FINANCIAL STABILITY REPORT

2006

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 vulnerable 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's aim with regard to financial stability is above all to contribute to the achievement of a degree of financial sector resilience that significantly reduces the risk of financial instability. The key preconditions for the fulfilment of this aim are price stability and sound development of financial institutions, which are achieved using monetary policy and financial sector supervision instruments. Co-operation with other national, foreign and international authorities and institutions is also very important in the area of financial stability. 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.

Communication with the public also involves submitting the Financial Stability Report to the Chamber of Deputies (the lower house) of the Parliament of the Czech Republic pursuant to Act No. 6/1993 Coll., on the Czech National Bank, as amended:

Article 3a

The Czech National Bank shall submit a financial stability report to the Chamber of Deputies for information at least once a year.

LIST OF BOXES

Developments in the world economy were very favourable; the euro area's results were surprisingly positive, but the cooling of the US economy is considered a risk

Developments in the world economy were favourable from the point of view of financial stability in 2006. Global economic growth strengthened further, with the higher-than-expected growth in the euro area being particularly important for the Czech economy. Commodity prices rose against a backdrop of robust economic activity, and oil prices remained a risk factor. The US economy is expected to cool somewhat during 2007, which could lead to a change in sentiment on the financial markets, which have been very sensitive to bad news recently.

Global imbalances remain sizeable…

Global imbalances, characterised by the US external deficit and the surpluses of Asian countries, were sizeable again in 2006. The risk of a further substantial depreciation of the dollar persists and could lead to fluctuations on the financial markets. Trade surpluses due to relatively weak exchange rates continued to be supported in 2006 by Asian economies through large intervention purchases mainly of dollar assets into their foreign exchange reserves.

…and the global savings surplus is reflected in low long-term interest rates and a "search for yield"

Another important factor is the global savings surplus, which is helping to keep long-term interest rates on major currencies at lower levels. This is fostering a continuing "search for yield", with persisting high investor demand for riskier assets from emerging economies. Therefore, further pressure for excessive appreciation of the koruna cannot be ruled out. This is a risk factor from the point of view of domestic economic activity and the external balance. Excessive appreciation of the koruna could also lead to worse corporate results, which could in turn be reflected in an increased default rate with a negative impact on the financial system.

Domestic macroeconomic developments have been very favourable and the current forecast does not suggest risks

The domestic macroeconomic environment also developed very favourably in 2006. Real GDP growth, which reached 6.1% in 2006, was positively affected above all by stronger investment activity and household consumption, while the contribution of net external demand declined year on year. The CNB's April 2007 macroeconomic forecast expects a slight slowdown in economic growth accompanied by a moderate increase in inflation pressures over the next two years. Despite the strong economic activity, the public finance deficit remains around 3% of GDP. However, financial market indicators suggest that investors do not regard these figures as very negative in the context of developments in other Central European countries.

The position of manufacturing is strong, while concentration in industries is low

The inflow of foreign direct investment in recent years has influenced the structure of the Czech economy, resulting in a high degree of foreign ownership of corporations. Many industries are dominated by large companies, usually foreign-owned, which export a large share of their production. The structure of the Czech economy is characterised by a strong role of manufacturing, which may increase the economy's dependence on global demand for certain manufactured articles. An international comparison dispels these concerns somewhat. Although the share of manufacturing in GDP in the Czech Republic is the highest among all the EU countries, the degree of concentration in the individual branches is the lowest. The strong position of large corporations is no exception either. A thematic article analysing the influence of foreign direct investment on the Czech economy also reveals only relatively weak risks.

Large, medium-sized and small enterprises recorded good results and their default rate is low

Non-financial corporations recorded very good results in 2006. Large corporations were particularly successful. Data on small and medium-sized enterprises also indicate positive trends, especially as regards value added per employee. Compared to the EU-12, corporate indebtedness is still low and does not pose a risk to financial stability. Loans to small enterprises have seen a significant recovery. Along with loans to households, this segment generates the highest yields for banks. Overall, the favourable evolution of the corporate sector is leading to low default rates. The predominance of loans with floating rates or interest rate fixations of up to one year is a risk factor in lending to corporations. This method of setting interest

rates enables banks to react flexibly to market developments. However, the interest payments of corporations on longer-term loans can increase considerably in times of interest rate growth, which may result in more defaults.

The favourable development of the domestic economy creates a risk of excessively optimistic expectations

The Czech economy is currently facing a risk of excessively optimistic expectations regarding its future development. These are based on the relatively high GDP growth rates seen in recent years and expectations of similar results in the coming years. High GDP growth rates, however, are not a sufficiently accurate indicator of growth in income. Other factors include excessively easy fiscal policy and improved access to loans amid low nominal interest rates. Optimism is also being fuelled by growth in asset prices. In the years ahead, this combination of factors could generate excessively high wage demands and excessive household consumption growth accompanied by faster debt growth.

Loans to households rose by almost one-third, with banks competing for more market share in this segment

Buoyant growth in loans to households continued into 2006. The annual growth rate exceeded 30%. This represented a slight slowdown in year-on-year terms, but the overall annual increase was 20% higher than in 2005. In 2006, banks attempted to increase their shares in the household loans market not only by providing new loans, but also by assuming existing loans granted by other banks. In loan consolidation, clients are usually offered lower interest rates or the opportunity to increase the consolidated loan to an amount exceeding the sum of the existing loans.

So far, growth in household debt cannot be regarded as a threat to financial stability…

The growth in household debt poses no significant risk to the financial sector, and Czech households as a whole cannot be regarded as overleveraged. Loans to households amounted to almost 20% of GDP at the end of 2006, while the EU-15 average is above 60%. Despite the buoyant growth in bank loans to households, the aggregate income of households from the interest they receive still exceeds the interest they pay. Given a symmetrical impact on interest received and paid, a rise in interest rates would have a positive effect on the net interest income of households as a whole. However, it would have an adverse effect on those households with deficit financing and subsequently on the overall financial sector via a higher default rate of households.

…but the number of households that are having problems repaying their loans is rising

One of the manifestations of the rise in debt is a rising number of households unable to repay their loans. This applies in particular to low-income households or households with only one breadwinner. This is evidenced, for example, by an ever-increasing number of executions ordered. However, statistics on executions show that the number of executions is stabilising following a rapid rise in 2005. The rise in the growth rate of executions completed in 2006 implies some acceleration of execution proceedings. The new insolvency act also addresses situations where a debtor who is unable to meet his obligations has more than one creditor. Such debtors will be able to declare personal bankruptcy.

World financial markets experienced several minor shocks, but the impact on Czech markets was limited

Several episodes in 2006 and early 2007 tested the level of risk aversion of major players on world financial markets. These episodes were started by seemingly marginal events. In all cases, the volatility of financial markets increased only temporarily and asset prices soon returned to their original levels. The episodes also affected yields on Central European financial markets, in particular stock and bond markets and exchange rates. However, the impact on the Czech financial markets was fairly limited. The currencies of Poland and Hungary mostly depreciated during these episodes, but the Czech koruna held steady. This could indicate a stronger tendency among investors to differentiate between individual countries of the region according to their economic fundamentals. In 2006, the impact of the corrections on the Czech financial markets was also dampened by a negative interest rate differential of the Czech koruna against the euro and the dollar, which is reducing flows of "hot money".

Yields on long-term bonds are anchored at low levels and a flatter yield curve would increase interest rate risk

Yields on ten-year Czech bonds move in line with euro yields. Their spread against euro bonds was negative in the first half of 2006 and in early 2007. The synchronisation of Czech and euro long-term bond yields suggests strong integration of the Czech and euro bond markets and may reflect the market-expected adoption of the euro as well as high credibility of the Czech National Bank. On the other hand, the market-expected rise in short-term interest rates coupled with flat long-term rates could lead to a flatter Czech yield curve. Since the banking sector typically transforms short-term liabilities into long-term assets, a flat or inverted yield curve may squeeze profitability and increase interest rate risk.

Property price growth rebounded in some regions, but it is not always necessarily entirely related to fundamentals…

After remaining flat in 2003–2005, property prices rebounded in 2006. In particular, supply prices of flats in Prague were up by almost 25% year on year at the end of 2006. A comparison of flat prices and income indicates a possibility of an emerging bubble on the property market. At the end of 2006, the ratio of flat prices in Prague to annual wages was approaching the level recorded at the end of 2003, when speculation on flat price growth connected with the Czech Republic's accession to the EU peaked. A comparison of flat prices and income in Prague and German and Austrian cities reveals that part of the price increase is not necessarily related to fundamentals. A comparison of income from the rent return with returns on other assets also shows that real estate prices are relatively high.

…and loans to developers can be relatively risky

The combination of a rising number of flats under construction, a lengthening of the time it takes to sell apartments and a growing level of debt financing of construction also entails certain risks. Loans to companies operating in the real estate business have been growing rapidly for four years, their volume having trebled since the end of 2002. Their growth rate was 35–40% throughout 2006. In the event of a fall in the prices of flats built by developers, the repayment of some loans could be problematic.

The financial architecture ran faultlessly and the new generation of CERTIS went live

The major financial infrastructure systems continue to run faultlessly. The SKD short-term bond settlement system recorded no system-relevant failures in 2006. As its operator, the CNB regularly tests the business continuity plan with the involvement of SKD participants. The CERTIS interbank payment system also ran smoothly in 2006. The new generation of CERTIS was successfully put into routine operation in November. It has a higher capacity, thus reducing the risk of system overload. The new generation also has lower running costs, which made it possible to reduce prices for its users.

The depth of financial intermediation remained stable

Financial intermediation in the Czech Republic, as measured by the volume of assets of financial institutions, grew by 7% year on year in 2006. Owing to similar nominal GDP growth, the depth of financial intermediation (as measured by the ratio of financial sector assets to GDP) was virtually unchanged and continued to fluctuate around 130%. The ratio of the assets of the whole financial sector to GDP is roughly one-third of the figure for the euro area, as is the case with bank assets. Total financial investment of insurance companies is roughly one-fifth of GDP.

The Czech financial sector is dominated by foreign owners

The concentration of the banking sector and the market shares of large banks are comparable with the EU average. Foreign ownership plays an important role in the Czech financial sector. At the end of 2006, foreign capital controlled 97% of the total assets of the banking sector and 75% of the total assets of the insurance sector. The shares of foreign owners in non-bank investment firms and pension funds are lower. Although the positive effects of the Czech financial sector's international links have so far predominated, a negative impact of some of the risks arising from such close links cannot be ruled out in the future.

The share of households in bank loans is converging towards that of non-financial corporations

The overall assessment of the banking sector showed no major changes with regard to financial stability in 2006. Non-financial corporations are still banks' most important clients, although loans to the household sector have been rising strongly

in recent years. Loans to corporations accounted for around 80% of the total bank credit portfolio at the end of the 1990s, but their share is less than 45% today. By contrast, the share of households has gradually risen to 40% today.

Bank loans rose by almost one-fifth

The favourable economic environment supported demand for loans in 2006. The annual growth rate of client loans picked up to almost 20% at the end of 2006, the highest figure since the pre-crisis year 1996. Overall, the growth in lending is associated with the buoyant economic activity and rising household demand for financing for owner-occupied housing. Households accounted for almost 50% of the total annual increase in bank lending.

The share of non-performing loans fell again, but this indicator slightly overestimates the quality of loans

The share of non-performing loans in total loans was 3.6% at the end of 2006, down by 0.5 percentage point year on year. Loan quality expressed as the percentage of non-performing loans is not the best indicator at a time of fast credit growth. The alternative flow indicator – the default rate – suggests that the share of non-performing loans overestimates the quality of loans owing to the buoyant growth in lending. The effect of macroeconomic developments on the credit, interest rate and currency risks of banks was tested as part of the stress testing exercise. The extension of these tests is described in one of the thematic articles, which confirms the resilience of banks to adverse macroeconomic shocks at the end of 2006. The thematic article on the calculation of financial soundness indicators arrives at similar conclusions.

Mortgage loans granted by banks are adequately secured

The share of the rapidly rising loans for house purchase in non-performing loans was 1.6% at the end of 2006, which is comparable with the end of the previous year. Roughly 64% are loans fully secured by property. At the end of 2006, banks granted mortgage loans with an LTV (loan-to-value) ratio of almost 53%, down by 2 percentage points from a year earlier. On average, mortgage loans are thus well secured from the banks' point of view.

