is structured as follows. Section 2 looks at the definition of financial integration and summarises the benefits and costs associated with this process and then examines the relationship between financial integration and financial (in)stability. Section 3 summarises the methods for measuring financial integration and discusses in detail the results of an empirical analysis of the impact of financial (in) stability on financial integration. Section 4 concludes.

2. FINANCIALLY INTEGRATED MARKETS AND FINANCIAL (IN)STABILITY

A commonly used definition of "financially integrated market" is that of Baele et al. (2004) and Weber (2006), i.e. the market for a given set of financial instruments and/or services is fully integrated if all potential market participants with the same relevant characteristics (1) face a single set of rules when they decide to deal with those financial instruments and/or services; (2) have equal access to the above-mentioned set of financial instruments and/or services; and (3) are treated equally when they are active in the market.[3]

This broad definition of financial integration contains three important features. The first is that it does not require financial structures to be identical within regions. It is natural for individual countries (regions) to have their own financial architecture and this need not be a barrier to financial

1 Central banks, national governments and financial institutions.
2 Identical risks arise because of, for example, the choice of a similar portfolio and/or the similarity of "aggregate" risks. These risks are amplified by investors' traditional search for yield.
3 Most definitions of financial integration are closely linked to the law of one price (i.e. assets having identical risks and returns should be priced identically regardless of where they are transacted). The law of one price allows for quantitative measures of financial integration (see section 3). However, fulfilment of the definition based on the law of one price does not automatically mean achievement of full market integration – see the broader definition of financial integration given above.

integration. The second feature is linked with the existence of frictions in the financial intermediation process, which can persist even after a high degree of financial integration has been achieved and which should affect the integrating regions symmetrically. The third feature stems from the separation of the supply of, and the demand for, investment opportunities (the creditor and debtor sides respectively).[4]

Financial integration generates benefits and costs for individual entities, be it directly or indirectly. Many research papers, e.g. Edison et al. (2002), Agénor (2003), Baele et al. (2004), Komárková and Komárek (2008) and ECB (2010), point to the need for a detailed knowledge of these costs and benefits in order to maximise the benefits and minimise the costs associated with the financial integration process. The experience of the ongoing financial crisis has increased the importance of this debate. The most frequently mentioned benefits of financial market integration include: (i) consumption smoothing due to international diversification of risks, (ii) the positive effect of capital flows on domestic investment and economic growth, (iii) improving efficiency of the financial system, and (iv) increasing prudence of financial market agents and the attainment of a high level of financial stability. The major costs include: (i) insufficient access to funding at times of financial instability, including capital concentration and procyclicality, (ii) inappropriate allocation of capital flows, (iii) loss of macroeconomic stability, (iv) herd behaviour among investors, financial contagion and high volatility of cross-border capital flows.

There is a relatively large body of research on the relationship between financial integration and globalisation,[5] but the implications of financial integration for financial stability (and vice versa) remain largely unstudied and less clear. However, the financial crisis has greatly increased the interest of economists and regulators (who are often also monetary policy-makers) in studying the relationship between financial integration and financial stability in depth. The question therefore arises whether financial integration supports financial stability or fosters financial instability, or conversely whether financial (in)stability affects financial integration (see section 3).

An integrating market fosters financial stability by improving access to international capital markets and thereby increasing the opportunities for investors, creditors or debtors to diversify their investment risks. Financial stability is also aided by easier growth in the size of financial intermediaries (through the removal of barriers to free trade or as a result of stronger stimuli emanating from expanded markets). Larger institutions can better reap the benefits of an expanded and integrated market and can also better withstand potential shocks than institutions of local significance.

Conversely, a strongly integrated market does not foster financial stability if the financial system is not sufficiently resilient and flexible to shocks (e.g. contagion risk or systemic risk), which are transmitted more rapidly through an integrated market. The more active financial institutions are in the financial markets, the more likely it is that those institutions will be systemically relevant. If those institutions get into difficulties themselves, they can undoubtedly contribute to financial instability in the economy. What is more, if the number and size of the institutions active in international markets rises, the risk arising from their business crosses geographical borders all the more and all the faster.

The financial integration process has also been fostered over the past decade by massive financial development, especially through financial innovations.[6] In the past, such innovations tended to foster diversification of risks (especially credit risk) within the national economy and thus stabilisation of the financial system. In recent years, however, the increased popularity of financial innovation has fostered misallocation of capital and risk across market participants. One of the main innovative products – and simultaneously a stimulant of international financial integration and a cause of the current crisis – has been securitisation.[7] It was securitisation that enabled the integration of various financial market segments, such as the illiquid mortgage market with the liquid bond market.

4 A highly integrated market requires the same access to financial intermediation or trading, clearing and settlement platforms for both parties regardless of their country of origin.

5 For more on the definitions of these terms, see Komárková and Komárek (2008).

6 The financial system is affected both by financial integration and by financial development. Financial integration affects, for example, the competitiveness of individual financial institutions and increases the room for risk diversification and risk sharing, even when market frictions are assumed to be present. Financial development helps to eliminate such frictions – see Hartmann et al. (2007).

7 Securitisation is a process whereby a set of illiquid assets producing a known or at least sufficiently accurately predictable cash flow (e.g. mortgages, leases, credit card debt, consumer loans and even copyrights) is transformed into a marketable security.

Another innovative product which supported financial market integration from a general perspective was resecuritisation.[8] This product, or rather its complexity, was simultaneously a cause of the crisis. In particular, such investments were difficult to value. The vast majority of investors relied on the results of rating agencies using similar valuation models heavily dependent on several input assumptions. In the deteriorating economic conditions, each resecuritised security could be rated variously.[9] A security that cannot be correctly valued quickly loses its liquidity and book value when the market gets nervous, leading to large losses in holders' balance sheets.[10]

A fundamental challenge for the regulatory and supervisory authorities is to minimise the negative impacts of financial market integration on financial stability without reducing the benefits of this process. Examples include increasing market transparency, limiting over-complicated financial instruments and introducing macro-prudential supervision to ensure timely warnings of the formation of imbalances or contagion across markets.

3. THE FINANCIAL INTEGRATION OF THE CZECH REPUBLIC AND SELECTED INFLATION-TARGETING COUNTRIES WITH THE EURO AREA

This section examines whether, and how quickly, individual segments of the financial markets (the foreign exchange, money, government bond and equity markets) of the Czech Republic and selected inflation-targeting countries of the Central European region (Hungary and Poland) and advanced Western economies (Sweden and the UK) are integrating with the euro area and what impact the current financial crisis has had on this integration process. An empirical analysis is conducted for the period January 1999–January 2010. In order to analyse the impact of financial stability on financial integration this period is divided into a pre-crisis period (January 1999–July 2007), a core crisis period (August 2007–April 2009) and a subsequent calm-down period (May 2009–January 2010).

In line with the definition of financial integration based on the law of one price (see section 2), two methods were used to measure financial integration[11]: (i) price-based measures and (ii) news-based measures.[12] The more the individual segments of the euro-candidates' financial markets are integrated with the euro area, the more the prices of these assets will be affected by common (global) factors rather than by local (national) factors. It can also be expected that with growing integration the individual segments of the financial markets will be a less likely source of asymmetric shocks.

Price-based measures are applied in accordance with Adam et al. (2002), who used the concepts of beta-convergence and sigma-convergence.[13] The concept of beta-convergence enables identification of the speed at which differences in yields are eliminated on individual financial markets. A negative beta coefficient signals the existence of convergence, and the magnitude of the beta coefficient expresses the speed of convergence, i.e. the speed of elimination of shocks to the yield differential of individual asset prices vis-à-vis the euro area. The closer the value of the beta coefficient is to -1, the higher is the speed of convergence. The concept of sigma-convergence captures the dispersion of the differences between the yields on identical assets in different countries at a given moment in time and thus identifies the degree of integration vis-à-vis the euro area achieved at that moment by the individual financial market segments in the countries under review. Sigma-convergence arises if and when the sigma coefficient falls to zero. Beta-convergence may, but need not, be accompanied by sigma-convergence. In fact, sigma-divergence may occur. Both concepts must therefore be tracked concurrently in order to assess financial integration.

News-based measures originate in Baele et al. (2004) and simply monitor the sensitivity of asset prices to local and global news. The technique is based on the assumptions that

8 Resecuritisation involves packaging already securitised products into a single investment for subsequent (re)selling.
9 Moreover, with the pressure of systemic risk rising, slight inaccuracies in the parameter estimates generated high probabilities of default even for securities with high ratings – see ECB (2010).
10 "Mark-to-market" (fair-value) accounting, which was originally meant to help investors quickly obtain information on the value of their balance sheet assets, ultimately proved misleading for balance-sheet valuation in conditions of inability by the market to value assets correctly (Cifuentes et al., 2005; Plantin et al., 2008).
11 Both methods are described in detail in Babeckii, Komárek and Komárková (2007) and CNB (2009).
12 Another approach to measuring financial integration is that based on quantity-based measures. This approach involves monitoring the cross-border barriers (analysing the cross-border activity of market participants and also "home bias") faced by financial market participants.
13 The terms beta-convergence and sigma-convergence originate in the economic growth literature – see, for example, Barro and Sala-i-Martin (1992).

in a fully financially integrated area portfolios are perfectly diversified and the degree of systematic risk is identical across assets in different geographical parts of the integrated area and so local factors are not significant. For individual countries, sensitivity is measured by gamma, which expresses the degree of sameness of reaction to news between prices of domestic assets and prices of benchmark assets.[14] Put differently, gamma represents the proportion of the change in asset prices which can be explained by common factors. Higher values of this parameter signal greater integration. Values greater than 1 indicate a multiplication effect, i.e. a stronger response of the price of a local asset relative to the benchmark asset. Negative values express an asymmetric response to news.

Table 1 shows the beta-convergence analysis results for the individual segments of the financial markets in the defined periods, while Chart 1 shows those for sigma-convergence. Chart 2 presents the results of the news-based analysis.

Pre-crisis period

This period was characterised by gradually increasing convergence across all the markets and countries under review in terms of both convergence level (sigma) and convergence speed (beta). The comparatively high beta coefficients indicate that the individual financial markets of the economies under review were integrating relatively quickly with the markets of the euro area (or Germany in the case of government bonds). The beta coefficients were broadly similar in value for the given countries and markets. The money market was converging the slowest and the foreign exchange and equity markets were converging the fastest on average.[15] In addition, the value of the sigma coefficient suggests that just before the crisis the level of integration differed only slightly in the countries under review (sigma in the range of 0.4–1.2). The exceptions were all the sigma coefficients for Hungary as well as the one for the Polish equity market, which were not unambiguously falling during the pre-crisis period. According to this analysis, and by comparison with the other countries under review, the level of convergence of the Czech financial markets was the most advanced. The highest level of integration was achieved by the foreign exchange market, followed by the equity and government bond markets. The lowest level of integration was attained just before the crisis broke out by the money market (as in the UK and Sweden).[16] However, the money market reached its highest level of integration immediately after the Czech Republic joined the EU and subsequently started to diverge slightly, unlike the Polish and Hungarian money markets.

Table 1

BETA COEFFICIENTS (SPEED OF CONVERGENCE)

	Government bond market			Equity market		
	99–7/07	8/07–4/09	5/09–01/10	99–7/07	8/07–4/09	5/09–01/10
CZ	-0.78	-0.78	-1.48	-0.83	-0.89	-0.88
HU	-0.82	-0.58	-0.96	-0.94	-1.34	-1.06
PL	-0.85	-0.83	-1.05	-0.95	-0.89	-0.90
SE	-0.89	-1.18	-0.70	-0.92	-0.75	-0.85
UK	-0.85	-0.86	-0.85	-0.85	-0.94	-0.97

	Foreign exchange market			Money market		
	99–7/07	8/07–4/09	5/09–01/10	99–7/07	8/07–4/09	5/09–01/10
CZ	-0.89	-0.86	-1.27	-0.69	-0.40	-0.74
HU	-0.88	-0.89	-1.22	-0.82	-0.76	-0.62
PL	-0.87	-0.92	-0.94	-0.67	-0.38	-0.28
SE	-0.97	-0.79	-0.78	-0.64	-0.93	-1.02
UK	-0.83	-0.92	-0.99	-0.75	-0.84	-0.59

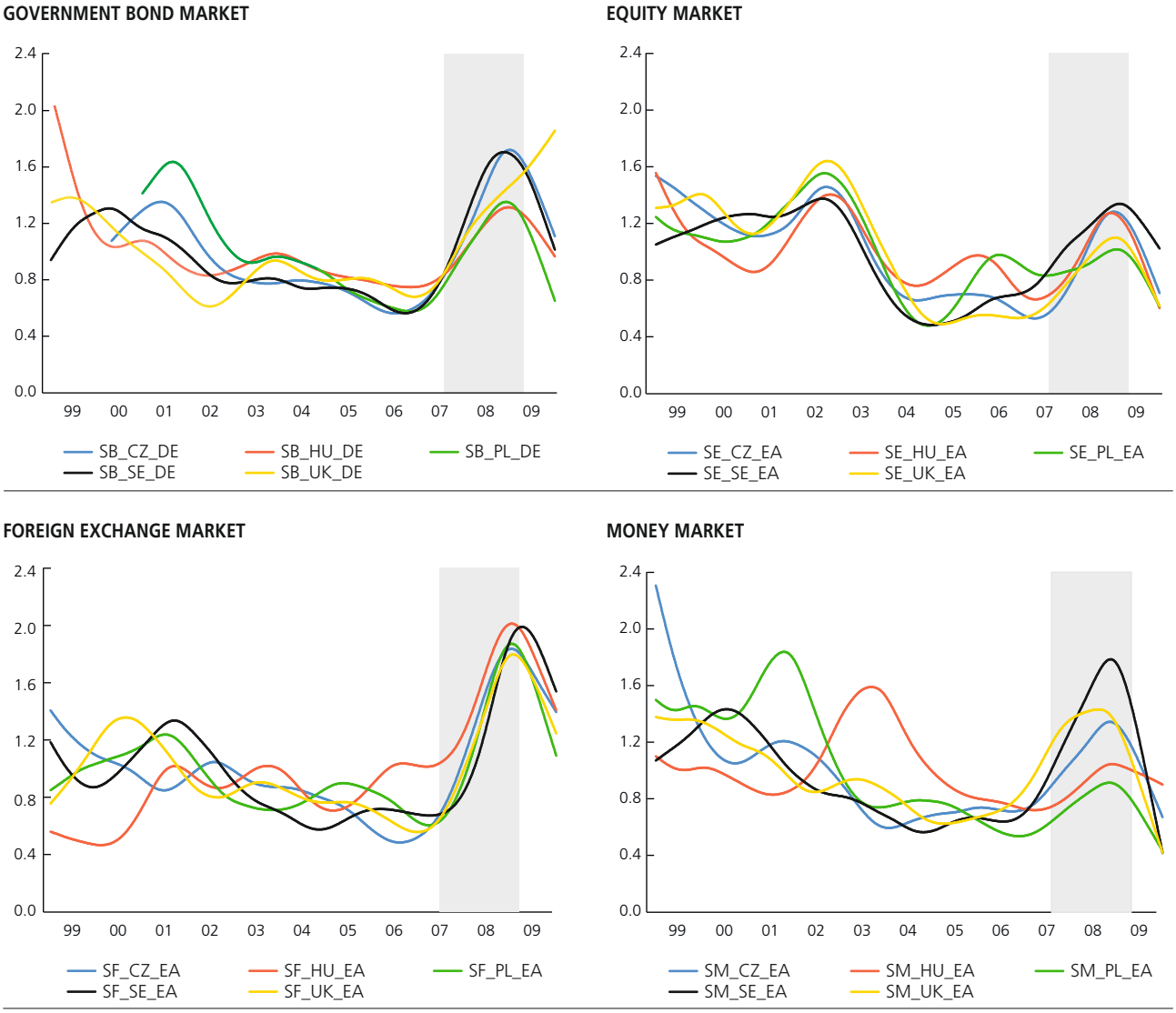
Note: CZ – Czech Republic, HU – Hungary, PL – Poland, SE – Sweden, UK – United Kingdom. Estimates are statistically significant at the 1% level. Euro area assets were used as the benchmark for the money market (3M interbank rates), the foreign exchange market (exchange rates against USD) and the equity market (main national equity indices), while the German asset was used as the benchmark for the government bond market (yields on 5Y benchmark bonds).
Source: Thomson Reuters, CNB calculation.

14 Asset prices are monitored at the aggregate level. It is assumed that the benchmark asset reacts only to global news.
15 In the case of the equity market, strong convergence can be seen from the moment the bubble burst in the U.S. equity markets in 2002 (the dot-com bubble).
16 The analysis indicates to some extent that regardless of period type the money market – at least in the cases of the Czech Republic, Sweden and the UK – is autonomous, with a strong local factor effect in the form of national monetary policy.

The news-based convergence analysis indicates that in the pre-crisis period the financial markets of the UK and Sweden achieved the highest level of integration on average (see Chart 2). Their government bond and equity markets in particular reacted to similar factors as the benchmark markets. This analysis confirmed the results of the price-based analysis, which indicated that in the pre-crisis period the Czech Republic achieved the highest degree of convergence in the case of the foreign exchange market and the lowest degree of convergence in the case of the money market, with the effect of local news (national monetary policy) prevailing, similarly as in Sweden.

Chart 1

SIGMA COEFFICIENTS (LEVEL OF CONVERGENCE)



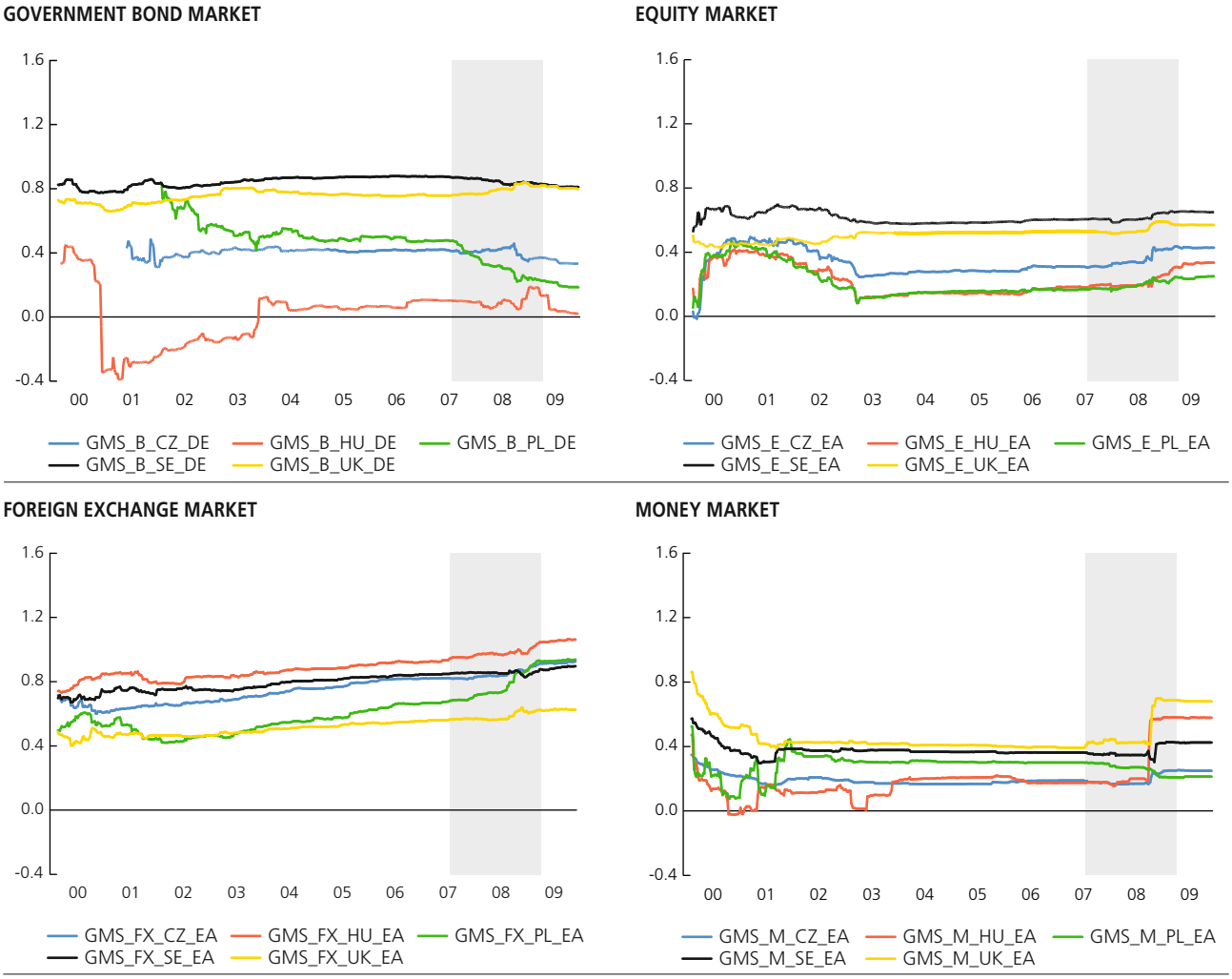
Note: CZ – Czech Republic, HU – Hungary, PL – Poland, SE – Sweden, UK – United Kingdom, EA – euro area, S – sigma coefficient, B – government bond market, E – equity market, F – foreign exchange market, M – money market. The grey-shaded area indicates the core crisis period (August 2007–April 2009). The rate of correlation of the charts between the euro area and the USA ranges from 70% to 99%.
Source: Thomson Reuters, CNB calculation.

Crisis period

The ongoing financial crisis had a negative effect[17] on all the financial segments analysed in relation to the euro area, albeit with different intensity. The probably temporary, yet strong disintegration potential of the crisis is indicated most clearly by the results of the price-based approach (see Chart 1, grey-shaded area). This period can be characterised by increased nervousness among market participants and related increased volatility of market asset prices. Concerned about their liquidity positions, both investors and investment services intermediaries reined in their market activity, including cross-border activity (growth in the home-bias effect, i.e. a preference for domestic assets) and thus weakened the integration process to a greater or lesser extent. This nervous behaviour and geographical discrimination, with more risky participants concentrating more on domestic markets, most affected the foreign exchange market and the government bond market (see Chart 1), as these markets started to diverge quite significantly and quickly. The convergence trend was regained only after central banks and governments adopted fundamental measures to reduce liquidity and credit risk. This led to a considerable decrease in the volatility of market asset prices (a decline in sigma coefficients).

Chart 2

GAMMA COEFFICIENTS (SENSITIVITY OF ASSET PRICES TO GLOBAL NEWS)



Note: CZ – Czech Republic, HU – Hungary, PL – Poland, SE – Sweden, UK – United Kingdom, EA – euro area, GMS – gamma coefficient, B – government bond market, E – equity market, FX – foreign exchange market, M – money market. Positive (negative) and increasing (decreasing) gammas indicate co-directional (counter-directional) sensitivity to news, and values close to zero indicate indifference. The grey-shaded area indicates the core crisis period (August 2007–April 2009).
Source: Thomson Reuters, CNB calculation.

17 Similar estimates were conducted symmetrically for the USA as the benchmark territory. The results were not very far from those of the selected countries vis-à-vis the euro area presented here. This indirectly suggests strong integration of the euro area and US markets

By contrast, the results of the news-based approach indicated that the integration of the financial markets (except for the Polish and Hungarian government bond markets) of the countries under review did not decrease (see Chart 2); in fact, it increased continuously in the case of the equity market. The simple conclusion of this approach might therefore be that financial instability simply does not affect the level of financial integration of the countries under review, or conversely increases it. However, the aforementioned results of the price-based approach (beta and sigma coefficients) indicated that the interpretation of this seeming paradox may be more complex.

The benchmark financial markets reacted to news coming in during the core crisis period (strong risk aversion, pooling of liquidity, high counterparty risk, etc.) almost exclusively negatively (with a declining trend). It is apparent from the stability/growth of the gamma coefficient that the financial markets of the countries under review also reacted to the same news. This may have been due to economic and asset integration between them and the benchmark territory.[18] Also significant, however, is the intensity with which the markets reacted, or rather the differences in the growth in volatility between individual market prices (a rise in the sigma coefficient and a fall in the beta coefficient). The different intensity of response of the individual markets to common (global) factors can be explained by, for example, the change in the composition of market participants at the time of the crisis, the different levels of development of the individual markets and by a preference for diversifying total portfolio risk across countries (Brooks and Del Negro, 2002) rather than across sectors.

The calm-down period

As indicated above, the measures adopted by some central banks and governments, especially in late 2008 and spring 2009, generated optimistic expectations and a general calm-down in the financial markets. With few exceptions, the coefficients we are studying (sigma, beta and gamma) improved. The money market reacted relatively intensively to these measures (see Chart 1, except Hungary), especially in the cases of Sweden and the UK, and quickly lost its originally high sigma values. The gamma coefficients (see Chart 2) also clearly show the money markets' response to the authorities' measures, which, especially in the case of the ECB, were not merely local in nature. A relatively small impact and a weak, or opposite, reaction to common news by the money market can be observed for Poland. An increased reaction to global news is also visible in the equity market. The reaction in the government bond market differs across countries. In the cases of the Czech Republic and Poland, local news starts to prevail in the government bond market and negative global shocks are transmitted to a decreasing extent. In the cases of Sweden and the UK, European news still prevails (high gamma coefficients). However, a still rising sigma coefficient for the UK suggests that even though the yields on UK government debt are highly sensitive to European news, the intensity of reaction of these yields is getting more and more distant from the intensity of reaction of Germany debt yields. In the case of Hungary's national debt, the coefficient for the rate of transmission of global news is still low, reflecting strong domestic shocks overshadowing European shocks (increased risk aversion). In the foreign exchange market the convergence trend is returning only slowly (see Chart 1). Except in case of the UK, however, the significance of European news is constantly rising, and in the case of Poland it has actually strengthened since the world authorities introduced their measures. Although this empirical analysis shows that the financial market situation is generally returning to an integration trend and major European news is more or less common to the countries under review, the commonly used indicators of market conditions reveal that the impact of the current crisis on the financial markets has not necessarily fully faded yet.

4. CONCLUSIONS

This article analysed the financial integration process primarily at times of financial (in)stability. It showed that financial integration and financial (in)stability are interconnected processes; increasing financial integration does not necessarily lead to financial (in)stability and financial (in)stability does not necessarily lead in the long term to financial market segmentation. In the past few years, financial integration has been stimulated by the development and implementation of financial innovations, whose incautious use – especially in the developed nations – contributed to the recent financial crisis. Assessments of

18 Investors are susceptible to herd behaviour at times of major market turbulence caused by the reactions of over-sensitive investors (fed constantly by pessimistic economic forecasts for the integrated region). This behaviour usually amplifies similar trends in seemingly different markets and can be a source of financial contagion. In the extreme case, herd behaviour can result in a financial market reacting to global news that does not relate directly to that market.

the experience of the ongoing financial crisis have further modified perceptions about the integrated market. The importance of integration across segments of the financial market (integration between the foreign exchange, money, bond and equity markets) is now being emphasised, while the accent on separate examination of integration from the geographical perspective in the national market (e.g. the relationship between the Czech and European equity markets) is being suppressed. Given the experience of the unwinding financial crisis, therefore, the previously underestimated link between integration of individual financial market segments seems to be the cardinal condition for financial integration between countries.

The empirical analysis – based on the price-based and news-based methods – revealed that: (i) a process of increasing financial integration has been going on steadily in the Czech Republic since the end of the 1990s; (ii) the financial crisis caused temporary price divergence of the Czech financial market from the markets of the euro area (in the cases of the equity, money and foreign exchange markets) and Germany (in the case of the government bond market); (iii) results similar to those for the Czech Republic were generally obtained for the other selected inflation-targeting countries; (iv) the overall consequences of the financial crisis for financial stability were not significant in the Czech Republic, thanks mainly to restraint in the use of financial innovations and to the general soundness and prudent behaviour of Czech financial institutions.

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PROCYCLICALITY OF THE FINANCIAL SYSTEM AND SIMULATION OF THE FEEDBACK EFFECT

Adam Geršl and Petr Jakubík

This article examines procyclicality of the financial system. The introduction describes the natural and regulatory sources of procyclicality, focusing on the potential procyclical effect of the current Basel II regulatory framework for banks. It also mentions the regulatory tools for mitigating procyclical behaviour by financial institutions currently being discussed in international forums. Under certain conditions, procyclical behaviour of the banking sector can lead to a feedback effect whereby banks, in response to an economic downswing, reduce their lending to the economy in order to maintain the required capital adequacy ratio. This then further negatively affects economic output and impacts back on banks in the form of, for example, further growth in non-performing loans. In the main empirical section of the article, this effect was simulated on the example of the Czech banking sector using the current stress-testing system and a single adverse scenario. The simulation results suggest that under certain assumptions the feedback effect may play an important role.

1. INTRODUCTION

One of the issues that have taken centre stage in the international debate on the lessons of the global financial crisis is that of procyclicality of the financial system. Procyclical behaviour of the financial system, and especially of banks, means that financial intermediaries amplify swings in economic activity. Procyclical behaviour can have particularly serious implications in an economic downturn, as under certain assumptions it can considerably prolong and deepen the recession via a feedback effect on the economy.

This article sets out to describe the main arguments of the current debate on financial system procyclicality and to give an overview of the current regulatory proposals for reducing procyclicality. To illustrate the seriousness of the effects of the potential strongly procyclical behaviour of the financial sector on the Czech economy, the feedback effect was simulated for the case of an adverse scenario. The article is structured as follows. Section 2 examines the sources of procyclicality of the financial system and summarises the debate on three related areas of regulation: provisioning, accounting rules for revaluation of financial assets and the procyclical effect of the current Basel II bank capital regulatory framework. Section 3 provides a brief overview of the tools that can be used to reduce procyclicality of the financial system. Section 4 describes an empirical simulation of the feedback effect on the Czech economy. Section 5 concludes by summarising the main findings from the synoptic and empirical sections.