Banks' capital adequacy ratio fell slightly despite the high net profit

The Czech banking sector generated a net profit of almost CZK 38 billion in 2006, down by roughly 3% compared to a year earlier. Dividends exceeded CZK 27 billion in 2006, the highest figure ever recorded. The capital adequacy ratio fell slightly to below 11.5% in 2006, mainly because of the slightly lower net profit, the high volume of dividends paid and growth in capital requirements due to the rising lending. However, all the individual banks exceeded the 8% regulatory minimum. The decline in capital adequacy signals a fall in the level of risk coverage by disposable capital, although it may also signify more efficient capital utilisation.

Insurance companies showed high profitability despite slowing growth in premiums written

Growth in premiums written has slowed in recent years and the ratios of financial investment from life and non-life insurance to GDP have remained relatively low compared to advanced EU countries. Insurance companies were compliant with the solvency criteria, i.e. their internal funds were greater than or equal to the required solvency margin. The aggregate available solvency margin under the insurance market supervision methodology was 3.4 times the required solvency margin on the life insurance market and 3.8 times that on the non-life insurance market. Insurance company stability was fostered by high return on equity, which exceeded 25% in 2006. Return on assets was 4.5%.

The groundwork has been laid for continued financial stability in the years to come… but the favourable phase of the business cycle is not a permanent phenomenon

Overall, 2006 can be regarded as a very successful year from the point of view of financial stability. The current trends in the financial sector and the economy as a whole also lay the groundwork for continued financial stability in the years to come. Some risk is associated with the emergence of excessively optimistic expectations regarding the long-term development of the economy, based on perceptions of the current favourable phase of the business cycle. When borrowing and investing, economic agents should bear in mind that the dynamics of the economy also entail less favourable phases of the business cycle.

PART I

1 INTRODUCTION

The Czech National Bank is pleased to present to the public its Financial Stability Report for 2006. In so doing it is fulfilling its new task stipulated by the Act on the CNB as from last year – to analyse 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 structure of the Report is broadly similar to that of the previous reports for 2004 and 2005, but its main part contains one less section. The introduction is followed by a section called *The real economy.* Its structure is based on the assumption that the financial sector operates in an environment shaped by external and domestic macroeconomic developments. These affect the situation of domestic corporations and households, who are the main debtors and creditors of financial institutions and represent the primary source of credit risk for them. The next section, entitled *Asset markets and the financial infrastructure,* contains an analysis of the financial markets and deals with an increasingly important segment of the asset market - the property market. It also looks at trends in the financial infrastructure area, where the CNB is actively involved. The last section, *The financial sector,* focuses on banks and non-bank financial institutions themselves. Attention is paid to the financial sector's structure, the profitability and efficiency of its institutions, the quality of the loan portfolio and compliance with prudential criteria. All these factors affect the ability of financial institutions to cope with potential shocks and threats.

Like last year, the Report includes four thematic articles relating to financial stability issues. The first article again deals with stress testing of the banking sector. In addition to updating the stress tests conducted in the previous reports, the stress testing system has been extended to include a credit growth forecasting model and a credit risk model. The tests now also deal with the portfolios of non-financial corporations and households in addition to the aggregate loan portfolio. The second article sets out to describe and discuss the methodology of selected financial soundness and financial stability indicators, including the attempts to construct an aggregate financial stability indicator. The third article discusses two FDI-related phenomena that may directly or indirectly affect financial stability, namely the sources of finance in companies founded by FDI and the life cycle of FDI. The last article is concerned with the capital market. It examines the market's efficiency by analysing the responses of prices on the Czech organised markets to the announcement of specific tender offers for minority shareholders' shares. The Report ends with a list of all the abbreviations used and a glossary of selected terms.

The Report analyses the evolution of relevant indicators in 2006. Where 2006 data were not available, data for the previous period were used. Data for the first months of 2007 were also used where available.

This Financial Stability Report was approved by the Bank Board of the Czech National Bank on 17 May 2007. It is available in electronic form at http://www.cnb.cz/.

2 THE REAL ECONOMY

2.1 THE MACROECONOMIC ENVIRONMENT

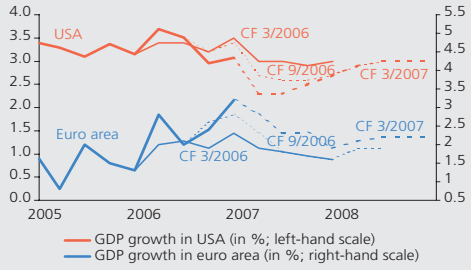
External and domestic macroeconomic developments were favourable in 2006. The strong economic activity was limited neither by further monetary policy tightenings in the USA and the euro area nor by growth in commodity prices. A faster-than-expected slowdown of the US economy, which could adversely affect economic activity in the euro area as well as the current positive market sentiment towards emerging economies, including the Czech Republic, remains a global risk for the period ahead. The Czech Republic is currently facing a risk of excessively optimistic expectations regarding its future development, driven by the high GDP growth rates, which, however, may not present a faithful picture of the improvement in household income. The Czech Republic's financial links and economic integration with the global economy are already approaching the levels common in Europe. The role of large companies in the structure of the economy and the specialisation in manufacturing do not give rise to any significant risks for future economic developments or financial stability.

Global economic growth accelerated further in 2006, but commodity prices rose as well.[1] The higher-than-expected growth in the euro area was particularly important for the Czech economy (see Chart II.1). World prices of oil continued to rise in 2006 H1 against the backdrop of the rapid growth of the world economy. With some fluctuations, the oil price growth slowed as 2006 progressed, helping to contain inflation pressures. The reputation of oil as a highly volatile commodity was confirmed in the first month of 2007, when its world prices started to increase sharply again. Oil prices therefore remain a significant risk factor. Growth in prices of other commodities, especially metals, picked up pace in 2006 (see Chart II.2). This was due mainly to increased demand from fast-growing countries, including a number of emerging economies. A role was also played by speculative demand from hedge funds and other investors. The higher prices of metals and other commodities are increasing the costs of the real sector, exerting downward pressure on its currently high profitability. On the other hand, these developments are beneficial to the metal-mining and metal-processing sectors, which still account for a large share of Czech industry (see section 2.2).

Global imbalances remained sizeable in 2006. The US current account deficit rose only slightly, to 6.5% of GDP (compared to 6.4% in 2005). This deficit was "financed" chiefly by Asian economies and oil-exporting countries, which recorded significant current account surpluses. The structure of financing of the US deficit changed somewhat in 2006, with the share of riskier corporate bonds rising and that of government bonds falling.[2] The risk of further significant depreciation of the dollar persists, but concerns regarding a potential reallocation of foreign exchange reserves from the dollar to other currencies did not materialise.

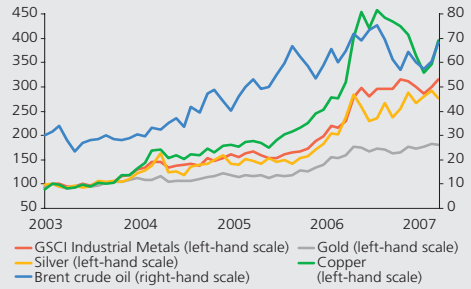
Another important factor is the persisting global savings surplus,[3] which is helping to keep long-term interest rates on major currencies at lower levels, thereby contributing to the global excess liquidity. The savings surplus – especially in Asian economies – and the investment of that surplus abroad was due not only to structural factors such as the absence of a stable financial sector, the practical non-existence of social policy and demographic developments, but also to cyclical factors relating to low yields on the domestic markets (e.g. in Japan).

CHART II.1
Expected and actual economic growth in the USA and the euro area
(quarterly data; year-on-year growth; outturns versus expectations of Consensus Forecast, CF)



Source: Eurostat, US Bureau of Economic Statistics, Consensus Forecast

CHART II.2
Selected commodity prices
(indices; 31 January 2003 = 100; oil price in USD)



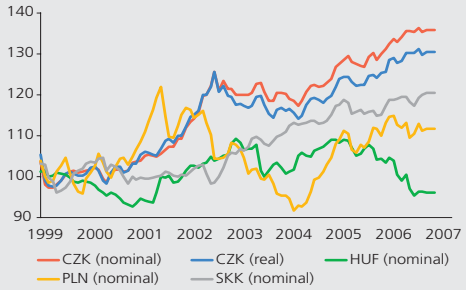
Source: Bloomberg

1 In its World Economic Outlook (April 2007), the IMF stated that the output of the world economy increased by 5.3% in 2006, the joint-highest figure in a decade together with 2004. Slightly lower growth of 4.9% is expected for the next two years.

2 See the ECB Financial Stability Review, June 2007.

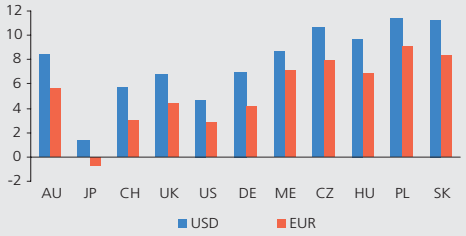
3 The terms "global savings surplus", "global excess liquidity" and "search for yield" are explained in detail in the glossary.

CHART II.3
Real and nominal effective exchange rates
(indices; 1999 = 100, weights = shares in foreign trade of 41 partners; real exchange rate using CPI)



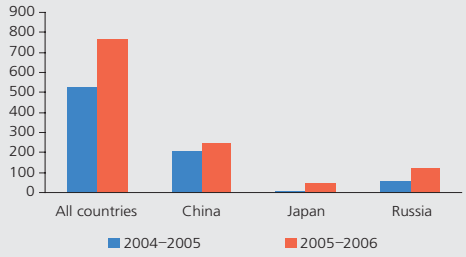
Source: Eurostat

CHART II.4
Nominal returns on currencies for foreign investors
(%; 2000–2006 average)



Source: Eurostat, CNB calculation
Note: Approximation of foreign investor's return on government bonds in the relevant currency. The average return is obtained as the sum of the average interest rate on government bonds and the average annual appreciation of the domestic currency's nominal exchange rate against the euro or dollar.

CHART II.5
Growth in global foreign exchange reserves
(change in reserves in USD billions)



Source: Bloomberg

Overall, the savings surplus and the excess liquidity on the financial markets fostered low long-term yields and thus a continuing "search for yield" by investors (see section 3.1). This factor is contributing to the appreciation pressures on the currencies of some emerging economies with floating exchange rates (see Chart II.3). These countries include the Czech Republic, whose currency has offered relatively high returns to foreign investors in recent years (see Chart II.4). Expectations of a monetary policy interest rate cut in the USA and a halt in the growth of monetary policy rates in the euro area emerged at the beginning of 2007 (see section 3.1). This could result in further pressure for excessive appreciation of the koruna, which is a risk factor from the point of view of domestic economic activity and the external balance. The available evidence suggests good resilience of the Czech economy and its export performance to a moderate appreciation of the koruna, but some adverse effects cannot be ruled out in the event of a sharper appreciation.

The increases in US monetary policy rates from 4.25% at the end of 2005 to 5.25% by June 2006 did not lead to any significant slowdown in GDP growth. However, the US economy is expected to cool somewhat during 2007 in the context of increasing negative signals from the mortgage and real estate markets (see Chart II.1). If the cooling were unexpectedly strong, it could result not only in a slowdown in the current economic recovery in the euro area, but also in a change in market sentiment on the financial markets, which currently seem very sensitive to bad news (see section 3.1). In such case, the impact on the euro area economy, which is the Czech Republic's largest trading partner, would be particularly relevant to the domestic macroeconomic environment.

Despite the increases in ECB policy rates (from 2.25% in December 2005 to 3.75% in March 2007), the euro area experienced a welcome recovery. Despite the above-mentioned risk, the markets expect GDP growth to rise slightly further in the years ahead. This is in line with an expected shift of global economic output from the USA to Europe and Asia. This shift, which decreases the risk of excessive dependence of global growth on the US economy, may foster a gradual decrease in global imbalances.

Asian countries continued to successfully support trade surpluses by maintaining relatively weak exchange rates of their currencies against the dollar. In 2006 this strategy was again implemented through intervention purchases mainly of dollar assets into their foreign exchange reserves. Total foreign exchange reserves (excluding gold) were more than USD 4,800 billion at the end of 2006. With Japanese reserves flat at around USD 875 billion, China became the largest reserves holder, breaking through the USD 1,000 billion barrier. Overall, the rate of growth of foreign exchange reserves increased further in 2006 (see Chart II.5).