2. PROCYCLICALITY OF THE FINANCIAL SYSTEM

Procyclicality is usually defined as the magnification of swings in the economic cycle by financial sector activities, most notably bank lending. It is caused by a whole range of interconnected factors, such as information asymmetry, fluctuations in balance-sheet quality, over-optimistic (or over-pessimistic) expectations, herd behaviour by market participants and financial innovation. Besides the natural sources of procyclicality, financial regulation and the accounting rules for revaluation of financial assets in financial institutions' balance sheets can play an important role.

The main determinants of the credit cycle are discussed in the literature connected with the cyclical nature of bank lending. Numerous studies have shown a positive correlation between GDP and the credit cycle (e.g. Calza, Gartner and Sousa, 2001). The profitability of corporate projects and credit demand rise in line with economic activity and productivity. Conversely, banks react to rising macroeconomic uncertainty by reducing the supply of credit (Quagliariello, 2007). Growth in interest rates has a negative effect on real sector demand owing to increased financing costs and can also adversely affect supply via banks' reaction to the increased credit risk of firms and households or the lower profitability of investment projects (Calza, Gartner and Sousa, 2001). However, if growth in interest rates leads to a fall in profit margins, banks may increase the supply of loans in an attempt to maintain their profitability thanks to larger loan portfolios. The impact of interest rate changes is therefore not entirely clear-cut. Koopman, Kraussl, Lucas and Monteiro (2009) demonstrate empirically that GDP is the most significant indicator affecting bank lending.[1] Macroeconomic fluctuations affect not only the volume of loans in the economy, but also credit standards. Maddaloni et al. (2010) demonstrated on data for the euro area countries that credit standards are tightened at times of economic contraction and softened at times of economic growth. Moreover, low interest rates cause credit standards to be softened (Bernanke and Gertler, 1995). Another

1 Eickmeier, Hofmann and Worms (2006) show that the fall in lending in Germany in 2000–2005 was driven by an adverse supply shock.

natural source of procyclicality is the way in which risks are measured and managed. Problems distinguishing between short-term swings and longer-term trends and estimating robust correlations between market and economic variables, together with the use of risk management techniques that take into account relatively short periods of past observations, can cause risks to build up in an expansion phase (Borio, Furfine and Lowe, 2001). This phase usually results in growth in optimistic expectations, leading to rising leverage of financial and non-financial institutions at times of growth. Simultaneously, the need to create a buffer of reserves for the adverse phase of the cycle is underestimated during the growth phase. During the subsequent economic slowdown, measured risk rises sharply and leverage falls, with mutually reinforcing effects on the financial and non-financial sectors in a situation where financial institutions have inadequate capital and other buffers.

In the field of financial regulation, discussions are going on in three areas. The first is the system of provisioning for bad assets, in particular non-performing loans. Efforts are being made to find a provisioning mechanism that will ensure timely recognition of loan losses and reduce the sensitivity of financial institutions to cyclical fluctuations in the economy. This is generating a conflict between macro-prudential regulation and current accounting principles. Advocates of the macro-prudential concept are pushing for the introduction of a provisioning system that would ideally cover expected losses over the entire economic cycle. This concept, implemented, for example, under the name "dynamic provisioning" in Spain in 2000, is aimed at enabling banks to build up a capital buffer in good times that can be used in bad times (De Lis, Pages and Saurina, 2001).[2] A countercyclical capital framework should foster a more stable banking system and dampen the impacts of cyclical fluctuations. By contrast, the accounting authorities prefer information provided to investors to be verifiable and object that dynamic provisioning allows profit to be manipulated and artificially smoothed on the basis of "excessive" provisioning in times of boom. The conflict between the regulatory and accounting views of loan loss provisioning is examined in, for example, Borio and Lowe (2001) and Frait and Komárková (2009).

The second area is the debate regarding the accounting rules for revaluing financial assets using market prices. The application of "mark-to-market" techniques for valuing financial assets (fair value accounting) can foster procyclicality of the financial system, particularly given the assumption that market prices are themselves procyclical because of over-optimism or imperfections in risk measurement and management (Novoa, Scarlata and Sole, 2009). Asset valuation based on current market prices involves assessing risks which arise from the current situation and which therefore do not reflect the entire business cycle. During a growth phase, financial risk indicators (such as default rate and asset price volatility) thus tend to decrease. This encourages growth in market liquidity at times of economic growth and the acceptance of a higher level of risk and subsequently growth in the leverage of financial institutions (including off-balance-sheet exposures).

The final area being discussed in relation to procyclicality of the financial system is Basel II itself (Basel Committee on Banking Supervision, 2006). Basel II requires banks to hold higher capital if the risks associated with holding financial assets (loans and securities) rise. This is because the capital requirement for credit risk is a function of the probability of default (PD), the loss given default (LGD) and the exposure at default (EAD), whose values and correlations can change according to the phase of the economic cycle.[3]

The procyclicality of Basel II – or the sensitivity of risk parameters to the current cyclical position of the economy – may be the main source of the feedback effect, as an economic contraction will generate, via growth in PD and LGD, a need for higher capital requirements, which, given certain assumptions, can lead to a decrease in lending to the real economy ("deleveraging"). Such a decrease, however, can produce a further negative effect on the real economy and a further increase in PD and LGD with a subsequent further increase in the capital requirements (Benford and Nier, 2007). The assumptions for strongly procyclical bank behaviour are discussed in detail in section 4, which subsequently contains an empirical illustration of the feedback effect on data for the Czech Republic.

2 Saurina (2009) suggests that the dynamic provisioning system played a positive role in maintaining the stability of the Spanish banking sector during the global financial crisis.

3 The risk of procyclicality was taken into account when Basel II was being prepared and some countercyclical elements, such as a requirement for conservative PD and LGD estimates (ideally covering the entire business cycle and containing a conservative buffer) were incorporated into the overall framework. In addition, under Basel II the time series used to estimate the models should cover essentially the entire economic cycle, bank portfolios should be tested for resilience to extreme shocks, and the models used should be validated and backtested.

3. PROPOSALS FOR MITIGATING PROCYCLICALITY

At least since the global financial crisis erupted, numerous international initiatives have been examining how regulatory, macro-prudential and accounting principles can mitigate procyclicality of the financial system. The main platforms for the debate of these principles are the Financial Stability Forum (since 2009 called the Financial Stability Board, FSB), the Basel Committee on Banking Supervision (BCBS) and the Committee on the Global Financial System (CGFS). These forums make use of technical and professional assistance from the Bank for International Settlements (BIS) in Basel. Given the significant role of accounting principles, discussions are also going on within the International Accounting Standards Board (IASB). At European level, these efforts are being coordinated by the European Commission (EC), the European Central Bank (ECB), certain committees under the European Council (the Economic and Financial Committee, EFC) and the Lamfalussy committees, in particular the Committee of European Banking Supervisors (CEBS). The European initiatives were launched back in October 2007 under the ECOFIN Roadmap.

The first set of proposals to mitigate procyclicality contains measures relating to the provisioning system. In this context, the European Commission has published a consultation paper that should result in an amendment of the capital directive. This document proposes to mitigate the procyclicality arising from regulation by means of provisioning and by introducing additional measures on top of the asset risk-based regulatory requirements, by ensuring responsible borrowing and lending, and by removing national discretions (e.g. in respect of capital requirements and capital) (EU Commission, 2009, 2010). Since 2009, the IASB has also been engaged in revising the provisioning system so that provisions cover expected losses through the cycle.[4]

In connection with changes in asset accounting, an IASB Exposure Draft (2009) on new accounting standards has been approved. Under these rules there are to be only two categories of financial instruments – those measured at amortised cost and those measured at fair value. A financial asset or financial liability should be measured at amortised cost if the instrument has basic loan features and it is managed on a contractual yield basis. In other cases, the instrument should be measured at fair value. This would substantially reduce the complexity of measurement of financial instruments, as under the currently valid IAS 39 there are four categories of financial assets and two categories of financial liabilities. The tools under discussion also include a BCBS proposal to introduce leverage limits. This leverage ratio would be used as a safeguard against excessive growth in banking transactions and underestimation of risks undertaken at times of economic growth. This issue is also covered by a consultation paper of the European Commission (EU Commission, 2010), which is coordinating its work with the BCBS. According to this proposal, the leverage ratio should be introduced at the end of 2012.

Probably most attention is being devoted to possible revisions of Basel II itself. A fundamental problem with this regulatory framework is that while one of its main objectives is to increase the risk-sensitivity of regulatory capital, this simultaneously means that the minimum capital requirements of banks are procyclical. Certain measures to mitigate this property were implemented into Basel II before it was introduced. Others were added later on, during the global financial crisis. Examples include efforts to capture the risk associated with off-balance-sheet structures, the risk of a sudden fall in the value of market portfolios and the risk of insufficient balance-sheet liquidity. However, the available evidence indicates that these mechanisms are unable to mitigate the cyclicality of Basel II to a sufficient extent. Proposals intended to further reduce the procyclicality of the framework are therefore under discussion. These suggestions can be divided into three main categories. The first comprises measures intended to mitigate the cyclicality of Basel II itself in an attempt to smooth the capital requirements over time without losing the ability to differentiate between risks. This can be achieved by, for example, reducing the cyclicality of the parameters inputted into the capital adequacy calculation. Another option is to smooth the already calculated capital requirements, i.e. to create countercyclical capital reserves on top of the minimum capital requirements. The third and final set of measures is linked with the relationship between capital requirements and provisioning.[5]

The proposal to seek potential measures to reduce the procyclicality of bank lending first of all within the existing Basel II framework seems very sensible. For example, the second pillar of Basel II allows supervisory authorities to stipulate higher capital requirements if the regulator decides that risks are not sufficiently covered. Mandatory stress testing of bank portfolios using extremely negative scenarios also plays a supporting role, as does backtesting of PD and LGD models using crisis-period data.

4 See http://www.iasplus.com/agenda/ias39impairment.htm.
5 The BCBS opened a public debate on this issue by publishing its Basel II reform proposals in December 2009.

4. THE FEEDBACK EFFECT AND ITS EMPIRICAL SIMULATION FOR THE CZECH REPUBLIC

In its initial phase the 2007–2009 global financial crisis caused substantial losses on assets linked to the sub-prime segment of the US mortgage market in many internationally active banks. When falling economic output in most economies started to lead to growth in credit risk in the traditional segments of households and corporations, concerns arose about the impact of the potential stronger procyclicality of the newly implemented Basel II.[6] This uncertainty was exacerbated by the fact that the new regulatory framework was untested by crisis and contained certain procyclical elements.

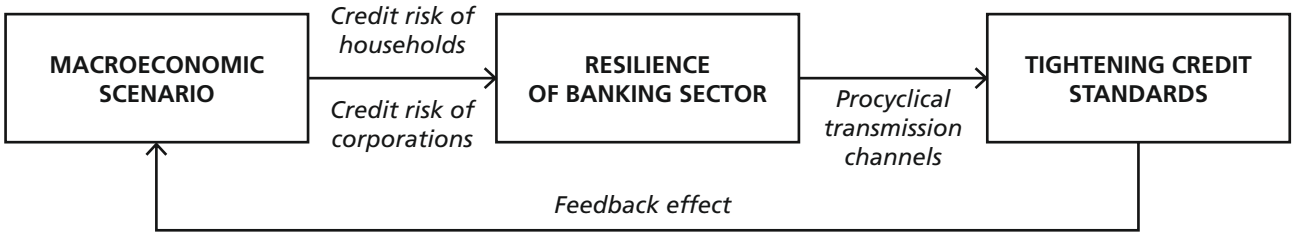
The main source of concern was the fact that rising credit risk was leading, via growth in PD (and possibly also LGD), to growth in risk-weighted assets (or capital requirements) in a situation where bank capitalisation had already been significantly weakened by losses from toxic assets. Growth in risk aversion and the globally synchronised recession, moreover, effectively eliminated any privately funded capital increases. To stop their capital adequacy ratios falling below a certain threshold, banks had to radically reduce their exposures to the real sector (and tighten their credit standards) and thus reduce their risk-weighted assets. This deleveraging process, however, could have adverse consequences for the economy and feed back to the banking sector, as a fall in lending to the real sector would inevitably lead to a further decline in economic output and thus to further growth in credit risk. This growth could lead to a further decrease in exposure to the real sector, which, in turn, would cause a deeper decline in economic output, and so on. Figure 1 illustrates this mutually reinforcing process.

However, the high degree of procyclicality that would lead to such a feedback effect has numerous strong assumptions. First, the volume of risk-weighted assets of most banks would have to be a direct function of PD and LGD, i.e. the majority of banks would have to apply the IRB approach[7] to the calculation of capital requirements for credit risk. Second, when calculating capital requirements most banks would have to use PD and LGD estimates responding directly to the phase of the economic cycle ("point-in-time" estimates). Only in this case would an economic downturn be reflected immediately in changes in PD and LGD.

Third, higher capital requirements would have to force the bank to change its behaviour, in the sense of reducing the supply of loans. This is possible if the bank is operating at the threshold of its targeted capital adequacy ratio, for example because of a fall in regulatory capital due to accumulated accounting losses. However, we would have to assume simultaneously that the bank does not have the option of strengthening its regulatory capital from external sources or accumulated retained earnings. The capital adequacy ratio targeted by banks would moreover have to be higher than the regulatory minimum of 8%. Many banks maintain a capital buffer above the regulatory minimum (for example to maintain their ratings) which they do not want to fall to zero. Fourth, the reduction in the supply of loans would have to exceed the decline in demand for loans due to the contraction in economic activity. Otherwise, banks would not have to actively reduce their risk-weighted assets by reducing their exposures, but would merely wait for demand for loans to fall spontaneously. This simultaneously implies that banks are able in reality to reduce the supply of loans (or reduce their portfolios). Fifth and finally, the reduced supply of loans

Figure 1

FEEDBACK EFFECT



6 Basel II was implemented in most European economies in 2007.
7 The Internal Rating Based Approach, a technique allowing banks to use internal rating models to manage credit risk.

would have to have a strong effect on economic output. This implies, for example, that private entities would have no other ways of raising funding (for example by issuing securities in the financial markets, retaining profits or obtaining funding from non-banking institutions). The propagation mechanism and transmission channels of this impact are discussed in more detail in, for example, Aikman et al. (2009).

Using data on the Czech banking sector we tried to simulate the feedback effect for a selected adverse macroeconomic scenario. To get as close as possible to a potential real situation, the simulation was conducted using disaggregated data on individual banks within the CNB's existing macro-stress-testing system. This system offers a suitable framework thanks to its orientation towards adverse macroeconomic scenarios, its dynamic nature (capturing the situation in banks over the eight subsequent quarters), the dependence of PD values on macroeconomic developments by means of credit models (see Jakubík and Schmieder, 2009) and the use of disaggregated data on the portfolios of individual banks in the Czech Republic.