The intervention purchases of the dollar into the foreign exchange reserves of Asian countries are pushing down the yields on US bonds (see section 3.1). This is reducing the effectiveness of Fed monetary policy.[4] One of the negative effects of the long-running period of low interest rates may be a widening of the intertemporal imbalances in the US economy due to a shift in demand from the future to the present. In certain circumstances, especially a significant decrease in asset prices, these imbalances could result in a sharp fall in consumption. A decline in the value of collateral would be an equally large problem and would affect

4 Empirical studies attempting to quantify this effect have arrived at very different conclusions, ranging from practically zero to 2 percentage points. The authors of these studies face considerable constraints as regards the availability of data on Asian investment. Earlier estimates of the effect of Japanese intervention purchases of the dollar, which worked with higher quality data, indicated an effect of up to 65 basis points for three-year bonds when interventions were at their strongest. For details, see ECB (2006): The Accumulation of Foreign Exchange Reserves. Occasional Paper No. 43, February 2006.

the corporate sector as well. Owing to the easy monetary policy in the past and to large household debt, it would not be easy to face off a looming recession with monetary policy instruments.[5] The adjustment would require further depreciation of the dollar, which could be reflected in volatility on the financial markets. Risks connected with a potential drop in asset prices and high corporate and household debt are also present in some EU economies.

The risks to the Czech Republic stemming from economic developments in Central Europe depend partly on the willingness of financial market investors to differentiate between individual countries according to economic fundamentals.[6] The macroeconomic developments in the other countries of this region were to a large extent heterogeneous in 2006 (see Table II.1). The macroeconomic situation in Slovakia and Poland was favourable, with both countries maintaining their relatively high rates of economic growth amid low inflation and stabilised or improving fiscal and external positions. By contrast, the macroeconomic situation in Hungary saw a deterioration, which is expected to deepen further in the near future. The differences between the individual countries are also reflected in their ratings.

The domestic macroeconomic environment can be regarded as very favourable (see Chart II.6). Economic growth, which reached 6.1% in 2006, was positively affected above all by stronger domestic demand (increased investment activity and household consumption), while the contribution of net external demand was much lower in 2006 than a year earlier. Inflation rose to around 3% during the year, but fell back at the close of the year.

The CNB's April 2007 macroeconomic forecast expects a slight slowdown in real GDP growth to 5.7% in 2007 and 5.3% in 2008. As regards the components of economic growth, household consumption, external demand, investment demand and related increases in export performance will play an important role in both years. The real monetary conditions will be slightly easy over the entire forecast period.

Fiscal policy in the Czech Republic could have been a negative signal for foreign investors and rating agencies in 2006. It improved in comparison with 2005, as the public deficit under ESA95 methodology was 2.9% of GDP in 2006 (down from 3.5% of GDP in 2005) and public debt remained unchanged at 30.4% of GDP. However, the relatively high deficit in a situation of robust economic growth may signal a need for reform, with an uncertain impact on economic activity. Financial market indicators suggest that investors do not regard these figures as very negative in the context of developments in other Central European countries. Czech government bonds denominated in euro therefore maintain low spreads against similar euro area bonds compared to other Central European economies (see Chart II.7). The low spreads are also aided by the Czech Republic's public debt, which is low by Central European standards.

TABLE II.1

Macroeconomic indicators for Central European countries

(estimates for 2007 and 2008)

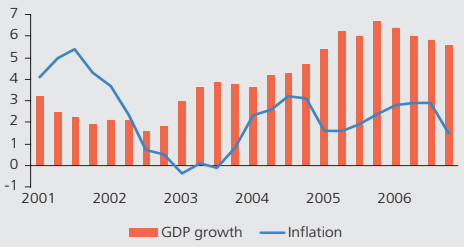
		2005	2006	2007	2008
Hungary	GDP growth (%)	4.2	3.9	2.4	3.0
	Inflation (%)	3.5	3.9	6.9	3.7
	Fiscal deficit/GDP (%)	-6.5	-9.8	-6.8	-4.7
	Current account deficit/GDP (%)	-7.4	-6.0	-5.0	-4.6
Poland	GDP growth (%)	3.5	5.8	5.7	5.2
	Inflation (%)	2.1	1.0	2.1	2.5
	Fiscal deficit/GDP (%)	-2.9	-2.4	-2.9	-2.8
	Current account deficit/GDP (%)	-1.8	-2.3	-3.0	-3.5
Slovakia	GDP growth (%)	6.0	8.3	8.6	6.7
	Inflation (%)	2.7	4.5	2.8	2.6
	Fiscal deficit/GDP (%)	-3.1	-3.7	-2.9	-2.4
	Current account deficit/GDP (%)	-8.6	-6.3	-4.7	-3.1

Source: Eastern Europe Consensus Forecast March 2007, European Commission
Note: Data for SK fiscal deficit taken from Convergence Programme November 2006.

CHART II.6

GDP growth and inflation in the Czech Republic

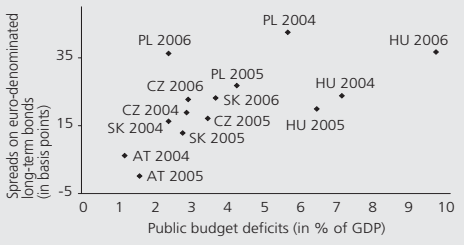
(quarterly data; year-on-year changes in %)



Source: CZSO

CHART II.7

Public budget deficits versus financial markets



Source: Eurostat, JP Morgan, Bloomberg, Consensus Forecast

5 A non-technical article by BIS Chief Economist William White received much attention from the financial community in 2006 (see White, W.: Is Price Stability Enough? BIS Working Paper No. 205, April 2006). It explains how financial imbalances and asset market bubbles can build up at times of low inflation, translating into macroeconomic instability in the longer term. Therefore, central banks should focus on the longer-term effects of monetary policy and take the effects on financial equilibrium into account when setting monetary policy.

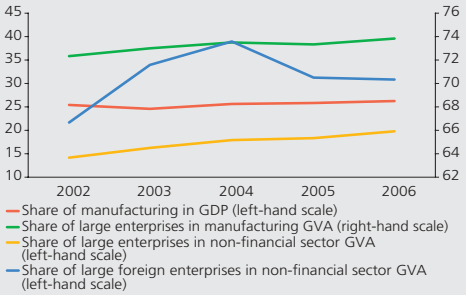
6 Investors do seem to differentiate to some extent between individual countries of the region according to their economic fundamentals, but regional sentiment is still present at times of corrections on the financial markets (see section 3.1).

Table II.2
Balance of payments of the Czech Republic: Selected indicators
(% of GDP)

	2003	2004	2005	2006
Current account balance	-6.2	-6.0	-2.6	-4.2
Balance of trade and balance of services	-2.2	-0.5	2.0	1.8
Balance of income	-4.7	-5.7	-5.2	-5.7
Balance of current transfers	0.6	0.2	0.7	-0.2
Foreign direct investment (FDI) in CZ	2.3	4.6	9.4	4.2
Returns on FDI in CZ	-4.6	-5.6	-5.4	-5.6
- reinvested earnings	-2.4	-2.7	-2.6	-2.6
- dividends	-2.0	-2.6	-2.5	-2.8
Balance of FDI	2.1	3.7	9.4	3.3
Balance of portfolio investment	-1.4	2.1	-2.7	-0.8
Balance of other investment	5.3	0.9	-1.4	1.3

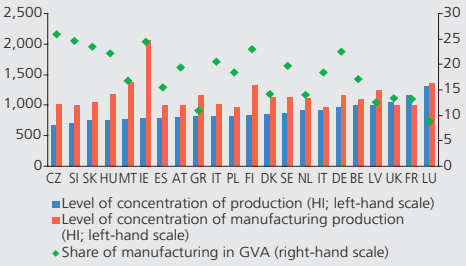
Source: CNB, CZSO

Chart II.8
Significance of large and foreign enterprises in the Czech economy
(%; GVA = gross value added; large enterprises = enterprises with 100 or more employees)



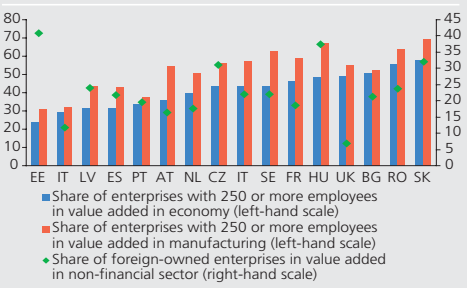
Source: CZSO, CNB calculation

Chart II.9
Significance of manufacturing and concentration of production
(2005; shares in %; GVA = gross value added; HI = Herfindahl Index)



Source: Eurostat, CNB calculation
Note: DE, GR, LT, HU and SE for 2004. Level of concentration calculated using data for 31 branches.

Chart II.10
Role of large and foreign-owned enterprises in the EU
(shares of large enterprises for 2004; shares of foreign enterprises for 2003; %)



Source: Eurostat, CNB calculation
Note: Data on share of foreign enterprises for UK 1999, SE 2000, NL, FR and ES 2001 and IT 2002.

The risks to economic activity and the exchange rate stemming from the external balance remained limited in 2006. The trade and services balance recorded a surplus, albeit a slightly smaller one than a year earlier (see Table II.2). The current account deficit thus widened slightly to 4.2% of GDP, also partly due to a higher income deficit and to a current transfers deficit. The deficit was financed by foreign direct investment inflow and partly also by inflow of other investment, as a net outflow of portfolio investment was recorded as a result of higher growth in investment by residents abroad than by non-residents in the Czech Republic. In 2006, dividends paid abroad were for the first time higher than reinvested earnings, but the return on foreign direct investment in the Czech Republic increased overall. An outflow of capital can in the short term affect the exchange rate, which can behave seasonally and depreciate when dividends are transferred abroad.[7]

The inflow of foreign direct investment in recent years has influenced the structure of the Czech economy, resulting in a high degree of foreign ownership of corporations (see Box 1).[8] Many branches are dominated by large companies, usually foreign-owned, which export a large share of their production. The structure of the Czech economy is characterised by a strong role of manufacturing (and some of its subsectors such as the car industry), which accounts for a significant share of GDP and export performance. This may increase the economy's dependence on global demand for certain manufactured products. The available evidence suggests that the role of large enterprises (those with 100 employees or more) and foreign-owned companies in the Czech economy is tending to strengthen over time. The exception is manufacturing, where the role of large producers is falling moderately due to an increase in the significance of smaller ones (see Chart II.8).

An international comparison reveals that although the share of manufacturing in GDP in the Czech Republic is the highest among all the EU countries, the degree of concentration in the individual branches is the lowest (see Chart II.9). The strong position of large corporations is no exception either. The Czech Republic ranks roughly in the middle of the set of countries for which this data is available (see Chart II.10). The only area where the Czech economy ranks high is the share of foreign-owned companies in the economy's total output.

Box 1: Financial links between the Czech and external economies: evidence from the financial accounts

The continuing trade and financial integration of the Czech economy into the global and European economy is leading to significant interlinkages of the domestic economy with foreign economies through mutual financial links. As regards financial stability, these cross-border financial links increase the local economy's sensitivity to foreign influences and are therefore a potential channel of cross-border contagion.[9]

7 Evidence from the financial account of the balance of payments and the international investment position suggests that the Czech economy is not affected by "hot money", i.e. a large volume of short-term deposits of non-residents in the local currency which can be liquidated quickly in the event of financial turbulence, fostering depreciation of the currency. This is due chiefly to the low koruna interest rates, which motivate market participants to use the Czech koruna as the financing currency in speculative *carry trades* (see section 3.1).

8 Selected effects of FDI on the Czech economy are discussed in the article *Foreign direct investment and the Czech corporate sector: Potential risks to financial stability* in the thematic part of this report.

9 The integration of the domestic economy into the external economy was analysed in the 2005 Financial Stability Report, Box 2 *Consequences of Capital Inflow and the Risk of Cross-Border Contagion,* pp. 24–25, using data on the receivables of banks operating internationally. See also Geršl, A. (2007): Foreign Banks, Foreign Lending and Cross-Border Contagion: Evidence from BIS Data. Finance a úvěr – Czech Journal of Economics and Finance 1–2/2007, pp. 27–40.

The use of the financial accounts is one way of capturing the degree of financial interlinkages between the local and external economies. The financial accounts describe the structure of financial assets and liabilities of the individual sectors of the economy (households, non-financial corporations, general government, financial institutions) and non-residents vis-à-vis residents. Financial assets do not necessarily equal financial liabilities for an individual sector or all residents as a whole, as regards either stocks or transactions. However, the net financial position of the local economy as a whole (i.e. the difference between the financial assets and liabilities of residents) must equal the countervalue of net financial assets of non-residents vis-à-vis residents, as non-resident institutions are the only remaining counterparty after consolidation of all financial links within the local economy.[10]

In Central European and advanced EU economies, the household sector as a whole is in surplus, having more assets than liabilities (see Table II.1 Box). Household savings are thus used to finance traditional deficit sectors such as non-financial corporations and partly general government. The net financial position of financial institutions is broadly balanced, as they serve as financial intermediaries. The higher level of financial assets and liabilities in advanced economies reflects greater depth of financial intermediation. The individual Central European economies are net debtors, with negative net international financial positions ranging from 30% to 100% of GDP. On average, advanced EU countries (and the euro area as a whole) are also net debtors, although some countries are net creditors (e.g. Germany, France, Belgium and the Netherlands).