Although the simulation was conducted under the aforementioned five assumptions, it can give us an idea of the magnitude of this effect. In the empirical analysis it is assumed that negative macroeconomic developments will foster higher capital requirements for all banks owing to higher PD and LGD values in their credit portfolios. These risk parameters are inputted into the capital requirement calculation under the Basel II IRB approach. Although this advanced method for calculating risk-weighted assets is applied by only a few banks in the Czech Republic, the institutions that do apply it are large banks accounting for almost three-quarters of total loans to the real sector.

The simulation was conducted on the data for the Czech banking sector as of 30 September 2009 using a highly adverse macroeconomic scenario describing a typical crisis in developing markets (e.g. the 1997 crisis in the Asian economies). This unlikely yet plausible scenario assumes very low Czech economic output in 2010 and a significant rise in risk aversion towards the Czech economy, manifesting itself in depreciation of the exchange rate and a rise in interest rates (see Chart 1).[8]

CHART 1

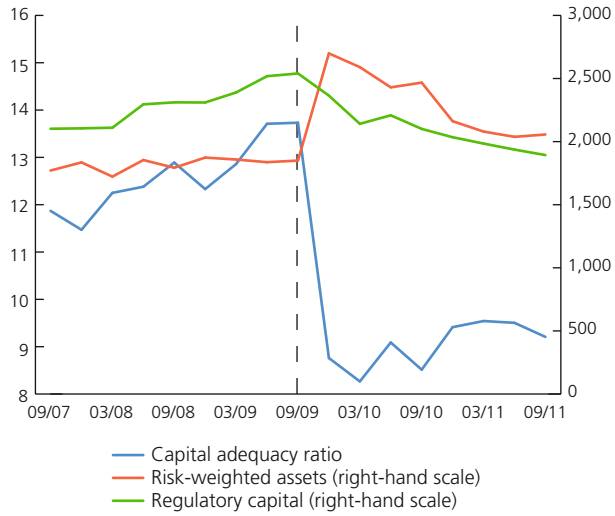
EVOLUTION OF KEY MACRO-INDICATORS IN ADVERSE SCENARIO

(in %; in CZK/EUR)

CHART 2

EVOLUTION OF CAPITAL ADEQUACY RATIO IN ADVERSE SCENARIO

(in %; RWA in CZK billions, regulatory capital in CZK hundreds of millions)



8 The scenario was created in November 2009. In order to simulate the feedback effect, however, it is an independent macroeconomic scenario.

We also assumed that banks will generate very low income (especially net interest income and net fee and commission income) over the entire simulation period to serve as a first line of defence against loan losses and losses due to market risks.[9] This leads immediately to absolute losses in many banks due to a fall in the value of bond holdings, exchange rate changes and loan loss provisioning, which together exceed the assumed income. The resultant losses are reflected immediately in a fall in regulatory capital.[10]

The downturn in economic output, however, is reflected simultaneously in growth in risk weights via growth in PD and LGD and leads to higher risk-weighted assets. In some banks, this can give rise to pressure to maintain sufficient capital adequacy.[11] Compared to the initial position as of 30 September 2009, the aggregate capital adequacy ratio is lower owing to a fall in capital (due to realisation of accounting losses) and to the rise in risk-weighted assets (see Chart 2), and is bordering on the regulatory minimum of 8%.

Assuming that all banks want to maintain a capital adequacy ratio of, say, 10% and there is no way of raising capital externally,[12] the logical response of banks is to lower their risk-weighted assets by reducing their credit exposures. The aforementioned results of the adverse scenario already contain a decrease in the credit portfolio reflecting reduced demand in an environment of weak economic output. To maintain a sufficient capital buffer, banks would therefore have to resort to a further decrease in loans in excess of the decline in credit demand.

In the following analysis of the feedback effect we proceed in a sequential manner. This approach is permitted by the dynamic nature of the banking sector stress-testing system. In the first quarter of the simulation (in this case 2009 Q4) banks are exposed to the effect of the worse economic situation and observe growth in PD and estimated LGD, a fall in the value of bonds, very low yields and also a decline in demand for loans. On the basis of these observed developments, banks for the first time calculate for themselves what their capital adequacy ratio would be at the end of the quarter if they failed to react in a significant way. If this calculated capital adequacy ratio is lower than required (the 10% assumed above), they will reduce their exposures during this quarter such that the resulting capital adequacy ratio is at least 10%. This is, of course, a very simplifying assumption, as the reduction in exposures would in reality probably last more than one quarter.

In the adverse scenario given here, 15 of the 21 banks tested are forced to react in the first quarter of the simulation.[13] The reduction in the supply of loans (for example through the sale of claims out of the banking sector or through the non-renewal of short-term revolving and overdraft financing, or even – which is more costly for banks, although not an entirely impossible strategy – through the cancellation of standby credit or the reduction of credit limits) in excess of the decline in credit demand will have a major impact on the economy, especially if economic agents have significantly limited access to funding from alternative sources. The existing evidence on bank financing in the Czech Republic suggests that the overwhelming majority of non-financial corporations have just one financing bank. This effectively prevents firms from switching to other banks with which they have no credit history (Geršl and Jakubík, 2009). Market financing is also not very widespread. On the other hand, we should add that large firms (which very often have foreign owners) can theoretically have other sources of funding either directly from their parent companies or from foreign banks in the form of cross-border loans. For the sake of simplicity, the simulation assumes very strong financial constraints on firms, which are forced to cut output if they lose bank

9 The scenario assumes that banks' net income (i.e. income gross of the effect of macroeconomic shocks) in the period 2009 Q4–2011 Q3 will reach just 50% of the average for the previous two years. This is a larger fall than in the scenarios used in the stress tests, as a figure of 70% is generally used for the worst-case scenario. This is because we are attempting to create a truly bad but still possible alternative scenario that is consistent with the aforementioned assumptions for realisation of the feedback effect.

10 The stress-testing methodology used for this simulation is described in a parallel thematic article in this Report entitled *Stress Test Verification as Part of an Advanced Stress-Testing Framework* (Geršl and Seidler).

11 PD is estimated using credit risk models, while growth in LGD is simulated by expert estimation; in the corporate exposure segment, for example, a rise in LGD from the regulatory 45% to 70% is assumed.

12 The option of increasing capital internally from retained earnings is kept, but this is more of a theoretical option given the assumed accumulated losses.

13 As capital regulation is responsible for the procyclical behaviour of banks in this simulation, the simulation is performed only for capitalised banks, i.e. branches of foreign banks are excluded.

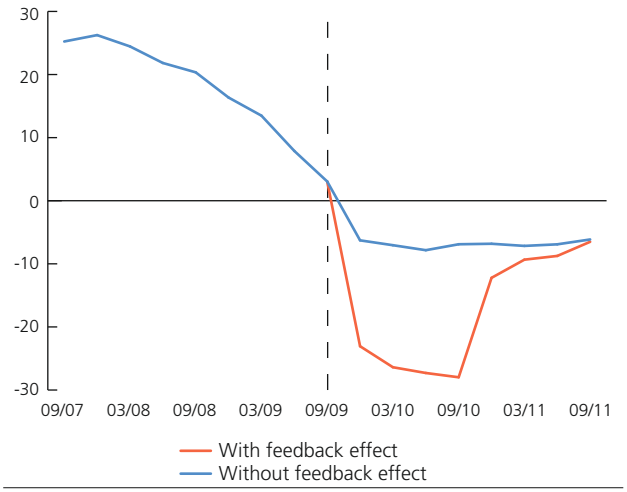
financing, which in turn leads to a further decline in economic output.

We assume that the reduced bank financing has a slightly lagged effect on the economy such that the decline in the loan supply in the first quarter of the simulation is reflected in real GDP in the following quarter, i.e. in 2010 Q1. The key issue is the estimation of the feedback effect itself. In this article we use a simple approach based on an estimate of the elasticity of GDP to changes in lending. Most of the studies applying this idea are based on the methodology presented in Driscoll (2004). This technique was also used by Čihák and Brooks (2009), who in cooperation with the European Central Bank for a panel of European countries estimated the elasticity between a decline in the year-on-year growth rate of loans (in excess of the decline caused by reduced loan demand) and year-on-year real GDP growth at around 0.1. This means that, for instance, a decline in the year-on-year growth rate of loans of 10 percentage points in excess of the decline due to lower demand is reflected in a decline in year-on-year GDP growth in the following quarter of 1 percentage point. This elasticity estimate was used to simulate the feedback effect for the Czech economy.

Chart 3

EVOLUTION OF TOTAL LOANS IN ADVERSE SCENARIO

(year-on-year growth in %)



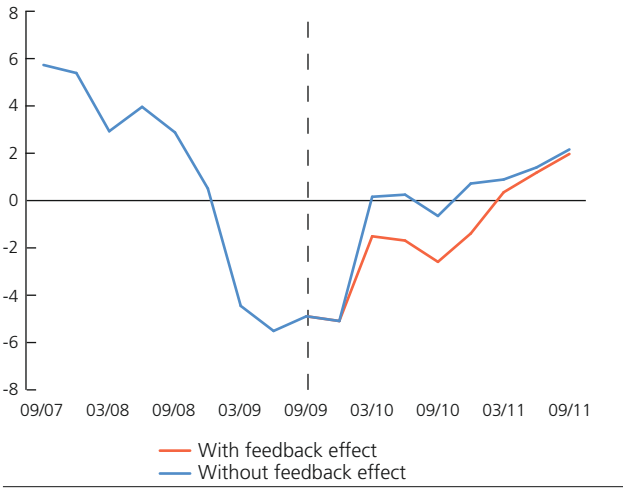
The contraction of the economy in the second quarter of the simulation (2010 Q1) caused by the feedback effect is reflected in bank portfolios in further growth of PD in the following quarters (LGD is assumed to be at a higher, but constant level). This leads to increased growth in loan losses, a decrease in regulatory capital and a rise in risk-weighted assets. At the same time, however, the feedback effect also generates a further decline in demand for credit in the given quarter.[14] The overall effects on profit/loss, regulatory capital and risk-weighted assets in 2010 Q1 and hence the resultant capital adequacy ratio depend on the calibration of the scenario and the size of the portfolios relative to banks' income. In 2010 Q1, banks will evaluate the expected impact of the economic environment on the resultant capital adequacy ratio and, if necessary, will further decrease the credit supply during the quarter. This will negatively affect GDP in the next quarter. The simulation performed here reveals, for example, that the same number of banks as in 2009 Q4 must further reduce their loan portfolios.[15] The same logic is then applied to all eight quarters for which the simulation is performed. Hence, if the feedback effect materialises, the original scenario (see Chart 1) and the original path of the effect on the banking sector (see Chart 2) do not apply and the economy and the key banking sector variables develop differently (see Chart 3 and Chart 4).

For the sake of simplicity, the simulation of the effect of procyclical bank behaviour on the economy is performed only for GDP; the other macroeconomic variables maintain

Chart 4

EVOLUTION OF REAL GDP IN ADVERSE SCENARIO

(year-on-year growth in %)

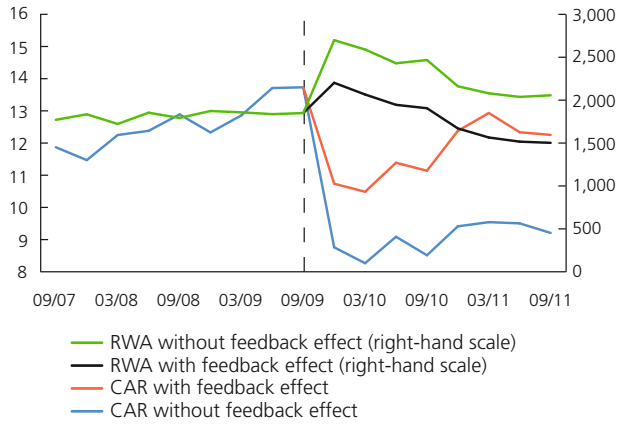


14 Another highly likely impact would be a decline in net income; this is fixed in the simulation for the time being and does not change as GDP declines further.
15 Only in the third quarter of the simulation, i.e. in 2010 Q2, does the number of reacting banks start to fall slightly.

CHART 5

EVOLUTION OF CAPITAL ADEQUACY RATIO (CAR) AND RWA IN ADVERSE SCENARIO

(in %; in CZK billions)



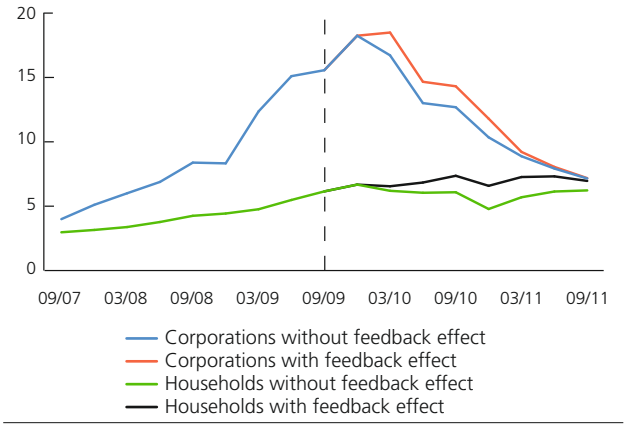
their original paths. This is, of course, a very significant simplification. It can be expected, for example, that monetary policy-makers would in all probability react to the sharper decline in GDP by easing the interest-rate conditions.

Chart 3 shows the evolution of year-on-year loan portfolio growth for the scenario without the feedback effect (i.e. with a demand-driven decline in loans only) and for the scenario with the feedback effect. The difference in the paths is directly correlated with the impact on GDP growth, as illustrated in Chart 4.

CHART 6

EVOLUTION OF PD PREDICTIONS FOR CORPORATIONS AND HOUSEHOLDS IN ADVERSE SCENARIO

(in %)



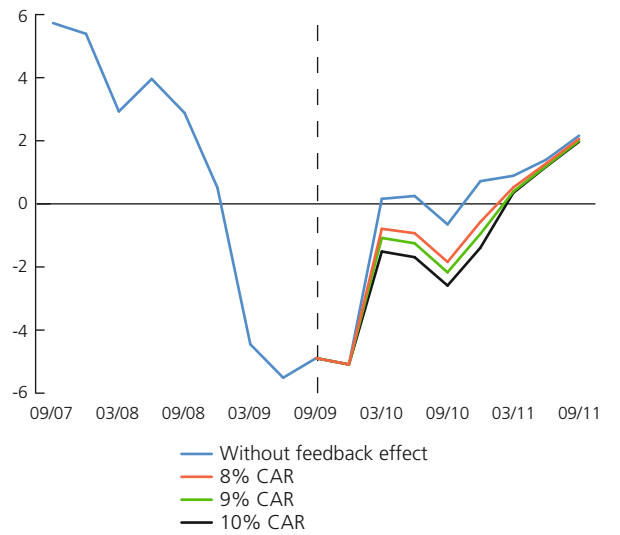
The decline in credit exposure reduces risk-weighted assets such that all the banks maintain the targeted capital adequacy ratio of 10% (see Chart 5). The path of the capital adequacy ratio in the presence of the feedback effect is thus better, since RWA declines. However, the worse evolution of the economy is reflected, with a lag, in growth of the risk parameter PD for the principal sectors of the economy (see Chart 6).