It is relevant to ask whether the observed financial links of Central European countries with non-residents are higher than and different from those in other EU countries. Data from the financial accounts indicate that the differences lie in the structure of financing of the domestic economy by non-residents rather than in the degree of relevance of that financing. Total claims of non-residents vis-à-vis residents in Central European countries and advanced EU countries account for 20% to 30% of all liabilities of residents (see Table II.2 Box). However, non-residents play a greater role in the financing of Central European countries through cross-border loans (around 24% of all loans to residents in the Czech Republic compared to 15% in advanced EU countries) and corporate ownership (roughly 40% held by non-residents). As the loans and holdings represent strategic rather than speculative interests of non-residents (by contrast with bond holdings, for example), the higher degree of financing by non-residents is a stabilising factor.

The importance of residents' financial investment abroad is starting to rise (see Table II.3 Box). However, the relevance of this channel of cross-border financial links remains lower for Central European countries than for advanced EU countries. Securities other than shares (i.e. bonds) are an exception. For example, they represent more than 50% of all bonds held by residents, a share similar to that in advanced EU countries.

The Czech economy is currently facing a risk of excessively optimistic expectations regarding its future development. These are based on the relatively high GDP growth rates seen in recent years and expectations of similar results in the coming years. Other factors include excessively easy fiscal policy and improved access to loans amid low nominal interest rates. Optimism is also being fuelled by growth in

10 Holdings of gold and other precious metals by residents are the only exception from this equation, as they are financial assets but represent no entity's liability.

Table II.1 (Box)
Financial positions of individual sectors
(unconsolidated stocks at end of period; % of GDP)

	CZ	HU	PL	E12
Households				
Financial assets	80.0	81.7	57.0	198.4
Liabilities	38.5	26.0	18.4	70.6
Net financial assets	41.5	55.6	38.5	127.8
Non-financial corporations				
Financial assets	117.4	105.7	80.7	167.4
Liabilities	196.3	213.6	145.6	266.8
Net financial assets	-79.0	-107.9	-64.9	-99.4
General government				
Financial assets	47.5	31.9	45.1	43.4
Liabilities	36.1	71.8	57.8	81.9
Net financial assets	11.4	-39.8	-12.7	-38.5
Financial corporations				
Financial assets	151.3	141.7	100.7	428.6
Liabilities	154.2	147.2	103.5	431.6
Net financial assets	-2.9	-5.5	-2.8	-3.0
Residents, total				
Financial assets	396.2	360.9	283.6	837.8
Liabilities	425.1	458.5	325.4	850.9
Net financial assets	-28.9	-97.6	-41.9	-13.1
Non-residents				
Financial assets	92.0	156.0	73.1	246.7
Liabilities	62.9	58.1	30.6	232.0
Net financial assets	29.1	97.9	42.5	14.7

Source: CNB, Eurostat
Note: CZ for 2006 (preliminary data), others for 2005. E12 = average for euro area countries + DK and SE excluding LU and IE.

Table II.2 (Box)
Role of non-residents in financing the domestic economy
(non-residents' claims on residents, unconsolidated stocks at end of period; % of GDP)

	CZ	HU	PL	E12
Currency and deposits: – in % of GDP	9.5	10.6	1.4	60.3
– in % of currency and deposits with local banks	9.4	14.1	2.5	31.1
Loans: – in % of GDP	16.7	35.0	19.2	29.3
– in % of all loans to residents	23.7	33.6	34.2	15.1
Securities other than shares: – in % of GDP	8.9	34.2	18.3	78.9
– in % of all securities other than shares issued by residents	22.8	48.0	37.5	55.2
Shares and other equity: – in % of GDP	49.4	71.4	29.8	70.9
– in % of all shares and other equity in residents' liabilities	40.7	49.3	29.9	28.1
Other accounts receivable: – in % of GDP	7.5	4.7	4.7	6.7
– in % of all other accounts payable of residents	9.2	8.9	7.9	16.5
All non-residents' claims on residents: – in % of GDP	92.0	156.0	73.1	246.7
– in % of all liabilities of residents	21.6	34.0	22.5	28.3

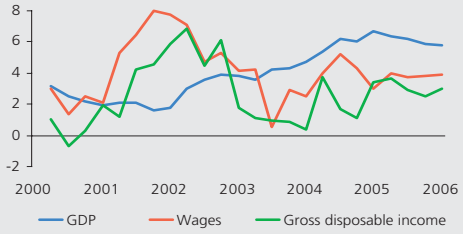
Source: CNB, Eurostat
Note: CZ for 2006 (preliminary data), others for 2005. E12 = average for euro area countries + DK and SE excluding LU and IE.

Table II.3 (Box)
Role of non-residents in investments of residents
(residents' claims on non-residents, unconsolidated stocks at end of period; % of GDP)

	CZ	HU	PL	E12
Currency and deposits: – in % of GDP	11.5	7.9	11.0	44.2
– in % of currency and deposits held by residents	11.2	10.8	17.2	25.9
Loans: – in % of GDP	4.0	16.4	0.9	39.0
– in % of all loans granted by residents	6.9	19.2	2.4	17.5
Securities other than shares – in % of GDP	31.0	18.2	12.7	62.9
– in % of securities other than shares held by residents	50.7	32.9	29.5	49.6
Shares and other equity: – in % of GDP	9.7	8.7	2.2	78.4
– in % of all shares and other equity held by residents	11.9	10.5	3.0	28.9
Other accounts receivable – in % of GDP	6.8	6.7	3.8	6.5
– in % of all other accounts receivable of residents	8.4	12.1	6.5	16.0
All residents' claims on non-residents: – in % of GDP	62.9	58.1	30.6	232.0
– in % of all claims of residents	15.9	16.1	10.8	26.1

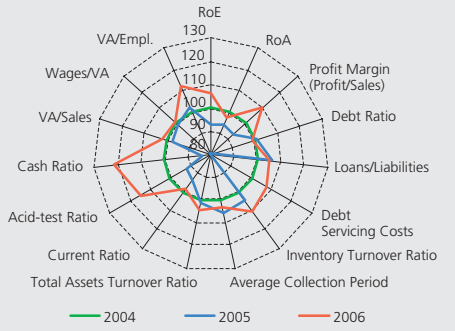
Source: CNB, Eurostat
Note: CZ for 2006 (preliminary data), others for 2005. E12 = average for euro area countries + DK and SE excluding LU and IE.

CHART II.11
Real annual growth in GDP, wages and gross disposable income of households
(%)



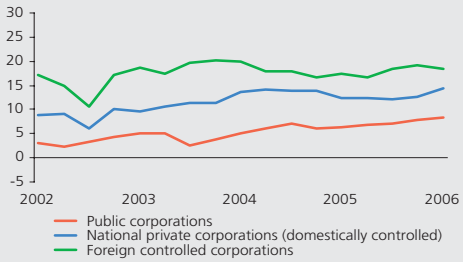
Source: CZSO
Note: Wages and gross disposable income are deflated by the consumer price index.

CHART II.12
Key financial indicators for non-financial corporations
(2004 = 100; index > 100 = improvement; index < 100 = deterioration)



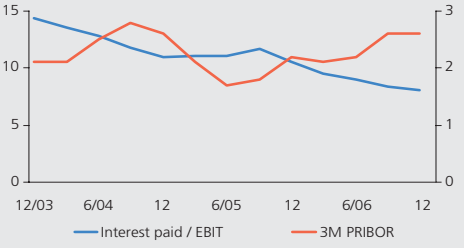
Source: CZSO, CNB
Note: For the liquidity indicators, data on short-term liabilities were unavailable, so data on total liabilities were used.

CHART II.13
Profitability (RoE)
(quarterly data; sum of profit/loss for four consecutive quarters; annual profitability in %)



Source: CZSO

CHART II.14
Share of interest paid by non-financial corporations in EBIT and interest rates
(%)



Source: CNB, CZSO

prices of assets (real estate and shares). This combination of factors could generate excessively high wage demands and excessive household consumption growth, accompanied by faster debt growth.

However, the high GDP growth rates on which the current optimism is based are not a sufficiently accurate indicator of growth in income. As in the previous year, the terms of trade deteriorated in 2006 as a result of rising prices of energy-producing materials and some other commodities and declining export prices in some segments of manufacturing. The outflow of income abroad (see Table II.2), which is giving rise to a significant gap between domestic and national income, is becoming increasingly important. It can be assumed that the growth rates of indicators such as real gross domestic income, real gross national income and real gross disposable income have been significantly lower than the real GDP growth rates over the past two years (see Chart II.11).[11]

2.2 NON-FINANCIAL CORPORATIONS

Non-financial corporations recorded very good results in 2006. Their financial indicators were the best in three years. At the same time, unlike in the advanced EU countries, non-financial corporations in the Czech Republic are not recording any major build-up in debt. Corporations have coped with the rising commodity prices. The corporate sector would be adversely affected by an unexpected sharp rise in interest rates or a significant appreciation of the exchange rate.

Non-financial corporations are still banks' most important clients, although loans to the household sector have been rising strongly in recent years. Loans to corporations accounted for around 80% of the total bank credit portfolio at the end of the 1990s, but their share is less than 45% today.[12] Partly for this reason, but mainly because this sector is the largest contributor to GDP growth, the financial soundness of corporations is a key indicator of the stability of the economy as a whole.

2.2.1 Enterprises with 100 employees or more

2006 was an extraordinarily successful year for large enterprises. Most of their financial indicators were the best in three years (see Chart II.12). Return on equity increased (see Chart II.13), the inventory turnover ratio and average collection period decreased, the ratio of personnel costs to value added declined and value added per employee increased. The rising productivity and corporate profitability is a result of past investments, restructurings, FDI inflows and a related increase in know-how.[13] As corporations' investment activity has increased, their indebtedness as a percentage of total liabilities has also risen – from 46.5% in 2005 to 47.5% in 2006. EBIT[14] has been declining in recent years, despite the rising indebtedness and a slight increase in interest rates last year (see Chart II.14). Compared to the EU-12,

11 The latest available data are for 2004. In that year, GDP rose by 4.2% and real gross domestic income increased by 4.5% thanks to an improvement in the terms of trade. Gross national income, however, grew by less than 3% and gross disposable income by 2.9%. Net disposable income rose by only 2.6%.

12 Bank loans are not the only source of external financing of corporations. Other important financing sources include loans from non-banking institutions and parent companies and trade payables. Bank loans account for around 55% of all loans received by non-financial corporations. As for the shares of other sectors in bank loans, households account for 38%, financial institutions 7%, general government 4% and non-residents the rest.

13 The effect of FDI on the corporate sector is examined in the article *Foreign direct investment and the Czech corporate sector: Potential risks to financial stability* in the thematic part of this report. Foreign investment in the banking sector is discussed in Box 8 in section 4.2.

14 EBIT = Earnings Before Interest and Taxes.

the corporate debt ratio is still low and does not pose a risk to financial stability (see Chart II.15).[15]

Turning to the profitability of individual industries, construction corporations were the best performers. Growth in construction was supported by better availability of mortgage loans, low interest rates and higher household incomes. The high profitability in construction is also related to the current intensive growth in bank loans to the real estate sector (see section 4.2). Above-average profitability was recorded in manufacturing, in particular manufacture of basic metals and fabricated metal products and manufacture of transport equipment. Although the price growth on commodity markets (see section 2.1) is generally having a negative effect on corporations, some industries may be profiting from it. This was the case in the manufacture of basic metals and fabricated metal products. The high profitability in transport equipment manufacturing is associated with growth in the car industry supported by the launch of new production facilities (see Chart II.16). Food and tobacco product manufacture is consistently turning in above-average profits. The income elasticity of demand for these products is very low. By contrast, profitability in transport, energy,[16] trade and hotels and restaurants tends to be below average. The worst results were recorded in agriculture (RoE of just 3.6%), although this is not particularly significant in terms of the overall economy.