The simulation results depend on many of the parameters discussed above. Besides the elasticity between the supply of loans and GDP growth, the key parameters include above all the capital adequacy ratio targeted by banks. For this reason, we conducted several alternative simulations with different targeted capital adequacy ratios of 8% and 9% and the original 10%. As the simulation results show (see Chart 7), the impact on the GDP growth path ranges from one percentage point (for a targeted capital adequacy ratio of 8%) to two percentage points (for a targeted capital adequacy ratio of 10%) of year-on-year GDP growth over a period of at least one year.

CHART 7

EVOLUTION OF REAL GDP IN ADVERSE SCENARIO GIVEN ALTERNATIVE ASSUMPTIONS ABOUT TARGETED CAPITAL ADEQUACY RATIO

(year-on-year growth in %)



5. CONCLUSION

This article set out to present an overview of the debate on the sources and effects of procyclical behaviour of the financial system. The main natural and regulatory sources of procyclicality were discussed, as were the current regulatory proposals for mitigating procyclicality.

In the event of a very strong decline in economic activity, and given some assumptions, procyclical behaviour by financial intermediaries can lead to a feedback effect, i.e. a mutually reinforcing effect between growing risks in the financial/banking sector and in the real economy. The main objective of the article was to try to simulate the potential magnitude of this feedback effect on the example of the Czech Republic. A single highly adverse scenario was chosen for the simulation and the entire simulation was performed on disaggregated data for the Czech banking sector using the CNB's stress-testing system.

The results of the simulation showed that under certain assumptions the feedback effect on the real economy can be 1–2 percentage points of year-on-year GDP growth over a period of at least one year. Procyclicality of the financial system should thus be taken into account in economic and macro-prudential policy-making.

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REGULATION OF ALTERNATIVE FUNDS IN THE CZECH REPUBLIC IN THE CONTEXT OF THE DEBATE ON THEIR POTENTIAL REGULATION IN THE EUROPEAN UNION[1]

Vít Ossendorf and Adam Jekl

This article analyses the implications of the European Commission's regulatory proposals for Czech alternative funds. The article has reservations about these proposals. Given the extent and depth of the current Czech regulations, however, the authors do not believe that adoption of the proposed European legislation will place any major burden on Czech alternative funds. The article recommends some changes to the current Czech regulations regardless of whether or not the Commission's regulatory proposals are adopted.

1. INTRODUCTION

The global financial crisis, ongoing since mid-September 2008[2], and the role of alternative funds in it[3] has greatly increased the interest of politicians, economists and the enlightened public in the issue of regulation of such funds. These funds have not previously been regulated at the European level. The European Commission says that the financial crisis has underlined the extent to which alternative funds are vulnerable to a wide range of risks. These risks, it argues, are of direct concern to the investors in those funds, but also present a threat to creditors, trading counterparties and to the stability and integrity of European financial markets.[4] For over a year, the Czech Republic has thus been confronted with the opinion of the Commission, European politicians[5] and the High-Level Group on Financial Supervision in the EU[6] that there is a need to regulate significant alternative funds. The US administration is also calling for regulation of alternative funds, or at least of hedge funds (a subclass of alternative funds). In its opinion, many hedge funds manage such large assets that they pose a threat to financial stability in the event of unlimited use of leverage.[7]

This article sets out to consider appropriate regulation of alternative funds in the Czech Republic. It contains a simple comparison of alternative and standard funds. Particular attention is given to the proposed new European regulations, which are compared with the current Czech regulations. The article concludes by assessing the proposed new European regulations and recommending various regulatory approaches for the Czech Republic.

2. DEFINITION OF ALTERNATIVE FUNDS IN THE CZECH REPUBLIC

Alternative funds are defined as all collective investment funds that are not standard funds (i.e. funds that are not regulated under Directive 2009/65/EC of the European Parliament and of the Council of 13 July 2009 on the coordination of laws, regulations and administrative provisions relating to undertakings for collective investment in transferable securities – the UCITS Directive). Although this directive has not yet been implemented into Czech law (the time limit for transposition is 30 June 2011), funds regulated under the UCITS Directive in the Czech Republic can be considered the same as the former standard funds

1 This article describes the legal situation as of 1 March 2010.
2 We regard the request of US investment bank Lehman Brothers Holdings Inc. of 15 September 2008 for protection against its creditors as the start of the global financial crisis.
3 See the Commission's statements on the role of alternative funds in the current economic and financial crisis given in section 3.
4 See p. 3 of the Explanatory Memorandum of the Proposal for a Directive of the European Parliament and of the Council on Alternative Investment Fund Managers and amending Directives 2004/39/EC and 2009/65/EC published on 30 April 2009 as COM (2009) 207 final.
5 See the report of the European Parliament with recommendations to the Commission on hedge funds and private equity (A6-0338/2008) ["Rasmussen" report] and the report on the transparency of institutional investors (A6-0296-2008) ["Lehne" report].
6 See the report of the High-Level Group on Financial Supervision in the EU ("de Larosière Group" report), 25 February 2009, p. 25. See http://ec.europa.eu/internal_market/finances/docs/de_larosiere_report_en.pdf .
7 See http://www.usatoday.com/money/companies/regulation/2009-03-26-hedge-funds-regulationt-geithner_N.htm.

under Act No. 189/2004 Sb., on Collective Investment, as amended (the "AoCI"). Conversely, alternative funds can, in the present Czech regulatory environment, be compared with special funds constituted under the AoCI.[8]

From the regulatory perspective, alternative funds in the Czech collective investment market can be divided into two groups – alternative funds that collect money from the public ("publicly offered alternative funds") and alternative funds that collect money from qualified investors (alternative non-public funds, funds for qualified investors, FQIs).[9] Alternative funds are (at least for the time being) regulated exclusively at national level.

Under the AoCI, publicly offered alternative funds can be constituted – in terms of the type of assets invested – as alternative securities funds (whose manner of investment is regulated in a similar way as standard funds), alternative real estate funds (which invest primarily in real estate and real estate companies) and alternative funds of funds (which invest in securities issued by other collective investment funds).

FQIs differ from publicly offered alternative funds in that they do not have a defined manner of investment and their securities can be acquired only by qualified investors. Any natural or legal person who declares in writing that they have experience in securities trading can become a qualified investor. Important distinguishing features from publicly offered alternative funds include a minimum investment amount of CZK 1 million and a ban on publicly offering or promoting such funds. FQIs may have no more than 100 shareholders.

Turning to the classification of funds by chosen investment policy, domestic funds – both standard and publicly offered alternative funds – include money market funds, bond funds, equity funds, mixed funds, funds of funds and real estate funds.[10] In the Czech Republic, the vast majority of FQIs are constituted as tax-optimised schemes for real estate owners/investors. No hedge funds[11] or private equity funds[12] have been constituted so far under Czech law. In our view, the founders of hedge funds and private equity funds prefer jurisdictions with more advantageous tax systems and tried and tested regulations.[13]

8 Council Directive 85/611/EEC of 20 December 1985 on the coordination of laws, regulations and administrative provisions relating to undertakings for collective investment in transferable securities (UCITS), as amended by Council Directive 88/220/EEC, Directive 95/26/EC of the European Parliament and of the Council, Directive 2000/64/EC of the European Parliament and of the Council, Directive 2001/107/EC of the European Parliament and of the Council, Directive 2001/108/EC of the European Parliament and of the Council, Directive 2004/39/EC of the European Parliament and of the Council, Directive 2005/1/EC of the European Parliament and of the Council and Directive 2008/18/EC of the European Parliament and of the Council, has been implemented into Czech law (the AoCI). This directive is the predecessor of the UCITS Directive. As regards the issue examined in this article these directives differ only negligibly, so for the sake of simplicity they are regarded as one and the same.

9 The AoCI refers to alternative funds as "special funds", publicly offered alternative funds as "special funds that collect money from the public" and FQIs as "special funds for qualified investors". Funds constituted before the Czech Republic joined the EU were, under the act, classed after 1 May 2004 as special securities funds (part of publicly offered alternative funds). Some of them were later converted into standard funds. Since 1 May 2004, funds of all types (both standard and alternative) have been constituted.

10 Under the regulations, only alternative funds converted as real estate funds are permitted to invest in real estate. Standard funds are not allowed to invest in real estate.

11 Hedge funds can be characterised by the following features: they focus on the absolute yield of a portfolio and they use various investment methods to achieve their goals, including risky techniques such as naked short selling, high levels of leverage, and derivatives.

12 Private equity funds tend to invest in unlisted companies whose participating securities are subsequently admitted to trading on a regulated market, or in listed companies whose participating securities are subsequently delisted from a regulated market. Private equity funds' investments are long-term (5 to 10-year investment horizons).

13 Foreign hedge funds do operate in the Czech financial market, but their activities are not easy to distinguish from those of other foreign entities active in the Czech financial market.

3. COMPARISON OF ALTERNATIVE AND STANDARD FUNDS IN THE CZECH REPUBLIC

As the Commission holds the view that alternative funds exacerbated the current financial crisis[14] and does not make the same claim about standard funds[15], we regard it as important to focus in the following analysis on the domestic collective investment market, on the nature of alternative and standard funds, and on the way they behaved before and during the financial crisis.

The value of the assets managed by domestic funds stood at €5.12 billion (CZK 132.6 billion) as of 30 June 2009.[16] Standard funds accounted for €2.04 billion (CZK 52.7 billion), publicly offered alternative funds for €2.18 billion (CZK 56.4 billion) and FQIs for €0.90 billion (CZK 23.5 billion).[17] For comparison, the total volume of assets managed by funds in the European market was €6,107 billion (€4,554 billion by standard funds and €1,553 billion by alternative funds).[18] The Czech collective investment market thus represented less than 0.1% of the total European market.

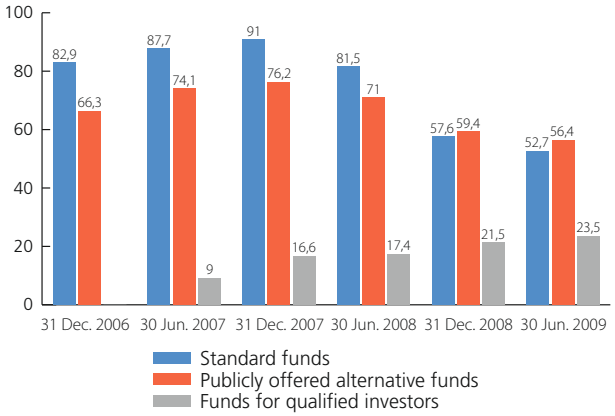
Unlike in the European market, where standard funds significantly exceed alternative funds in terms of volume of assets managed, the split between the two sectors in the Czech Republic recently has been almost equal (see Chart 1).

A more detailed look at the asset structures of publicly offered alternative funds and standard funds reveals that from the medium-term perspective (three years back) the asset structures of the two types of funds are very similar (see Chart 2). Almost half the assets are long-term debt instruments, and shares are in second place in both cases. The asset structures then differ slightly. In the case of publicly offered alternative funds deposits are in third place as regards asset volume, although their share in assets increased significantly only at the start of 2008, i.e. when the economic situation began to worsen ahead of the full outbreak of the current global financial crisis.[19]

Chart 1

VOLUME OF ASSETS MANAGED BY FUND TYPE IN CZK BILLIONS (2006–2009)

(in %)

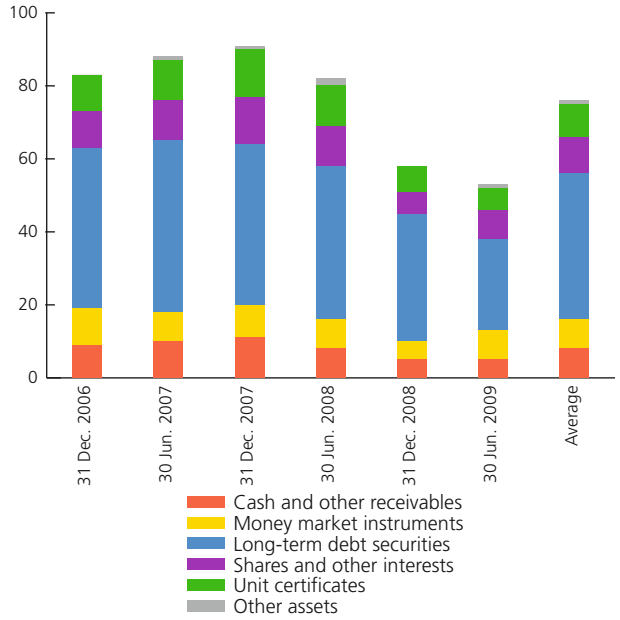


Source: CNB

Chart 2

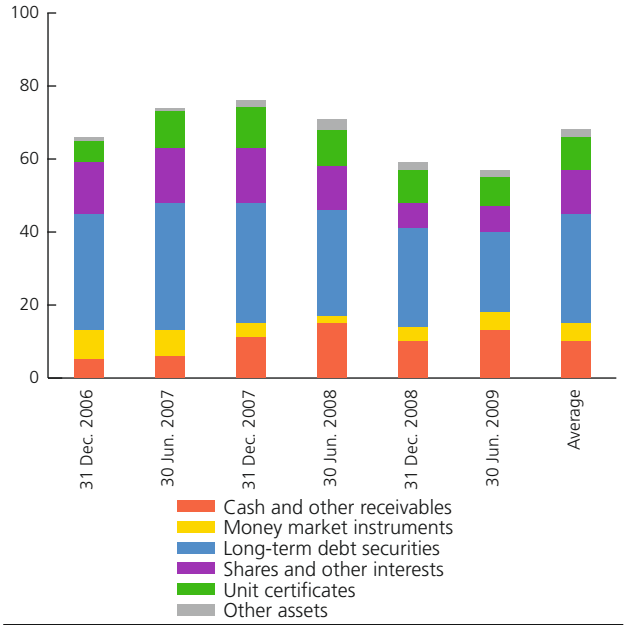
COMPARISON OF ASSET STRUCTURES OF PUBLICLY OFFERED ALTERNATIVE FUNDS AND STANDARD FUNDS IN CZK BILLIONS (2006–2009)

STANDARD FUNDS



14 See p. 3 of the Explanatory Memorandum of the AIFM Directive.
15 See point 2 of the recitals of the UCITS Directive, which, in relation to standard funds, talks about "the development and success of the European investment funds industry".
16 Czech funds managed an amount equivalent to 3.59% of Czech GDP for 2008.
17 Czech standard funds managed an amount equivalent to 1.43% of Czech GDP for 2008. The equivalent figures for publicly offered alternative funds and FQIs were 1.53% and 0.63% respectively (alternative funds altogether 2.16%).
18 See the data of the European Fund and Asset Management Association (EFAMA) at http://www.efama.org/index.php?option=com_docman&task=cat_view&gid=335&Itemid=-99. European funds managed an amount equivalent to 48.84% of EU GDP for 2008 (European standard funds 36.42% and European alternative funds 12.42%).
19 Based on the information known to us, it is impossible to state with certainty whether the increase in the share of deposits in portfolios was due more to expected negative trends in equity markets or to increased pressure from investors to redeem their shares from funds.