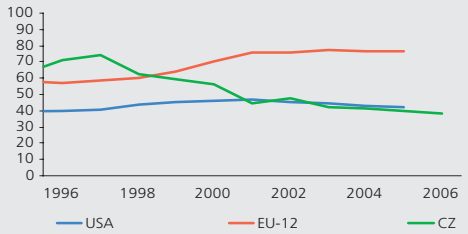
2.2.2 Small and medium-sized enterprises

The financial soundness of large enterprises also affects small and medium-sized enterprises (SMEs), doing so through supplier-customer relations. SMEs account for a significant proportion of value added (around 46%), employment (around 48%), investment (around 43%) and overall output (around 42%).[17]

The available aggregate CZSO data on SMEs show a positive trend in value added per employee. This variable has been increasing in real terms for enterprises of all sizes since 2002 (see Chart II.17). While real growth in value added is rather volatile for small enterprises with 1–9 employees, it is relatively stable over time for enterprises with 50–100 employees.[18] The data also indicate a positive relationship between enterprise size and value added per employee (see Chart II.18). The larger the enterprise, the more value added per employee it is able to generate. At the same time, however, such enterprises have higher personnel costs per employee.[19]

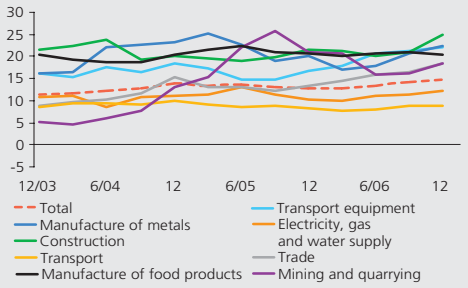
The positive trends recorded for corporate financial indicators are generating a rising rate of growth of loans to corporations (see Chart II.19). This growth started to pick up in 2003 and has continued rising since then, mainly due to the SME sector.[20] The share of bank loans to SMEs in total loans to non-financial enterprises has gradually risen (reaching 44% at the end of 2006). The growth rate of bank loans to medium-sized and especially large enterprises has recovered at a slower pace. Growth in loans to large corporations picked up considerably in the last quarter of 2006, and at 15% is catching up with enterprises with 10-99 employees (17.5%). The highest credit growth is still being recorded by small enterprises with

CHART II.15
Debt ratios of non-financial corporations
(% of GDP)



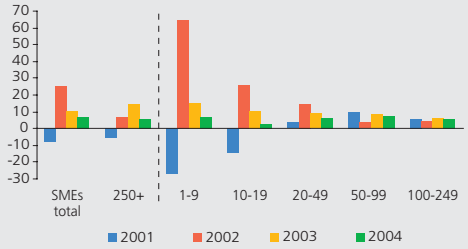
Source: Eurostat, CNB, US Bureau of Economic Analysis
Note: The debt ratio is calculated as the ratio of loans received and bonds issued from financial accounts to GDP.

CHART II.16
Profitability (RoE) of non-financial corporations
(quarterly data; sum of profit/loss for four consecutive quarters; annual profitability in %)



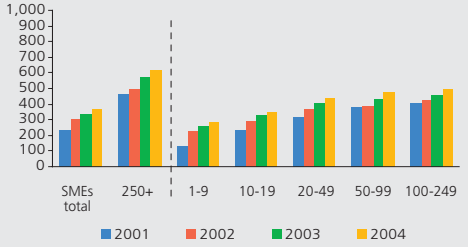
Source: CZSO, CNB calculation

CHART II.17
Real growth in value added per employee
(%; deflated by CPI; firms by number of employees)



Source: CZSO

CHART II.18
Value added per employee
(thousands; firms by number of employees)



Source: CZSO

15 Indebtedness of non-financial corporations is a widely discussed issue in Europe; see, for example, the ECB Financial Stability Review, June 2007.

16 Although the profitability of corporations in the energy sector was below average, ČEZ generated above-average profits.

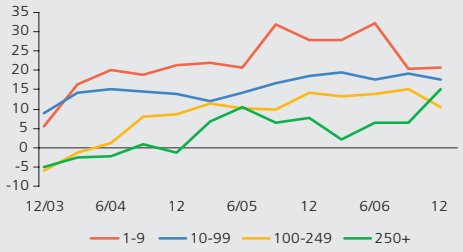
17 The CZSO publishes data on SMEs with a two-year lag. The shares given are based on 2004 figures. These shares are relatively stable over time.

18 The volatility of real growth in value added per employee rises again for enterprises with more than 250 employees.

19 This relationship was analysed in the 2005 Financial Stability Report.

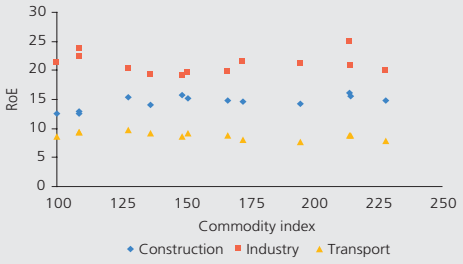
20 Growth in loans to SMEs was higher in both relative and absolute terms.

CHART II.19
Credit growth
(quarterly data; year-on-year growth in loans to corporations by number of employees in %)



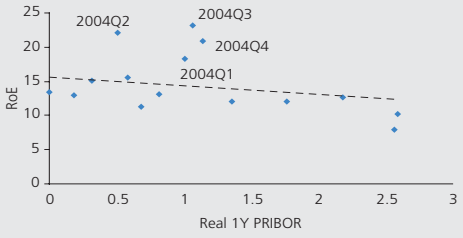
Source: CNB (CRC)

CHART II.20
Profitability versus commodity prices
(quarterly data from 2003 Q4 to 2006 Q4; RoE in %; commodity index 2003 Q4 = 100)



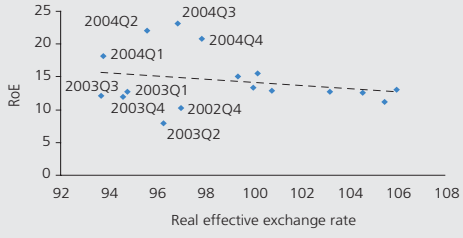
Source: CZSO, Bloomberg

CHART II.21
Profitability versus real annual interbank interest rates
(data from 2002 Q4 to 2006 Q4; %)



Source: CNB, CZSO

CHART II.22
Profitability versus real effective exchange rate
(data from 2002 Q4 to 2006 Q4; RoE in %; real effective exchange rate as index; 2005 Q3 = 100; increase in real effective exchange rate corresponds to appreciation)



Source: CNB, CZSO

1–9 employees. Many banks are targeting special packages at this segment. Alongside credit to households, this segment generates most income for banks.[21]

2.2.3 Analysis of risks of non-financial corporations

The financial results of non-financial corporations are affected by the overall state of the domestic economy and can also respond to the situation in other countries. Corporate development is most affected by interest rates, the exchange rate, commodity prices, domestic economic growth and economic growth in major trading partner nations.

The commodity market has seen rising prices of oil and metals since 2004 (see section 2.1). The overall rate of growth of metals prices picked up considerably in 2006. At the same time, there was an increase in prices of other important inputs, such as imported intermediate products. However, the data suggest that the profitability of large Czech enterprises (100 employees or more) has not been significantly affected so far by the growth in these prices. Looking at profitability in the main commodity-dependent sectors (industry, construction and transport) since 2004, it seems that enterprises coped with the rising input costs either by reducing their wage cost-output ratios or in other ways (see Chart II.20). A gradual upturn in prices in most branches of industry in 2006 and 2007 Q1 suggested that enterprises, given favourable demand conditions, were gradually passing the accumulated rise in input costs into their prices.

The relationship between the profitability of non-financial corporations and real interest rates is obvious. Declining real interest rates make it cheaper to invest and also have a positive affect on the volume of investment. This should subsequently be reflected in higher corporate profits. This implies that the relationship between profitability and real interest rates should be negative.[22] An empirical analysis for large non-financial corporations confirmed the negative correlation between profit and real interest rates (see Chart II.21).[23]

The exchange rate of the koruna appreciated considerably in both nominal and real terms between 2001 and the end of 2006. The negative correlation between the appreciation of the koruna exchange rate and the profitability of non-financial corporations in 2002–2006 was confirmed empirically (see Chart II.22). This is consistent with the export orientation of Czech production. The strong, faster-than-equilibrium appreciation of the koruna (see section 2.1) may result in lower competitiveness and a subsequent deterioration of corporate financial results. This could lead to a higher default rate with knock-on effects on the financial system.

The aggregate credit risk for the corporate sector as measured by the 12-month default rate was around 3% in 2006, the lowest level since 1997. According to the CNB's internal prediction models, it should increase slightly in 2007.[24] Despite this prediction, the figures are still very favourable and do not put any pressure on the stability of the financial sector.

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21 Large enterprises usually negotiate a low interest margin thanks to potential alternative financing channels. By contrast, bank loans are a more important source of external financing for small enterprises, since they do not have access to the capital market. The available evidence suggests that the higher level of credit risk for small enterprises is reflected in higher interest margins on bank loans.

22 Corporate profitability can be also affected by nominal interest rates via the *cash flow* effect. See, for example, Mills, K., Morling, S. and Tease, W. (1994): The Influence of Financial Factors on Corporate Investment, RBA Research Discussion Papers No. 9402, Reserve Bank of Australia.

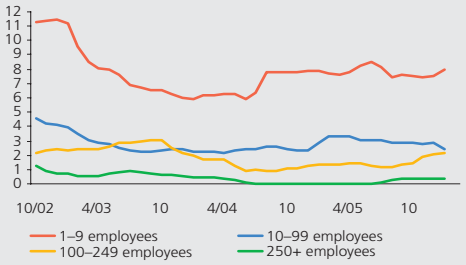
23 The fact that this relationship was examined as from 2002, i.e. at a time of relative interest rate stability with low nominal interest rates, might pose a problem for these analyses. Another potential problem is the lagged impact of interest rates on profitability via investment. The empirically observed negative relationship was fairly robust for the period studied.

24 Credit risk modelling is described in the article *Credit risk and stress testing of the banking sector in the Czech Republic* in the thematic part of this report.

It has been shown empirically that enterprise size is one of the determinants of credit risk. The larger the enterprise, the lower the risk of default.[25] The 12-month default rate of large enterprises with more than 250 employees was 0.37% at the start of 2006, while that of enterprises with 100–249 employees was 2.13% and that of enterprises with 10–99 employees was 2.41%. Micro-enterprises with 1–9 employees are the most risky, recording a default rate of 7.93% at the start of 2006.[26] The credit risk of all categories of enterprises seems to be stable despite the increased credit growth (see Chart II.23).

The available analyses confirm a link between the default rate and real GDP growth and real interest rates at the aggregate economy level.[27] The current favourable trends in these macroeconomic determinants are leading to low default rates for both the corporate sector and the household sector.[28] The overall situation in the corporate sector has long been improving and no major risks to its future development can be identified at present.

CHART II.23
12M default rate of corporations by number of employees
(%)



Source: CNB (CRC)

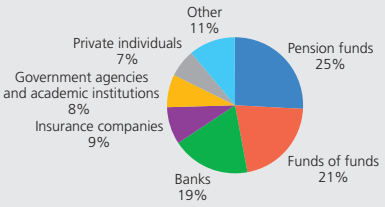
Box 2: Private equity as an alternative source of corporate financing

Low interest rates and excess liquidity on financial markets have motivated market agents to seek alternative forms of investment with higher yields. This has resulted in increased investor interest in the private equity market in recent years. Specialised private equity funds offer investors relatively high yields of around 10% a year and in particular a low correlation between such yields and yields on public stock markets. This helps to mitigate overall portfolio risk. In advanced European economies, investments in private equity funds have become part of the investment portfolios of many major institutional investors, among them pension funds, life insurance companies and funds of funds (see Chart II.1 Box).

Private equity funds mostly apply a leveraged buyout (LBO) strategy, i.e. they invest the funds raised from their investors in buying up businesses, which they then restructure and resell – at a profit, of course. A typical LBO transaction involves not only the fund's investors, but also banks, which provide acquisition financing. Initial public offerings on public stock markets are a frequently used exit strategy for terminating such investments, although secondary sales to other private equity funds have also recently proved popular.

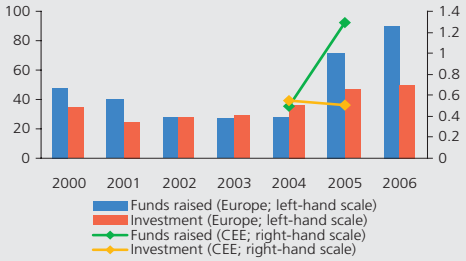
According to statistics from the European Private Equity & Venture Capital Association (EVCA), the European private equity market recorded a further increase in funds raised and investment in 2006 (see Chart II.2 Box). Investors are also showing increased interest in private equity funds investing exclusively in Central and Eastern Europe. Such funds raised EUR 1.3 billion from primary investors in 2005, a rise of 161% compared to 2004, and

CHART II.1 (BOX)
Investor base of European private equity funds
(investors' shares in funds raised in 2006)



Source: EVCA

CHART II.2 (BOX)
Growth in funds raised and investment by European private equity funds
(EUR billions)



Source: EVCA

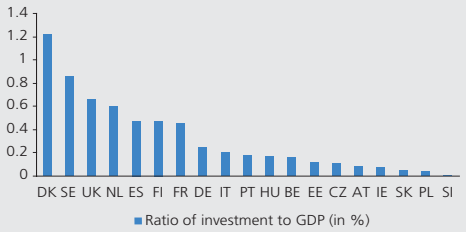
25 The 12-month default rate was calculated as the volume of loans 30–89 days past due as a percentage of the average total outstanding amount on loan accounts in the 12-month period after the reference point of time. This variable can thus only be observed until January 2007.

26 Data from the CRC newly include "sub-limit receivables", i.e. those that do not exceed a certain threshold, which previously could not be determined from the aggregate CRC data. This allows more accurate calculation of the indicator.

27 For more on this issue, see Jakubík, P. (2007): Credit Risk in the Czech Economy, IES Working Paper, 11/2007. This relationship is confirmed by studies for other economies, for example Jakubík, P. (2006): Does Credit Risk Vary with Economic Cycles? The Case of Finland, IES Working Paper, 11/2007.

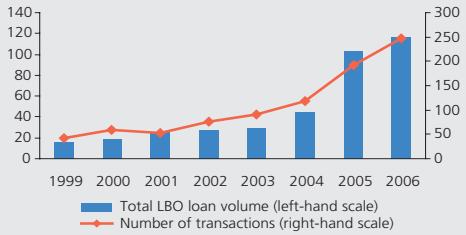
28 The macroeconomic credit risk model estimated for the Czech aggregate economy is discussed in detail in Jakubík, P. (2007): Macroeconomic Environment and Credit Risk, Finance a úvěr – Czech Journal of Economics and Finance, 57(1–2), 2007, pp. 60–78.

CHART II.3 (BOX)
Relevance of private equity fund financing in selected European countries
(% of GDP; 2005)



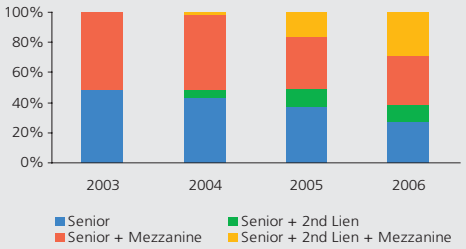
Source: EVCA

CHART II.4 (BOX)
Growth in LBO bank financing in Europe
(EUR billions)



Source: Standard & Poor's LCD

CHART II.5 (BOX)
European LBOs by debt structure
(% of total number of transactions)



Source: Standard & Poor's LCD

a further increase is expected for 2006.[29] Most of the funds raised (about 80%) are invested in LBOs. Alongside Hungary and Poland, the Czech Republic is one of the largest recipients of investment from private equity funds specialising in Central and Eastern Europe. More than 20% of the investment activities of such funds were in the Czech Republic in 2005, which corresponds to roughly EUR 109 million. However, it remains a rather marginal source of financing of the corporate sector, totalling no more than tens of investments a year. This is reflected in a low ratio of private equity fund investment to GDP (see Chart II.3 Box). On the other hand, these funds have been behind new initial public offerings on the public stock market in the past two years, thereby helping to develop the financial market in the Czech Republic. This form of investment is expected to grow in significance and converge towards the more advanced EU countries.

With regard to financial stability, the most frequently discussed aspect of the growth in the private equity market is its effect on the banking sector and the credit derivatives and structured debt products markets. In the case of acquisitions, banks provide debt financing that exceeds the amounts invested in target companies by the funds themselves several times over. The available evidence suggests that the volume of debt financing has increased significantly in recent years (see Chart II.4 Box). According to information from the CVCA (Czech Venture Capital Association), a member of the EVCA, the investors in the Czech Republic – and in Central and Eastern Europe as a whole – are foreign funds raising their funds again from foreign, mostly Western European institutional investors. That said, acquisition debt financing is also increasingly being provided by local banks in the Czech Republic, even if the volumes are insignificant given the total number of transactions in the Czech Republic.

The debt provided by banks for LBOs is in many cases modified and structured in such a way as to postpone the repayments of principal as far as possible into the future (bullet-type debt). Banks are thus involved in relatively risky investments where recovery of the amount lent is shifted to the future and the risk of default is thereby increased. However, the bank debt does not always stay in the bank's balance sheet. In advanced financial markets, banks often structure such debt into several layers according to seniority (and thus also according to degree of risk) and sell it to buyers on secondary markets.[30] The available evidence suggests that in the European context debt is being structured into many layers in an increasingly sophisticated manner, meaning that the European market is converging towards the US one (see Chart II.5 Box). In 2006, around 30% of all transactions contained a relatively complicated four-layer debt structure, whereas no transaction had such a structure in 2002.

29 Central and Eastern Europe Statistics 2005. EVCA, November 2006. A Deloitte survey of expectations of private equity funds specialising in Central and Eastern Europe suggests a further increase in funds for 2006, along with expectations of growth in new investments and transaction size as well as increased availability of acquisition debt financing from banks (Central Europe – Private Equity Confidence Survey. Deloitte, June 2006).

30 As part of the ECB's financial stability activities, a survey was conducted among banks that are active in financing LBOs in the EU (see ECB (2007): Large Banks and Private Equity Sponsored Leveraged Buyouts in the EU. ECB Occasional Paper, April 2007). The results reveal that many European banks prefer the *portfolio model,* i.e. they retain the acquisition financing in their balance sheets as an investment. By contrast, non-European (mainly US) banks active on the European LBO market tend to prefer the *capital turnover model,* where banks structure the debt financing and sell almost all of it on the secondary market.

2.3 HOUSEHOLDS

Households continued borrowing, albeit at a declining rate. However, as a percentage of GDP their debt remains around one-third that in advanced EU countries. The debt of low-income groups of households or households with only one breadwinner poses a risk. Many such households would not be able to meet their obligations if the main breadwinner were to become unemployed or fall ill.

Households create savings and – together with foreign entities – provide funds to non-financial corporations through banks and other financial intermediaries. They are simultaneously the second largest debtor of the financial sector. They borrow not only from banks (see section 4.2), but also from non-bank financial intermediaries (see section 4.4).

Although the rate of growth of bank loans to households is rising by around 30% year on year, households remain a surplus unit (see Box 1) and their aggregate income from the interest they receive exceeds the interest they pay (see Chart II.24). Of course, assets and liabilities are not evenly distributed across households. There is typically a multiple generation model where younger generations tend to be deficit units (with liabilities exceeding financial assets) and older generations tend to be surplus units.

Given a symmetrical impact on interest received and paid, a rise in interest rates would have a positive effect on the net interest income of households as a whole. However, it would have an adverse effect on those households with deficit financing and subsequently on the overall financial sector via a higher default rate of households.[31] The increased default rate would reduce consumer demand, which would be negatively reflected in GDP growth and a rise in credit risk among non-financial corporations. The corporate sector might be similarly affected by an excessive rise in real wages due to lower-than-expected inflation caused, for example, by a strong appreciation of the exchange rate. Higher real wages have a positive effect on households' disposable income, but simultaneously imply a rise in corporate costs and an increased risk of corporate bankruptcy.[32]

Despite the rising household debt ratio, a slight decline in the rate of growth can be observed in 2006 compared to 2005 (see Chart II.25).[33] Household debt meanwhile remains far below the EU-15 average. Loans to households amounted to just under 20% of GDP at the end of 2006, while the EU-15 average is above 60%. The ratio of debt to income is almost 41%, while the ratio of debt to assets is 26%. The slower growth in these indicators reflects a narrowing of the difference between the rate of debt growth and the rates of income and financial asset growth. Interest paid by households accounted for almost 1.6% of disposable income in 2006.

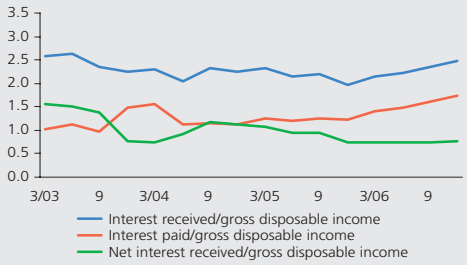
Given the increasing wealth of households and their efforts to achieve higher returns, the shares of their investment in building savings schemes, pension schemes and domestic and foreign fund units recorded further growth at the expense of bank deposits (see Chart II.26). As regards credit and loans, strong demand for housing led to a rise in mortgage loans and building society loans (see Chart II.27).

31 The quantification of this relationship can be demonstrated using an estimated model of the banking portfolio default rate for the household sector. According to this model, the default rate depends on the unemployment rate and real interest rates. A full description of the model can be found in the article *Credit risk and stress testing of the banking sector in the Czech Republic* in the thematic part of this report.

32 The scenario of a strong appreciation of the exchange rate is tested in the article *Credit risk and stress testing of the banking sector in the Czech Republic* in the thematic part of this report.

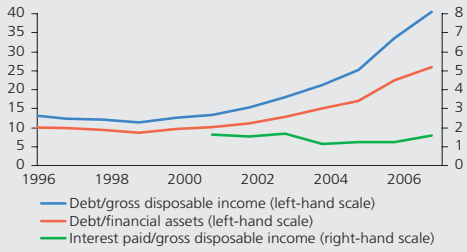
33 Loans to households totalled less than CZK 200 billion in 2001 and more than CZK 600 billion in 2006. This means the nominal debt more than trebled in five years.

CHART II.24
Ratios of interest received and paid to households' disposable income
(%)



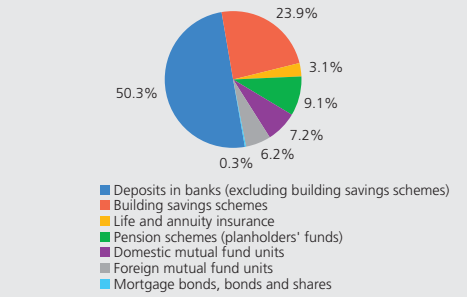
Source: CZSO

CHART II.25
Ratio of debt to gross disposable income and financial assets; ratio of interest paid to households' gross disposable income
(%)



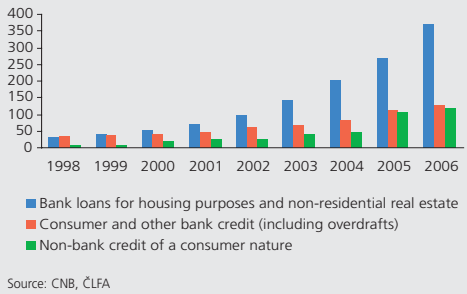
Source: CNB, CZSO
Note: The data for 2005 and 2006 are only estimates.

CHART II.26
Structure of households' financial assets in 2006
(%)



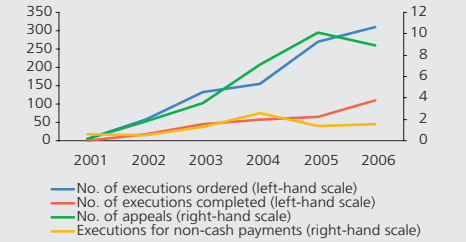
Source: CNB, AKAT

CHART II.27
Bank and non-bank credit to households
(CZK billions)



Source: CNB, ČLFA

CHART II.28
Execution proceedings
(thousands)



Source: Chamber of Executors of the Czech Republic

One of the manifestations of the rise in debt is a rising number of households unable to repay their loans. This is evidenced, for example, by an ever-increasing number of executions ordered. In 2004 there were 155,000 such cases, but 2005 saw as many as 270,000 and 2006 a full 309,000. Nevertheless, these figures show that the sharp upswing in executions recorded in 2005 has since stabilised and slowed somewhat (see Chart II.28).[34] A rise in the rate of growth of executions completed in 2006 implies some acceleration of execution proceedings. Another positive phenomenon is a decline in the number of appeals against execution proceedings, which suggests higher transparency and efficiency of such proceedings. Executions are a means of enforcing creditors' individual claims. However, if a debtor in default has more than one creditor the execution process cannot be applied, as one creditor would enjoy undue preference over the others. In this situation, the insolvency law must be applied. In the case of indebted households, the new Insolvency Act offers the option of debt discharge, sometimes referred to as personal bankruptcy (see Box 3).