PUBLICLY OFFERED ALTERNATIVE FUNDS



Note: Average for 31 December 2006–30 June 2009.
Source: CNB

An important piece of information is the absolutely negligible share of financial derivatives in the portfolios of both types of funds. In Europe, it is usual even for standard funds to invest in financial derivatives and to use leverage. These practices are not common in Czech standard funds or even publicly offered alternative funds (where financial derivatives are used for hedging or efficient portfolio management).

The asset volumes of the two types of funds followed very similar paths before and during the crisis – very slight growth in assets until 2007, an appreciable fall in the first half of 2008, a sharp decline in the second half of 2008 and a slower decline in the first half of 2009 (this fall was due not only to a decrease in the assets' market value, but also to increased redemptions in the case of open-ended funds).

FQIs have a specific position in the Czech capital market, as they do not invest actively on that market but invest almost exclusively in real estate. Thanks to this, they recorded asset growth during the financial crisis, although this was due primarily to the foundation of new funds and to the inflow of new investments. Given their predominant investment method (purchasing real estate and holding it in their portfolios), we are of the opinion that FQIs could not have caused or exacerbated the crisis in the Czech Republic.

According the analysis, we can also say that the publicly offered alternative funds sector and the standard funds sector in the Czech Republic are practically identical in terms of asset value and structure. This is no surprise when one considers that the two types of funds are subject to similar regulation as well. It is evident from the aforementioned asset composition that the instruments used by the two types of publicly offered funds could not have caused or exacerbated the crisis in the Czech Republic. What is more, if the Commission is right in its view that standard funds did not cause or exacerbate the crisis, the same view must also apply to Czech publicly offered alternative funds given their similar asset structure.

4. DIRECTIVE ON ALTERNATIVE INVESTMENT FUND MANAGERS

On 29 April 2009[20] the European Commission published a Proposal for a Directive on Alternative Investment Fund Managers[21] (the "AIFM Directive"). The AIFM Directive is being presented by the Commission as part of the response to the financial crisis. The Commission is trying to create a unified and effective regulatory system for alternative fund managers (hereinafter also "managers") in the European Union.[22] The Commission does not intend to regulate the investment policies of individual alternative funds directly.[23] That would be a difficult task considering the diversity of those investment policies.

20 The Proposal published by the Commission on 29 April 2009 is the only official proposal so far. For the compromise proposals of the Swedish and Spanish Presidencies, see section 6.
21 Proposal for a Directive of the European Parliament and of the Council on Alternative Investment Fund Managers and amending Directives 2004/39/EC and 2009/65/EC published on 30 April 2009 as COM (2009) 207 final.
22 See p. 5 of the Explanatory Memorandum of the AIFM Directive.
23 See point 8 of the recitals of the AIFM Directive.

A manager is defined as any legal or natural person whose regular business is to manage one or several alternative investment funds. The directive is therefore not limited in scope solely to hedge funds and private equity funds, but covers all collective investment funds to which the UCITS Directive does not apply.[24]

The AIFM Directive lays down rules for the authorisation, ongoing operation and transparency of managers. Every EU-domiciled manager that manages assets exceeding €100 million invested in an alternative fund will require authorisation to operate. For managers which only manage unleveraged alternative funds and do not grant investors redemption rights during a period of at least five years, a de minimis threshold of €500 million applies. This exemption is targeted mainly at private equity funds, which pose a lower systemic risk.[25]

Managers will be required to comply with relevant capital requirements, which are specified analogously to those for investment companies constituted under the UCITS Directive.[26]

To obtain authorisation, managers are required to demonstrate that they are suitably qualified to provide management services. Managers will have to provide detailed information on their business activities, the characteristics of the alternative funds they manage and their governance systems. They will also be required to comply with information obligations towards investors and supervisory authorities.[27]

The AIFM Directive will offer managers with due permission (an opt-in) from the home state an advantage in the form of authorisation to market alternative funds to professional investors[28] throughout the EU. Cross-border marketing will be subject only to a notification duty whereby the manager will provide notification of its intentions and file relevant information with the home supervisory authority, which will forward that information to the host supervisory authority. Managers will also be able to provide management services for alternative funds domiciled in other EU Member States.

The directive also allows alternative funds domiciled in third countries outside the EU to be marketed in the EU provided that such states meet strict requirements regarding regulation, supervision and international cooperation, including the OECD's requirements for exchange of information in tax matters. This last requirement will be probably critical with regard to alternative funds domiciled in offshore centres,[29] although the Commission believes that offshore centres will have a strong incentive to adapt to these conditions and that this requirement is consistent with the G20's objectives to enhance transparency in such jurisdictions.[30] By contrast, the AIMA[31] is convinced that this requirement will put European managers of European alternative funds at a disadvantage compared to non-European ones.[32]

24 The AIFM Directive thus also regulates real estate, commodity and other asset funds regardless of their legal form and regardless of whether they are nationally regulated or supervised. See p. 5 of the Explanatory Memorandum of the AIFM Directive.

25 The Commission assumes that these limits cover around 48% of all managers managing almost 98% of all assets deposited in EU-domiciled alternative funds. A prediction of the coverage of individual fund managers, including hedge fund managers, and their assets at various de minimis thresholds is given on pp. 48–51 of the AIFM Directive Impact Assessment, which is available at http://ec.europa.eu/internal_market/investment/alternative_investments_en.htm. In the Czech Republic the AIFM Directive should apply to four investment companies managing around 84% of the managed assets of all alternative funds (according to data as of 30 June 2009).

26 See Article 7(1)(a) of the UCITS Directive. The requirement ensues from Article 21 Directive 2006/49/EC of the European Parliament and of the Council of 14 June 2006 on the capital adequacy of investment firms and credit institutions (Basel II) applying to investment firms (in the Czech Republic banks with licences to provide investment services and investment firms).

27 See Articles 19–21, 23, 24 and 27–29 of the AIFM Directive.

28 Investors within the meaning of Annex II of Directive 2004/39/EC of the European Parliament and of the Council of 21 April 2004 on markets in financial instruments amending Council Directives 85/611/EEC and 93/6/EEC and Directive 2000/12/EC of the European Parliament and of the Council and repealing Council Directive 93/22/EEC (MiFID).

29 See the *AIMA Position Paper on the European Commission's Draft Directive on Alternative Investment Fund Managers (AIFMs)* available at http://www.aima.org/download.cfm/docid/84F2C795-8895-4945-AED17E9521E45C60.

30 See the Commission document *Directive on Alternative Investment Fund Managers (AIFMs): Frequently Asked Questions* available at http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/09/211&format=HTML&aged=0&language=EN&guiLanguage=fr.

31 Alternative Investment Management Association (an international association of hedge funds).

32 See the *AIMA Position Paper on the European Commission's Draft Directive on Alternative Investment Fund Managers (AIFMs)* available at http://www.aima.org/download.cfm/docid/84F2C795-8895-4945-AED17E9521E45C60.

The Member States will be entitled to permit the marketing of alternative funds also to non-professional investors (in particular consumers) on their territory. In such cases they may stipulate additional legal requirements for managers.

5. COMPARISON OF REGULATION OF ALTERNATIVE FUNDS IN THE CZECH REPUBLIC WITH THE DIRECTIVE ON ALTERNATIVE INVESTMENT FUND MANAGERS

The Czech regulations, unlike the AIFM Directive, do not concentrate on laying down rules for the activities of managers. The AoCI contains detailed rules for the types of assets in which publicly offered alternative funds are allowed to invest. In this way, differently to the AIFM Directive, it greatly limits the number of asset-type categories. In the Czech Republic, only FQIs are subject to similar regulation as in the AIFM Directive in terms of asset-type freedom.

The AIFM Directive took over a whole range of rules from the UCITS Directive. The UCITS Directive is the main inspiration for the AoCI. Most of the passages of the mandatorily harmonised regulations for standard funds under European law were also applied to alternative funds under the AoCI. Managers of standard and alternative funds are subject to the same rules in the AoCI. The only exception applies to FQIs, which are subject to limited requirements as regards transparency and information obligations towards the supervisory authority. The AIFM Directive differs from the regulation of managers currently contained in the AoCI mainly in those places where it was not inspired by the UCITS Directive.

The new passages not previously addressed in European collective investment law concern regulation of short selling, the obligation to appoint an independent asset valuator, restriction of the use of leverage by the supervisory authority, and regulation of alternative funds having controlling influence in issuers. Extensive information obligations towards investors and the supervisory authority are a systemically new measure. These correspond in scope to the UCITS Directive, where, however, they are laid down with regard to the fact that standard funds are offered to the public.[33]

One of the frequently criticised activities of hedge funds is short selling. The AIFM Directive pays special attention to this issue in its passage on risk management. All alternative funds to which the AIFM Directive applies are subject to regulation of short selling. The AIFM Directive empowers the Commission to issue measures intended to protect alternative funds from exposure to excessive risk due to short selling. Generally, this special regulation is surprising, as short selling is also used by other institutions from the investment banking sector (banks and investment firms) without it being regulated in such way.[34] Although neither the Explanatory Memorandum nor the recitals of the AIFM Directive say so, the fact that hedge funds often use short selling to "punish" countries or companies whose currencies or investment instruments are overvalued may be an important motive for restricting short selling.[35] At first sight, restricting this activity of hedge funds might prevent sudden changes in exchange rates and investment instrument prices and the financial instability that ensues from such changes. On the other hand, one should not underestimate the purging effect of "punishment" by hedge funds. As Czech FQIs do not use short selling for speculative reasons,[36] we believe that they will be virtually unaffected by such regulation under the AIFM Directive. The AoCI forbids standard funds and publicly offered alternative funds to perform short selling.[37]

Another new measure is the manager's obligation to appoint an independent asset valuator for each alternative fund it manages. According to the Commission, the creation of this function is meant to protect investors. Such assets, for which transparent market prices often do not exist, are difficult to value, which means there is scope for manipulation.[38] In our view, for the Commission to achieve its goals it would be enough for the manager to perform the valuation with professional care and the valuation to be independently and properly verified by the depositary. The AoCI assumes such a rule. In our opinion, creating the new function of independent asset valuator would mean an unnecessary extra cost for Czech alternative funds.

33 See point 58 et seq. of the recitals of the UCITS Directive.
34 The main new measure is authorisation of the supervisory authority to limit the extent to which managers may use leverage.
35 This reason, however, can be inferred from the justification given for regulating leverage. See point 15 of the recitals of the AIFM Directive.
36 Czech FQIs have used traditional short selling only a few times in the past, to cover impending losses of liquidity.
37 The AoCI forbids them both traditional and naked short selling.
38 See point 13 of the recitals of the AIFM Directive.

The AIFM Directive sets out to increase the transparency of alternative funds and enhance market discipline.[39] One of the means of achieving this objective is a detailed prescribed information obligation towards investors. These rules are quite surprising, because according to the AIFM Directive alternative funds are not intended primarily for the public. In respect of regulation of FQIs, the AoCI is based on the view that professional investors and FQI managers will agree on the extent and depth of the information obligation themselves. Under the AIFM Directive, managers also have an information obligation towards the supervisory authority. Compared to the information obligations of FQIs towards the Czech National Bank under the AoCI, the AIFM Directive assumes the provision of a substantially larger set of information to the supervisory authority.[40] The use of this information for prudential supervision is debatable, as alternative funds may only be marketed to professional investors and the AIFM Directive does not specify investment methods with regard to limiting risks for alternative funds or the market. It is also debatable whether the AIFM Directive should limit risks at all, as taking on greater risks is one of the ways of achieving higher returns.[41]

Highly debatable provisions relate to managers managing alternative funds using a systematically high level of leverage and alternative funds acquiring controlling influence in issuers of participating securities that the alternative fund has in its assets. Under the AIFM Directive, in the first case the supervisory authority will be entitled to restrict leverage, while in the second case the managers of such alternative funds will have an extensive information obligation towards the issuer, its shareholders and representatives of employees. The information obligations towards issuers also include a duty to provide information on development plans. These rules laid down in the AIFM Directive currently have no precedent in Czech law. The only legislation that comes close is the harmonised regulation of takeover bids,[42] which, however, concentrates solely on the acquisition of controlling influence in listed issuers. The information obligations towards issuers run counter to the principle of freedom to do business (in particular the obligation to create and disseminate a development plan for an issuer). In addition, there is practically no justification for it to apply only to managers and not to other investment banking institutions (banks and investment firms).[43] Entirely baseless – and unique on the financial market – are the information obligations of an issuer (not a manager) following the delisting of its participating securities from a regulated market in which an alternative fund previously acquired a controlling stake. The issuer has to meet the information obligations for a further two years after leaving the regulated market, as if its participating securities were still listed.

In return for compliance with the strict regulatory rules imposed on managers, a single European passport for managers is to be created. Managers certainly welcome this rule, as under the AoCI it has only applied to standard funds up to now. In the context of unification of the single European passport rules for the marketing of securities to the public, this Commission activity should be welcomed by Czech regulators.

The AIFM Directive allows Member States to permit managers to market alternative funds to non-professional investors as well. In such cases, the Member States are entitled to require managers and alternative funds to meet other requirements.[44] In this context, surprisingly, it does not refer to the UCITS Directive, which regulates funds designed primarily for non-professional investors (especially as regards information created and disseminated, given the consumer nature of the investors).

6. ASSESSMENT OF THE DIRECTIVE ON ALTERNATIVE INVESTMENT FUND MANAGERS

The Commission's efforts to create a single European passport for managers, and thus also for alternative funds

39 See p. 9 of the Explanatory Memorandum of the AIFM Directive.
40 See Article 57(3) of the AoCI and Articles 19–21, 23, 24 and 27–29 of the AIFM Directive.
41 Taking on greater risks can be dangerous not only for alternative funds, but also for the market. See the aforementioned passage on the regulation of short selling.
42 See Directive 2004/25/EC of the European Parliament and of the Council of 21 April 2004 on takeover bids, implemented in the Czech Republic into Act No. 104/2008 Coll., on takeover bids, as amended.
43 Commercial law allows partners that control unlisted companies to decide freely on their existence and non-existence. They do not publish development plans, but issue final fundamental decisions as entrepreneurs. It is surprising, therefore, that alternative fund managers are to be an exception among entrepreneurs.
44 Otherwise the AIFM Directive can be viewed as involving maximum regulation of alternative funds, for which the Member States may not lay down stricter requirements. See point 9 of the recitals of the AIFM Directive.

themselves, should be welcomed. However, we feel that the Europe-wide regulations have not been chosen ideally.[45] We are not sure whether, in the case of the AIFM Directive, the costs associated with each new regulation do not exceed its benefits.

It is hard to say that the Europe-wide regulations will protect non-professional investors (in particular consumers).[46] As mentioned above, the AIFM Directive assumes that alternative funds will be marketed primarily to professional investors. Professional investors are mostly banks, which should have very sophisticated risk management systems in place, so they need no extra protection from the AIFM Directive. In practice, moreover, such investors see to it themselves that the manager provides them with enough information and has appropriate risk management. In the case where a Member State decides that alternative funds may also be marketed to non-professional investors in its jurisdiction, the AIFM Directive leaves it to the discretion of that Member State to decide on any further rules.