Box 3: Personal bankruptcy

Act No. 182/2006 Coll., on Insolvency and Methods of Resolution Thereof (Insolvency Act), whose effective date has been postponed to 1 January 2008, will newly offer households the opportunity to discharge their debts if they are no longer able to meet their obligations. Two basic mechanisms have been defined to this end. The first option is a one-off realisation of assets, and the second is payment according to a five-year payment plan. Both options are conditional upon payment of at least 30% of the amount due and on the debtor having "honest intentions" to discharge his obligations. A discharge petition can be submitted only by the debtor, not by creditors. The discharge method is decided by the creditors by a simple majority of votes weighted according to the size of their claims. A court then decides whether to permit personal bankruptcy and approve the discharge plan. The plan must then be respected by the creditors. Where personal bankruptcy is not the best method for ensuring maximum recoverability of creditors' claims (for example, if it would be better from the creditors' perspective to have bankruptcy adjudicated in respect of the debtor's estate), the court should dismiss the discharge petition. Where the discharge process takes the form of a payment plan, the debtor is obliged to work, keeping from his earnings only the subsistence level of income plus any amount necessary to perform gainful activity.[35] Should he receive any extraordinary income by way of gifts or inheritances within this five-year period, he is obliged to sell such assets and use the funds to discharge the debt above and beyond his regular payments. If the debtor does not duly meet his obligations, a court can cancel the discharge process. Once the applicable statutory time-limits expire, a debtor may undergo the personal bankruptcy process several times during his lifetime, subject to fulfilment of the "honest bankrupt" condition (i.e. personal bankruptcy must not be abused by the debtor). The Act also establishes an insolvency register, which will be accessible to the public and administered by the Ministry of Justice (along with a database of bankruptcies). On termination of the insolvency proceedings, the court will delete the debtor from the list and the data will be made inaccessible.

34 Executions are discussed in detail in the 2005 Financial Stability Report.

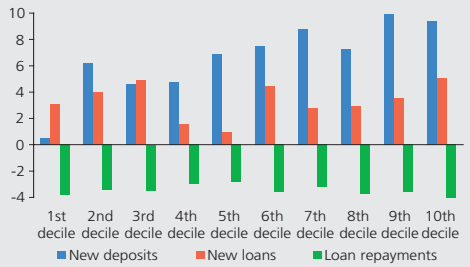
35 For example, where a debtor needs a computer and a car to earn income, he may keep this property. By contrast, the consumer electronics and motorcycle in his possession will be sold and the income used to discharge the debt.

Personal bankruptcy is a standard instrument used in most Western European countries and the USA. Comparing personal bankruptcy law in the Czech Republic and Germany, the largest difference consists in the monthly amount that a debtor may keep. In the Czech Republic this equals the subsistence level of income, whereas under German law it depends on the amount earned, which is more motivating for the debtor. Bankruptcy in the USA can take two forms. The first is the declaration of full liquidation of the bankrupt's estate, while the other is more akin to debt restructuring. In the event of bankruptcy of the former type, the debtor's property is sold off and creditors are subsequently satisfied according to seniority. Secured debts are settled by enforcement of collateral, while unsecured debts are settled by sale of the remaining assets. This mechanism enables a debtor to discharge a large proportion of his unsecured debts, as settlement takes place within a relatively short period of time (3–6 months) and the remaining debts are expunged by the court. Unlike in the Czech Republic, a debtor may apply for this type of discharge no more than once every six years. The latter type corresponds to the payment plan method in the Czech Republic. The payment plan is approved by a court and any remaining debts are forgiven at the end of a 3- or 5-year period. Unlike in the Czech Republic, the type of bankruptcy is entirely at the debtor's discretion. The latter type is preferred in many cases, as it generally ensures a better assessment from financial institutions for any future loan applications. Financial institutions can obtain information about the bankruptcy and the type thereof from a credit register. The discharge process does not apply to some specific claims such as alimony, claims on the state and student loans.

Personal bankruptcy is a potential solution for those whose debts are already so high they would be unable to repay them even by the end of their lifetime. The Act gives such people the chance to start over, while aiming to provide maximum recoverability for creditors. It is too early to say how well the Act will work in practice, but significant interest in debt discharge is expected from the moment the Act takes effect.

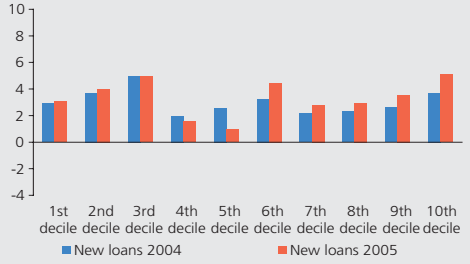
In the context of household debt, information about the distribution of debt across income categories is important as regards financial stability (see Chart II.29). This distribution remained broadly unchanged compared to 2004. The upward debt trend in high-income groups is continuing (see Chart II.30). The debt of low-income groups has also long been rising. Compared to 2004, there was an increase in new loans in the first and second income deciles and in the sixth to tenth income deciles. By contrast, the third to fifth deciles were flat or falling. Debt presents a risk primarily for low-income groups, which have relatively lower savings and depend more on social benefits. As in 2005, on the other hand, it was confirmed in 2006 that the households most dependent on social benefits are those with below-average income, not those with the lowest income, which borrow relatively little (in particular, households of old-age pensioners).

CHART II.29
New household deposits and loans by income categories in the family accounts
(share in gross money income in %; for 2005)



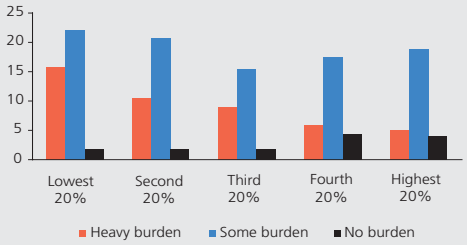
Source: CZSO, CNB calculation

CHART II.30
New household loans by income categories in the family accounts
(share in gross money income in %)



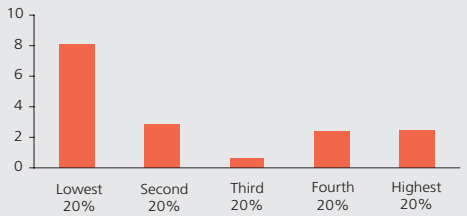
Source: CZSO, CNB calculation

CHART II.6 (BOX)
Consumer credit burden on households
(households that have obtained credit; shares in total number of households in %)



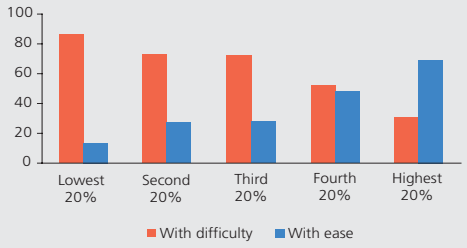
Source: CZSO
Note: The x-axis categorises households by size of net money income. The total number of households includes all households surveyed, i.e. including those which have not obtained credit.

CHART II.7 (BOX)
Problems making consumer credit repayments
(shares in total in %)



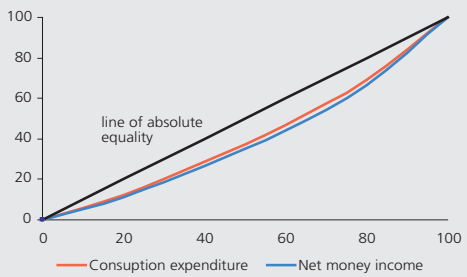
Source: CZSO

CHART II.8 (BOX)
Households making ends meet with money income
(shares of households in total in %)



Source: CZSO

CHART II.9 (BOX)
Lorenz curve
(x-axis is cumulative percentage of households and y-axis is cumulative percentage of income and consumption)



Source: CZSO

Box 4: The consumer credit burden on households

Total household debt is rising apace. Its ratio to gross disposable income increased further in 2006, to almost 41%. The ratio of consumer credit to gross disposable income also rose, reaching 12%. The CZSO conducted a new survey entitled "2005 Living Conditions".[36] Although roughly two-thirds of the debt consists of loans for house purchase, the CZSO focused the survey primarily on consumer credit.[37] The latter is riskier than the former and any problems relating to its repayment might effect consumption.

The survey captures how households subjectively perceive their situation and hence does not necessarily reflect the true situation. The survey reveals that consumer credit had been obtained by 23% of the households surveyed. It was used more by low-income households than those with high incomes (40% in the lowest-income group and 28% in the highest-income group).[38] Consumer credit repayments constituted a burden on households (a heavy burden for 7.3% and some burden for 13.3%). The situation differed across the income groups of households. Consumer credit payments were a heavy burden mainly for low-income households (see Chart II.6 Box). More low-income households than high-income households had difficulties making such repayments (see Chart II.7 Box). This indicates a risk of potential default primarily for low-income households, as well as a higher sensitivity of their balance sheets to shocks, with subsequent impacts on consumption.

Loan repayment is also associated with the issue of to what extent households make ends meet with their net money income. Almost 67% of households stated that they had difficulty making ends meet with their income (of which 37% had minor difficulties). In the three lowest-income groups the figure was 70–90%, whereas in the highest-income group it was only 30% (see Chart II.8 Box). This confirms the differences across the income groups of households and the fact that low-income households use consumer credit more frequently to finance consumption, as their income is limited. The higher the debt and the lower the income group, the lower the ability of households to cover an unexpected expense. 44% of households could not afford to pay an unexpected expense of CZK 6,000. In the two lowest-income groups the figure was as high as 50–70% (compared to around 16% in the highest-income group). Moreover, low-income households depend on social transfers and are more burdened with fixed housing costs. Differences in the consumer credit burden on households can be also seen in consumer expenditure. The Lorenz curve (see Chart II.9 Box) suggests that the inequality of income groups of households as regards consumption almost naturally reflects the inequality of households as regards net money income.

Overall, the survey reveals that loan repayment constitutes some burden for all households. Difficulties with repayment were experienced most of all by lowest-income households. They were relatively very sensitive to payment of an unexpected expense. However, the share of the consumption expenditure of the lowest-income group of households in total consumption was relatively low, although the combined share of the three lowest income groups accounted for almost half of consumer expenditure.

36 The conducting of an annual survey in the Czech Republic results from an amendment to Regulation (EC) 1177/2003 and related implementing regulations of the European Commission.

37 At the end of 2006, consumer credit totalled CZK 213 billion, of which bank loans amounted to CZK 110 billion.

38 The box is based on the quintile distribution of net money income per capita.

3 ASSET MARKETS AND THE FINANCIAL INFRASTRUCTURE

3.1 THE FINANCIAL MARKETS

Thanks to the global excess liquidity, the monetary policy tightenings in the USA and the euro area in 2006 had no major impact on long-term yields on the major world currencies. Risk aversion stayed low on global financial markets. Low interest rates fostered a "search for yield" and investment in riskier assets. In a situation of expectations of tighter CNB monetary policy, the strong integration of Czech long-term yields and yields in the euro area could result in a flattening of the yield curve, which would increase the pressure on banking sector profitability. Corrections on the financial markets suggest increased investor nervousness associated with uncertainty about the current favourable situation. The impact of the corrections on the Czech financial markets was, however, dampened in 2006 by a negative interest rate differential of the Czech koruna against the euro and the dollar and by the sound fundamentals of the Czech economy.

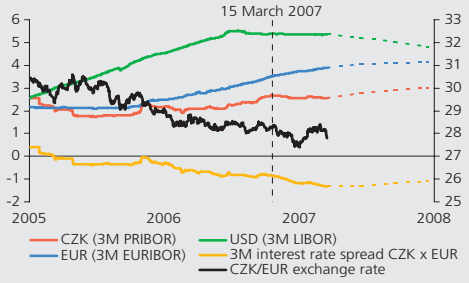
Developments on domestic and foreign financial markets affect financial institutions directly by changing the value of portfolios of assets held, as well as indirectly through their impact on the real economy.

Short-term interest rates reflect the current monetary policy settings and expected changes thereto. In 2006, the money market rates of major global currencies rose gradually in response to increases in monetary policy rates (see Chart III.1). The Fed continued tightening monetary policy only until the first half of 2006 (see section 2.1). In mid-March 2007, money market rates indicated expectations of a slight decline in dollar rates in 2007 due to expected lower economic growth and a cooling on the real estate market. By contrast, the ECB raised its key interest rate throughout the year in a situation of economic recovery and growth in the money supply and wages. In mid-March 2007, the market was expecting a slight tightening of ECB monetary policy in the near future. The global shift towards higher monetary policy rates in the past two years can be interpreted as an attempt by monetary policy authorities to return interest rates to more neutral levels and thus prevent a possible overheating of their economies and growth in global imbalances.