The AIFM Directive should, among other things, probably protect the financial market against shocks that might arise from certain activities of alternative funds.[47] Based on the comparison given in the previous section we have doubts about whether the regulatory and supervisory tools envisaged in the AIFM Directive will contribute effectively to achieving this objective. As this regulation was created without any in-depth Europe-wide analysis, the aforementioned doubts can be raised from the Europe-wide perspective as well. The open questions that further analysis might answer include why this regulation applies only to alternative funds and not to other investment banking institutions (banks and investment firms), which use the same instruments in the course of their activities.[48]

According to information from the Swedish Presidency[49] Sweden has proposed a revision of the AIFM Directive. It has recommended deleting the limit on short selling and the obligation to use independent asset valuators and suggested softening the rules for limiting leverage and the obligations linked with controlling interests in issuers. In our opinion, this is a step in the right direction. The question is, though, whether this proposal will be accepted by the other Member States, especially by those advocating tight regulation.[50] In a compromise proposal, the Spanish Presidency has further recommended a change regarding relations with third countries outside the EU. Fund industry representatives regard this change as being too protectionist.[51]

7. PROPOSALS TO REGULATE ALTERNATIVE FUNDS IN THE CZECH REPUBLIC

In the Czech Republic the AIFM Directive is expected to apply to four managers (investment companies) managing around 84% of the assets managed by all Czech alternative funds.[52] From the Czech Republic's perspective, we can say that these alternative funds were certainly not among those that exacerbated the financial crisis. However, the question remains whether this was due to stricter domestic regulation and whether we would have to have made different conclusions under hypothetical laxer regulation.

We believe, however, that the current relatively high level of regulation will represent a substantial advantage for

45 Jacques de Larosière, author of the report of the High-Level Group on Financial Supervision in the EU, joined FSA chairman Lord Turner and Sir James Sassoon in criticising the draft AIFM Directive. See http://www.cityam.com/news-and-analysis/trio-regulators-slam-ecs-hedge-fund-regulation-plans.

46 On p. 3 of the Explanatory Memorandum of the AIFM Directive the Commission talks about "investor protection". The Explanatory Memorandum does not make clear whether this term also encompasses non-professional investors.

47 See p. 3 of the Explanatory Memorandum of the AIFM Directive.

48 The Commission is also aware of this potential criticism. On p. 5 of the Explanatory Memorandum of the AIFM Directive it announces a further unspecified "review of relevant EU Directives" in this context.

49 See http://www.nytimes.com/2009/11/17/business/global/17inside.html?_r=1, http://www.hedgefundsreview.com/hedge-funds-review/news/1556271/news-focus-sweden-raises-issues-draft-eu-directive and http://online.wsj.com/article/SB125737892834929505.html.

50 French Finance Minister, Christine Lagarde, has said that France is opposed to the original draft AIFM Directive because it is too minimalistic (a similar opinion was expressed by Poul Nyrup Rasmussen, a prominent member of the European Parliament's Committee on Economic and Monetary Affairs, while he was an MEP). France would prefer to regulate individual funds directly. See http://www.iiea.com/blogosphere/eu-shuns-funds.

51 See the comments made by Andrew Baker, Chief Executive Officer of AIMA, at http://www.hedgeco.net/blogs/2010/02/16/aima-warns-of-protectionist-outcome-in-aifm-hedge-fund-directive/.

52 The share of the assets managed by the four largest managers (investment companies) in the Czech alternative funds sector is calculated using the data as of 30 June 2009.

the Czech funds industry if the AIFM Directive is adopted. Although we have reservations about the AIFM Directive owing to the aforementioned objections, we believe that its adoption will not have any major impact on the existing business of Czech managers (unlike in the case of institutions not accustomed to a high level of regulation).

However, the adoption of the AIFM Directive would imply a major revision of the AoCI. Changes would need to be made above all to the provisions on authorisation of investment companies and investment funds, the performance of their activities (in particular governance) and the regulation of information obligations and supervision. New passages would introduce obligations for alternative funds using leverage and alternative funds acquiring controlling influence in issuers as well as regulation of the single European passport for managers. The implementation of the AIFM Directive would also necessitate major amendments to, or the replacement of, a whole range of implementing regulations. In this regard, it would be worth considering whether to issue a new collective investment act. The present AoCI has already been amended ten times (including one major revision)[53] and the new UCITS Directive will have to be implemented into Czech collective investment law by mid-2011.

The key principle of any implementation of the AIFM Directive should be a requirement for Czech alternative funds not to be subject to stricter regulation than that under the AIFM Directive (apart from the exception given below). The AIFM Directive contains virtually no discretions for the Member States. The only significant scope for discretion we can see for Czech legislators is the potential setting of stricter requirements for managers of publicly offered alternative funds. We suggest abandoning the current regulation of publicly offered alternative funds' investment policies and replacing it with regulation of managers pursuant to the AIFM Directive. From the UCITS Directive it would be appropriate to adopt the information obligations targeted at non-professional investors (in particular consumers).

Even if the draft AIFM Directive or some other European alternative funds regulation is not adopted, it is still worth considering changing the Czech regulations. Our first suggestion is to unify the rules for public offers of collective investment funds and investment securities to the maximum possible extent.[54] We also see no reason to have two similarly regulated sectors of standard funds and publicly offered alternative funds standing side by side. We see room above all for relaxing the regulation of publicly offered alternative funds. The AoCI offers substantially fewer types of publicly offered alternative funds than the regulations in other Member States.[55] The main absentees are private equity funds, commodity funds and infrastructure funds. With regard to the protection of non-professional investors we are more circumspect on the issue of the potential inclusion of hedge funds among publicly offered alternative funds; the proposal for commensurate regulation in the Czech Republic has not, at least according to our information, been carefully considered. The question is whether regulation alone is the main barrier to greater development of Czech funds. For the Czech Republic to become attractive to the alternative funds sector, the related tax regulations need to be revised, as they have some deficiencies compared to the European competition.[56]

8. CONCLUSION

This analysis of the Czech collective investment funds market has shown that Czech alternative funds neither caused nor exacerbated the crisis. The possible reasons for this include their small relative size and cautious investment policies and the existing regulations. However, we see the existence of two similar collective investment sectors – alternative and standard – as problematic. In particular, the publicly offered alternative funds sector is practically identical to the standard funds sector in terms of both manner of regulation and the structure of the assets they hold in their portfolios. Consequently, we see scope for reform towards regulating the alternative funds sector separately and thereby creating a more effective competitive environment.

We view the draft AIFM Directive as a forced response by the Commission to the calls for regulation as a way of averting another crisis. Unfortunately, the original plan to regulate

53 By an amendment implemented by Act No. 224/2006 Coll., amending Act No. 189/2004 Coll., on Collective Investment, and Act No. 15/1998 Coll., on Supervision in the Capital Market Area and on the Amendment of other Acts, as amended.

54 The regulation of public offers of investment securities and securities prospectuses under Act No. 256/2004 Coll., on Capital Market Undertakings, as amended, does not apply to collective unit certificates. The AoCI lays down rules for public offers of unit certificates separately.

55 If alternative fund managers are not going to be regulated, it would be appropriate to regulate the investment policies of alternative funds.

56 See, for example, the comments of Deputy Finance Minister Peter Chrenko at http://www.financninoviny.cz/zpravy/investicni-fondy-ma-lakat-nizsi-dan/364709.

only systemically relevant alternative funds has turned into excessive regulation of practically all alternative funds. The potential adoption of the AIFM Directive and its subsequent implementation into Czech law should not entail any drastic changes given the current high level of domestic regulation of Czech alternative funds. However, we feel it is not economically efficient to introduce such a strict system for almost the entire European alternative funds sector. It would be useful to conduct a Europe-wide analysis of alternative funds and to open a fundamental debate on the regulation of alternative funds with the other G-20 members.[57]

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57 In February 2010 the FSA published the results of a survey on the behaviour of hedge funds with regard to financial stability. This survey revealed no clear evidence to suggest that the activities of hedge funds give rise to systemic risk. See http://www.fsa.gov.uk/pubs/other/hedge_funds.pdf.

GLOSSARY

Balance-sheet liquidity
The ability of an institution to meet its obligations in a corresponding volume and term structure. The term funding liquidity is also used, meaning the ease with which economic agents can obtain external finance.

Capital adequacy ratio
The ratio of regulatory capital to total risk-weighted assets. Tier 1 capital adequacy is the ratio of Tier 1 capital to total risk-weighted assets (see also *Tier 1*).

CERTIS A payment system processing all domestic interbank transfers in Czech koruna in real time. Banks, credit unions and foreign bank branches are participants in this system. As of 31 December 2009, the CERTIS comprised 44 direct participants and 7 third parties – for example, card payment clearing houses and securities clearing and settlement institutions.

Collective investment funds
Mutual and investment funds whose sole business activity is collective investment, i.e. collecting funds from investors and investing them. CIFs are broken down by investor type into funds intended for the public (dominated by open-ended mutual funds) and funds for qualified investors, and by asset risk into money market, bond, equity, mixed and real estate funds and funds of funds. Sometimes the category of funds of funds is not listed separately, but is included in the other categories according to the type of funds in which they invest.

Connectivity An indicator of the degree of interconnectedness of a network element with the other elements (e.g. in a network of interbank exposures); for each bank, connectivity is calculated as the number of relationships with other banks divided by the maximum possible number of relationships and takes values from 0 to 100%. The average connectivity of the entire network is calculated as the average across all banks.

Credit default swap (CDS)
A credit derivative in which the buyer of the collateral undertakes to pay the seller periodical fixed payments ("swap premium") for the duration of the contract in exchange for a conditional payment of the counterparty in the case of default of the "reference entity" to which the agreement refers. If default does not occur, the contract terminates at a specified time and the seller only gains a premium for taking on the potential credit risk.

Credit premium The premium on the return on a portfolio for credit risk.

Custody Banks offer their clients the service of safekeeping and management of securities and settlement of securities transactions on both domestic and foreign markets. The bank opens and maintains a securities owner account for the customer, on which it performs settlement of the customer's capital market trades as instructed by the customer. As the custodian, the bank performs activities directed at preserving the rights attaching to the securities in its custody.

Debt deflation A situation where the real value of the debt of corporations and households rises as a result of falling prices and incomes. This happens primarily in a situation where the decrease in nominal interest rates is insufficient to offset the fall in the rate of growth of incomes.

Default Default is defined as a breach of the debtor's payment discipline. The debtor is in default at the moment when it is probable that he will not be able to repay his obligations in a proper and timely manner, without recourse by the creditor to settlement of the claim from the security, or when at least one repayment (the amount of which deemed by the creditor to be significant) is more than 90 days past due.

Default rate The 12-month default rate is the number of new defaulters over a 12-month reference period as a proportion of the total number of entities existing in that period. The default rate can also be defined analogously in terms of volume based on the obligations assumed by debtors.

Eligible collateral An asset accepted to ensure fulfilment of an obligation to the central bank.

Equalisation provision

The equalisation provision is set aside for individual areas of non-life insurance and is intended to equalise increased insurance claim costs arising due to fluctuations in loss ratios as a result of facts independent of the will of the insurance company.

Herfindahl index (HI)

The sum of the squares of the market shares of all entities operating on a given market. It expresses the level of concentration in the market. It takes values between 0 and 10,000. The lower the HI, the less concentrated the market.

Household insolvency

A situation where a household is unable to cover its current expenditures by its current income and the sale of its asset holdings. Insolvency is defined in legal terms in Act No. 182/2006 Coll., on Insolvency and Methods of Resolution Thereof.

Institutional investor

Either (a) a bank executing trades in investment instruments on its own account on the capital market, an investment company, an investment fund, a pension fund or an insurance company, or (b) a foreign entity authorised to carry on business in the same fields in the Czech Republic as the entities listed under (a).

Interest rate spread

Also interest rate differential; the spread between the interest rate on a contract (deposit, security) and a reference interest rate.

Interest rate transmission channel

One of the channels of the monetary policy transmission mechanism. It acts such that, for example, an increase/decrease in monetary policy interest rates leads first to an increase/decrease in interest rates on the interbank market. Consequently, there is an increase/decrease in the interest rates announced by banks for the provision of loans and the acceptance of deposits. The result is a downturn/upturn in investment activity as a part of aggregate demand and ultimately a decrease/increase in inflation pressures.

Jump-to-default risk

The risk of sudden default that arises before the market can reflect that risk in prices.

Liquidity Money in the broader sense (cash, short-term assets quickly exchangeable for cash, etc.).

Loan-to-value (LTV) ratio
The ratio of a loan to the value of pledged property.

Loss given default (LGD)
The ratio of the loss on an exposure in the event of counterparty default to the amount owed at the time of default (see also *Default*).

Market liquidity The ability of market participants to carry out financial transactions in assets of a given volume without causing a pronounced change in their prices.

Monte Carlo simulation
A numerical technique based on repeated random sampling. It employs a large number of simulations of a particular random variable to determine its approximate distribution and thus also the most likely value it can take.

Natural population increase
The difference between the number of live births and the number of deaths in the same period of time in a given area. See also *Total population increase*.

Non-performing loans
Substandard, doubtful and loss loans. Also called loans in default or default loans.

Overnight segment
The money market on which overnight funds are traded.

Price-to-income The ratio of the price of an apartment (68 m^2) to the sum of the annual wage in a given region over the last four quarters.

Price-to-rent The ratio of the price of an apartment to the annual rent. The price-to-rent ratio is the inverse of the rental return.

Property developers/developments
Companies/projects whose aim is to build a complex of residential and commercial property. Property developers' work includes choosing an appropriate site, setting up a project, obtaining the necessary permits, building the necessary infrastructure, constructing the buildings and selling the property. Developers also often organise purchase financing for clients and frequently lease or manage the property once it is built (especially in the case of commercial property). Given the combination of construction activity and speculative property purchases, developers' results are strongly dependent on movements in property prices.

Property supply prices
Property sale supply prices in estate agencies. Supply prices should be higher than transfer prices. Property supply prices in the Czech Republic are published, for example, by the CZSO and the Institute for Regional Information (which also publishes data on market rent supply prices). See also *Property transfer prices*.

Property transfer prices (aka "Property realisation prices")
Prices based on Ministry of Finance statistics from property transfer tax returns and published by the CZSO. These prices are the closest to actual market prices in terms of methodology, but are published with a time delay. See also *Property supply prices*.

Quantitative easing
A method for implementing monetary policy in a situation where the central bank is no longer able to lower its monetary policy rate because it has already reduced it almost to zero. Quantitative easing involves the central bank buying assets from commercial banks and thereby creating a sizeable stock of free reserves with those banks. The purpose of this type of policy is to strengthen the balance-sheet and market liquidity of the banking system and minimise the risk of growth in interest rates due to insufficient liquidity. Japan has applied quantitative easing in the past decade, and the US Fed, for example, is to some extent pursuing a similar policy at present.

Rent return The ratio of the annual supply rent to the supply price of the flat. It is the inverse of the price-to-rent indicator.

Risk premium The risk premium an investor demands on investments in riskier financial instruments.

Secondary market The market on which existing securities are traded.

SKD Short-Term Bond System. The system 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. As of 31 December 2009, a total of 155 owner accounts – belonging to 109 clients (securities owners) – were registered in SKD. In all, 18 agents and 5 custodians use the system.

Solvency Solvency in the insurance sector is the ability of an insurer to meet its insurance obligations, i.e. to settle eligible insurance claims arising from insured losses. Solvency II – a new regulatory framework prepared by the European Commission – is a set of rules for European insurance companies and reinsurers laying down quantitative requirements, qualitative requirements, prudential rules, compliance with market discipline and disclosure duties.

Systemic risk The risk of the entire financial system or market collapsing.

Technical provisions
Under the Act on Insurance, an insurer must set aside technical provisions to meet insurance obligations which are either likely to be incurred or certain to be incurred but uncertain as to amount or as to the date on which they will arise.

Tier 1 The highest quality and, for banks in the Czech Republic, also the most significant part of regulatory capital. The dominant components of Tier 1 are equity capital, retained earnings and mandatory reserve funds.

Value at risk The size of loss, with predefined probability, which a bank may suffer when holding a current portfolio for a certain period if market factors (e.g. interest rates, exchange rates) develop unfavourably.

Yield spread Also yield differential; the spread between the yield on a bond and the yield on a reference ("benchmark") bond.

AFAM CR	Association of Funds and Asset Management of the Czech Republic
AKAT	Czech Capital Market Association
APF CR	Association of Pension Funds of the Czech Republic
ATM	automated teller machine
b.p.	basis point
BIS	Bank for International Settlements
CAP	Czech Insurance Association
CAR	capital adequacy ratio
CCR	Central Credit Register
CDS	credit default swap
CEBS	Committee of European Banking Supervisors
CEE	Central and Eastern Europe
CEIOPS	Committee of European Insurance and Occupational Pensions Supervisors
CERTIS	Czech Express Real Time Interbank Gross Settlement System
CESR	Committee of European Securities Regulators
CIFs	Collective Investment Funds
CIS	Commonwealth of Independent States
CLFA	Czech Leasing and Finance Association
CNB	Czech National Bank
CZ	Czech Republic
CZEONIA	Czech OverNight Index Average (reference O/N interest rate on the interbank market)
CZK	Czech koruna
CZSO	Czech Statistical Office
DJStoxx50	Dow Jones EURO STOXX 50, the main European stock index, comprising 50 corporations
EA	euro area
EBIT	Earnings Before Interest and Taxes
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization
EC	European Commission
ECB	European Central Bank
EEA	European Economic Area
EIB	European Investment Bank
EMBI	Emerging Market Bond Index
EMU	European Monetary Union
EONIA	Euro OverNight Index Average (reference O/N interest rate on the interbank market)
ESCB	European System of Central Banks
ESRB	European Systemic Risk Board
EU	European Union
EU-12	euro area as of 2001–2006
EUR	euro
EURIBOR	Euro InterBank Offered Rate (reference interest rate on the interbank market)
FDI	foreign direct investment
Fed	Federal Reserve System
FRA	forward rate agreement
GARCH	Generalised Autoregressive Conditional Heteroscedasticity
GBP	pound sterling
GDI	gross disposable income
GDP	gross domestic product
HI	Herfindahl index
HP	Hodrick-Prescott filter
HUF	Hungarian forint
IBRD	International Bank for Reconstruction and Development
IF	investment firm

IP	investment position
IMF	International Monetary Fund
IPB	Investiční a Poštovní banka, a. s.
IRB	Internal Rating Based Approach, an approach within the Basel II framework for capital adequacy of banks
IRI	Institute for Regional Information
IRS	interest rate swap
JPY	Japanese yen
LFS	Labour Force Survey
LGD	loss given default
LIBOR	London InterBank Offered Rate (reference interest rate on the interbank market)
LTV	loan-to-value
MCR	minimum capital requirement – the minimum required capital for calculation of the solvency of insurance companies and reinsurers
MF CR	Ministry of Finance of the Czech Republic
MFI	monetary financial institution
MiFID	Markets in Financial Instruments Directive
MLSA	Ministry of Labour and Social Affairs
MNB	Magyar Nemzeti Bank (the Hungarian central bank)
MRD	Ministry for Regional Development
NACE	General Industrial Classification of Economic Activities
NPL	non-performing loan
O/N	overnight
OECD	Organisation for Economic Cooperation and Development
OIS	overnight indexed swap
OMF	open-ended mutual fund
OR	operational risk
p.p.	percentage point
PBTDA	Profit Before Taxes, Depreciation and Amortization
PD	probability of default
PLN	Polish zloty
PRIBOR	Prague InterBank Offered Rate (reference interest rate on the interbank market)
PX	Czech stock market index
QA	quick assets
QIS	quantitative impact study
RMBS	residential mortgage-backed securities
RoA	return on assets
RoE	return on equity
RoS	return on sales
S&P500	Standard & Poor's 500, a US stock index comprising 500 corporations
SCR	solvency capital requirement – the minimum solvency requirement for risks undertaken by insurance companies and reinsurers
SEK	Swedish krona
SKD	Short-Term Bond System
SKK	Slovak koruna
SMEs	small and medium-sized enterprises
USD	US dollar
VA	value added
VAT	value added tax

Country abbreviations:

AT	Austria
AU	Australia
BE	Belgium
BG	Bulgaria
BR	Brazil
CA	Canada
CH	Switzerland
CN	China
CY	Cyprus
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
FR	France
GR	Greece
HR	Croatia
HU	Hungary
IE	Ireland
IN	India
IT	Italy
JP	Japan
KO	Korea
LT	Lithuania
LU	Luxembourg
LV	Latvia
ME	Mexico
MT	Malta
NL	Netherlands
NO	Norway
NZ	New Zealand
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia
UK	United Kingdom
US	United States

Financial stability indicators									
	2005	2006	2007	2008	2009	2010			
						Jan.	Feb.	Mar.	Apr.
FINANCIAL SOUNDNESS OF BANKS									
Capital adequacy (%)	11.9	11.4	11.5	12.3	14.1	14.1	14.4	14.3	
Tier 1 capital adequacy (%)	11.3	10.0	10.3	11.7	12.7	12.7	12.9	12.9	
Leverage (leverage ratio, assets as a multiple of equity)	12.4	12.3	13.4	12.0	11.4	11.3	11.2	11.0	
Non-performing loans / total gross client loans (%)	4.1	3.8	2.8	3.3	5.4	5.5	5.6	5.8	
Sectoral breakdown of total loans (%)									
– non-financial corporations	44.6	44.9	41.7	40.9	37.2	37.5	37.2	37.1	
– households	32.2	35.0	37.5	38.9	42.7	43.0	43.1	43.4	
– sole traders	2.8	2.5	2.2	2.1	2.0	2.0	2.0	2.0	
– other (incl. non-residents)	20.4	17.5	18.7	18.1	18.0	17.5	17.7	17.5	
Return on assets (%)	1.4	1.2	1.3	1.2	1.5	1.5	1.3	1.3	
Return on Tier I (%)	25.2	22.5	24.5	21.7	25.9	25.1	22.3	23.0	
Quick assets / total assets (%)	32.8	30.4	24.0	23.1	25.3	25.7	25.9	27.3	
Quick assets / client deposits (%)	50.5	45.5	36.6	35.9	38.0	38.5	38.7	40.5	
Net open position in foreign exchange / capital (%)	0.5	0.2	0.3	0.1	0.4	1.1	0.3	0.8	
Macroeconomic environment									
Real GDP growth (year on year, %)	6.3	6.8	6.0	3.2	-4.1				
Consumer price inflation (end of period, %)	2.2	1.7	5.4	3.6	1.0	0.7	0.6	0.7	1.1
Public finance deficit / GDP (%)	-3.6	-2.6	-0.6	-1.5	-5.9				
Public debt / GDP (%)	29.8	29.6	28.9	29.8	35.4				
Trade balance / GDP (%)	2.0	2.0	3.3	2.8	5.0				
External debt in % of banking sector external assets	95.2	82.2	77.9	75.6	76.4				
Balance of payments current account / GDP (%)	-1.3	-2.6	-3.2	-3.1	-1.0				
Monetary policy 2W repo rate (end of period, %)	2.0	2.5	3.5	2.25	1.0	1.0	1.0	1.0	1.0
Financial markets									
3M PRIBOR (average, %)	2.0	2.3	3.0	4.0	2.0	1.4	1.4	1.3	1.3
1Y PRIBOR (average, %)	2.1	2.7	3.4	4.1	2.5	1.9	1.9	1.8	1.8
10Y government bond yield (average, %)	3.6	3.8	4.3	4.6	4.9	4.3	4.3	4.1	3.7
CZK/EUR exchange rate (average)	29.8	28.3	27.8	25.0	26.4	26.2	26.0	25.5	25.3
Change in the PX stock index (% year on year, end of period)	42.7	7.7	14.2	-52.7	30.2	52.0	77.7	59.6	44.9
Real estate market									
Total change in residential property prices (transfer prices, % year on year)	6.0	10.4	19.4	8.0	-5.9 *				
Change in apartment prices (supply prices according to CZSO, % year on year)	0.2	13.4	23.2	19.6	-8.8			-7.3	
Apartment price / average annual wage	3.9	4.2	5.1	5.4	4.3				
Apartment price / rent (according to IRI)	15.4	17.3	22.9	23.8	22.4				
Non-financial corporations									
Return on equity (%)	9.2	10.2	11.2	9.4	8.8				
Debt (% of total liabilities)	44.7	45.7	47.1	47.3	46.8				
Debt (% of GDP)	40.9	39.3	45.0	46.5	47.8				
– loans from Czech banks (% of GDP)	14.8	19.7	21.1	23.0	21.6				
– loans from Czech non-bank financial intermediaries (% of GDP)	4.7	4.7	4.9	5.2	4.7				
– other (incl. financing from abroad, % of GDP)	22.1	15.0	16.1	18.3	21.5				
Interest expenses (profit/interest paid, %)	10.8	13.5	11.6	10.4	9.0				
12M default rate of households (average, %)	1.5	1.7	2.1	3.5	6.5			6.6	
Households (incl. sole traders except 12M default)									
Debt / gross disposable income (%)	34.0	40.3	48.1	52.1	54.3				
Debt / financial assets (%)	22.5	26.0	31.5	34.6	35.0				
Net financial assets (total financial assets – total liabilities, % of GDP)	…	…	51.9	50.1	56.8				
Debt / GDP (%)	17.3	20.3	24.9	28.1	30.7				
– loans from Czech banks to households (% of GDP)	10.7	15.3	18.9	21.9	24.8				
– loans from Czech non-bank financial corporations to households (% of GDP)	3.1	3.1	3.7	3.8	3.1				
– loans from Czech banks to sole traders (% of GDP)	0.9	1.1	1.1	1.2	1.2				
– loans from Czech non-bank financial corporations to sole traders (% of GDP)	0.4	0.4	0.5	0.4	0.4				
– other (incl. financing from abroad, % of GDP)	2.2	0.3	0.7	1.0	1.0				
Interest expenses / gross disposable income (%)	1.1	1.3	1.4	1.5	1.1				
12M default rate of households (average, %)	…	…	…	3.3	4.8			5.4	

* estimate for 2009 H1; only for family houses and apartments (around 74.4% of index)

Financial stability indicators									
	2005	2006	2007	2008	2009	2010			
						Jan.	Feb.	Mar.	Apr.
Financial sector									
Assets / GDP (%)	133.5	133.0	142.1	145.5	150.9				
Bank assets / GDP (%)	98.9	97.5	105.4	109.2	112.9				
Banking sector									
Share in financial sector assets (%)	74.1	73.3	74.2	75.0	77.2				
Client loans / bank assets (%)	39.5	45.2	48.4	50.8	50.3	49.8	50.0	49.6	
Client loans / client deposits (%)	60.8	67.7	73.8	79.1	75.5	74.7	74.6	73.7	
Growth in loans (%, end of period, year on year):									
total	16.7	19.9	26.4	16.4	1.3	0.1	0.1	0.4	
non-financial corporations	14.3	20.8	17.2	14.1	-7.8	-7.7	-7.7	-7.1	
– property loans	34.2	39.5	41.1	25.5	-5.9	0.7	0.0	1.3	
households	34.0	30.4	35.1	20.9	11.1	10.6	10.2	9.5	
– loans for house purchase	34.1	32.5	37.6	20.1	11.5	10.9	10.5	9.8	
– consumer loans	36.8	26.5	26.1	22.8	9.8	9.1	8.5	7.4	
sole traders	16.9	7.7	8.7	10.4	-1.4	-0.9	-1.1	-1.5	
Non-performing loans / total loans (%):									
non-financial corporations	5.1	4.4	3.1	4.2	7.8	8.0	8.1	8.3	
households	3.2	2.9	2.7	2.7	3.8	4.0	4.1	4.2	
– loans for house purchase	1.6	1.6	1.5	1.6	2.5	2.7	2.8	2.8	
– consumer loans	7.8	7.3	6.6	6.7	8.3	8.7	9.2	9.4	
sole traders	10.7	9.2	7.2	8.2	10.8	10.9	10.7	11.1	
Coverage of non-performing loans by provisions (%)	64.5	61.3	70.2	67.4	56.8	57.1	57.1	55.6	
Aggregate LTV for mortgage loans	42.6	41.2	45.9	46.3	56.6				
Banking sector external debt in % of banking sector liabilities	9.1	8.7	10.2	11.9	10.0				
Non-bank financial corporations									
Share in financial sector assets (%)	25.9	26.7	25.8	25.0	22.8				
Premiums written / GDP (%)	3.9	3.8	3.8	3.8	4.2				
Solvency of insurance companies: life insurance (%)	325	301	276	233	…				
Solvency of insurance companies: non-life insurance (%)	339	327	337	407	…				
Change in financial investment of insurance companies (%)	8.9	9.3	6.1	6.3	5.9				
Return on equity of insurance companies (%)	13.5	24.6	21.7	14.1	20.4				
Claim settlement costs / net technical provisions (life, %)	12.1	10.3	12.8	14.8	14.8				
Claim settlement costs / net technical provisions (non-life, %)	69.4	71.7	61.4	59.7	60.5				
Change in assets managed by pension funds (%)	20.9	18.2	14.6	14.7	8.4				
Return on equity of pension funds (%)	…	121.8	112.2	21.9	25.1				
Growth in loans from non-bank financial corporations engaged in lending (%):									
total	…	7.3	20.8	8.4	-15.8				
households	…	9.3	29.8	3.5	-18.0				
non-financial corporations	…	5.8	14.7	12.8	-13.8				
Composite indicators**									
Banking stability index (end of period)	0.65	0.36	0.17	0.17	0.16			0.29	
Creditworthiness index for non-financial corporations (end of year)	0.971	0.973	0.972	0.972	0.971				
Market liquidity index (average for period)	0.2	0.3	0.1	-0.4	-0.8	-0.5	-0.4	-0.3	-0.3

** see FSR 2007, FSR 2008/2009 and the main text of this report for the methodology and interpretation of the composite indicators

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