The three-month koruna interest rate (PRIBOR) rose slightly in the second half of 2006 in response to two increases in the CNB's monetary policy rates in July and September 2006. The CNB has held the repo rate at 2.5% since then. Market rates edged down again at the end of the year owing to appreciation of the koruna exchange rate and speculation on a possible lowering of monetary policy rates or continued stability thereof. This caused the negative interest rate differential vis-à-vis the euro rate to widen to more than 1 percentage point at the end of 2006. This widening might lead to depreciation pressures on the koruna, although it is being counteracted by positive market sentiment and the koruna's equilibrium real appreciation trend. In mid-March 2007, the market was expecting further CNB rate increases in 2007 owing to a potential rise in inflation pressures in a climate of strong economic growth and renewed household consumption.

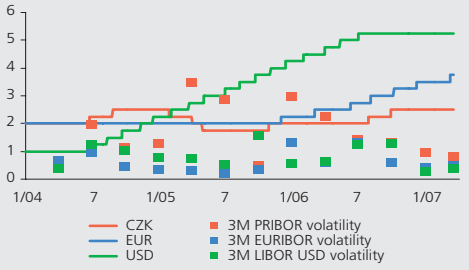
Money market rate volatility in the Czech Republic remains relatively low compared to the advanced countries (see Chart III.2), despite changes to CNB monetary policy implementation in 2006 (see Box 5).[39]

CHART III.1
Three-month interest rates and koruna-euro exchange rate
(interest rates and spread in %, left-hand scale; exchange rate in korunas to the euro, right-hand scale)



Source: Bloomberg
Note: Dashed lines denote market expectations for 3-month rates derived from FRA contracts as of 15 March 2007 (from LIBOR rates in the case of USD).

CHART III.2
Monetary policy rates and historical volatility of three-month interest rates
(rates in %; volatility as standard deviation of daily changes in past quarter, in basis points)



Source: Bloomberg

39 In March 2007, money market rates did not react either to the announced monetary policy changes, in particular the lowering of the inflation target to 2% from 2010, or to the changes in the frequency of monetary policy rate decisions and in communication.

Box 5: Impacts of changes in the frequency of CNB monetary policy operations on the money market

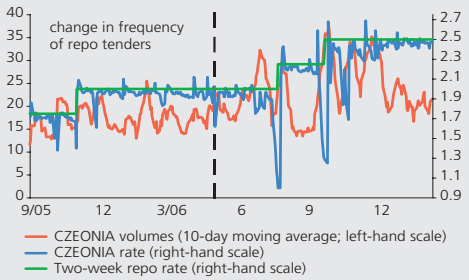
Monetary policy implementation procedures are one of the major factors affecting the interbank money market and short-term interest rate volatility. The CNB's main instrument takes the form of two-week repo operations conducted as regular tenders. With effect from 4 May 2006, the repo tender frequency was reduced from daily to three a week.

If banks cannot balance their daily liquidity positions through repo operations with the CNB, increased interest in the interbank money market, and especially in O/N deposits, can be expected. Activity on the O/N deposit market can be tracked by means of the CZEONIA index volume. Increased use of the interbank market was indeed observed in the three-month period after the reduction in frequency, as measured by O/N transaction volumes, which amounted to around CZK 23 billion daily on average, compared to around CZK 17 billion daily in the three months before the change took effect (see Chart III.1 Box). However, this growth was not necessarily due primarily to the reduced repo tender frequency, but to repeated speculation by banks on an increase in interest rates in this period. The observed higher volatility of the O/N rate and its dramatic falls in periods immediately preceding rises in the repo rate support this hypothesis.[40]

Increased interest in automatic facilities was also observed in the period following the reduction in frequency, although this too can clearly be put into the context of speculation on an increase in the basic repo rate.

As the period of reduced repo tender frequency is relatively short for analytical purposes and significantly burdened with bank speculation on rate increases, it is difficult as yet to assess the impact of the reduction in the frequency on the behaviour of interbank market participants.

CHART III.1 (BOX)
CZEONIA index volumes and CZEONIA rates
(volumes in CZK billions; rates in %)



Source: CNB

The available evidence suggests that interest rates on bank loans to non-financial corporations in the Czech Republic are directly linked to money market yields. Any increase in yields would immediately be reflected in the financial conditions of corporations, affecting their profitability and potentially even their default rate (see section 2.2).[41] However, the impact of the expected increase in short-term interest rates in 2007 on non-financial corporations' ability to repay their debts can be viewed as very limited.[42]

The monetary policy tightenings had no major impact on the long-term interest rates of the major world currencies in 2006. In a situation of rising short-term rates,

40 In a situation of expected growth in the repo rate, banks are motivated not to enter into repo contracts with the CNB, but to deposit their liquidity on the interbank market in the form of O/N deposits and to enter into repo tenders only after the new, higher repo rate becomes effective. The resulting high liquidity for interbank O/N contracts in turn reduces the O/N rate as far as the discount rate level, at which banks can deposit their liquidity with the CNB in the form of the automatic deposit facility.

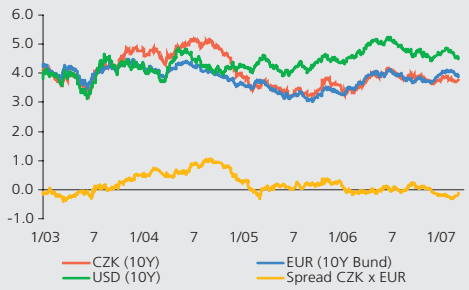
41 The share of new loans with fixations of up to one year or with floating interest rates in total new loans to non-financial corporations increased from 93% on average in 2005 to 96% in 2006. Households are also sensitive to short-term rates; new loans with fixations of up to one year or floating interest rates (including bank overdrafts) accounted for 60% of total new loans to households on average in 2006.

42 See the article *Credit risk and stress testing of the banking sector in the Czech Republic* in the thematic part of this report.

the negative slope of the dollar yield curve thus increased and the euro yield curve flattened out in 2006 (see Chart III.4). Although yields on ten-year euro and dollar government bonds increased slightly in the first half of 2006, they edged downwards later on (see Chart III.3). In both cases, however, they remain relatively low, albeit slightly higher than in 2005. The persisting low level of long-term rates in the last three years is due to a combination of several factors. The long period of low inflation has lowered long-term inflation expectations and the term premium demanded by investors for long-term assets. Furthermore, the long-term real interest rate may also have declined due to the global savings surplus and hence excess liquidity on the financial markets (see section 2.1).

Yields on ten-year Czech bonds move in line with euro yields. Their spread against euro bonds was negative in the first half of 2006 and in early 2007. The comovement of Czech and euro long-term bond yields suggests strong integration of the Czech and euro bond markets and may reflect the market-expected adoption of the euro as well as high credibility of the CNB (see Box 6).

CHART III.3
Long-term government bond yields and yield spread
(yields on 10-year government bonds in %)



Source: CNB, Bloomberg

Box 6: Measuring financial integration on foreign exchange, stock and bond markets

Financial market integration occurs when assets (currencies, shares or bonds) having the same risk factor and yield are priced identically by the markets no matter where they are traded. This follows from the law of one price.[43] The more the individual segments of the Czech financial market become integrated with the European market, the more their asset prices will be affected by global (European) factors rather than local factors. Although high integration of asset prices with the advanced euro area countries may have a stabilising effect, it may at the same time create a channel for the transmission of external shocks to the domestic financial system.[44]

The concepts of *beta-convergence* (allowing the speed of financial integration to be determined) and *sigma-convergence* (allowing the degree of financial integration at any point in time to be determined) can be used to quantify the level of financial integration. Both concepts originate from the literature on economic growth and its dynamics.[45] To quantify beta-convergence, it is useful to apply common regression analysis or the panel estimate method, in the form of the equation:

$$\Delta R_{i,t} = \alpha_i + \beta R_{i,t-1} + \sum_{l=1}^{L} \gamma_l \Delta R_{i,t-l} + \varepsilon_{i,t} ,$$

where $R_{i,t}$ is the difference between the asset yields (national index) of country i and a selected reference territory (a benchmark, European index) at time t, Δ is the difference operator, a_i is a dummy variable for the respective country and L is the lag operator.[46] The size of coefficient β may be interpreted as a direct measure of the convergence speed. A negative beta

TABLE III.1 (BOX)
Beta-convergence of foreign exchange markets
(1995–2006)

	1995–2006	1995–2000	2001–2006
Czech Republic	-0.86	-0.88	-0.96
Hungary	-0.84	-0.89	-0.84
Poland	-0.85	-0.87	-0.84
Slovakia	-1.01	-1.05	-0.91

Source: Bloomberg, CNB calculation
Note: All estimates were statistically significant at the 1% level.

TABLE III.2 (BOX)
Beta-convergence of stock markets
(1995–2006)

	1995–2006	1995–2000	2001–2006
Czech Republic	-0.76	-0.71	-0.90
Hungary	-0.80	-0.76	-0.89
Poland	-0.90	-0.90	-0.93
Slovakia	-0.71	-0.76	-0.72

Source: Bloomberg, CNB calculation
Note: All estimates were statistically significant at the 1% level.

TABLE III.3 (BOX)
Beta-convergence of bond markets
(1997–2006, Poland 1999–2006, Slovakia 2002–2006)

	1995–2006	1995–2000	2001–2006
Czech Republic	-0.66	-0.86	-0.86
Hungary	-0.76	-0.79	-0.84
Poland	-0.81	-0.77	-0.76
Slovakia	-0.80	-0.80	-0.73

Source: Bloomberg, CNB calculation
Note: All estimates were statistically significant at the 1% level.

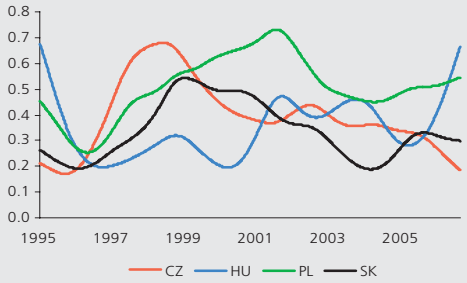
43 If the law of one price did not apply, there would be scope for arbitrage. Assuming a fully integrated market with no barriers (economic, legal, cultural, etc.), any investor would be able to take advantage of this arbitrage opportunity, causing the law of one price to apply again.

44 The analysis is based on the results of a research study by Babetskii, I., Komárek, L., and Komárková, Z. (2007): Financial Integration of Stock Markets among Selected New Member States and the Euro Area. CNB Working Paper, in print.

45 See, for example, Barro, R. J., Sala-I-Martin, X. (1992): Convergence. Journal of Political Economy 100, pp. 223–51.

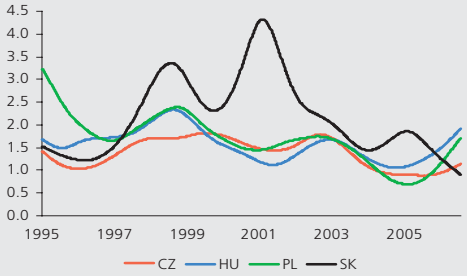
46 The number of lags is determined on the basis of information criteria.

CHART III.2 (BOX)
Sigma-convergence of foreign exchange markets
(1995–2006)



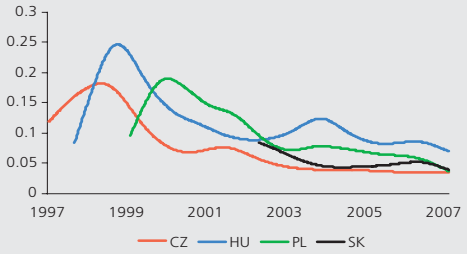
Source: Bloomberg, CNB calculation

CHART III.3 (BOX)
Sigma-convergence of stock markets
(1995–2006)



Source: Bloomberg, CNB calculation

CHART III.4 (BOX)
Sigma-convergence of bond markets
(1997–2006)



Source: Bloomberg, CNB calculation

coefficient indicates the occurrence of convergence, and the absolute value of the beta coefficient indicates the convergence speed. The higher the absolute value of the β coefficient, the higher the speed of convergence, and if β = 0, no convergence is observed.

To quantify sigma-convergence, the (cross-section) standard deviation (σ) is calculated according to the equation:

$$\sigma_t = \sqrt{\left(\frac{1}{N-1}\right)\sum_{i=1}^{N}\left[\log(y_{it}) - \mu_t\right]^2},$$

where y is the asset yield, μ is the mean value of the data-set at time t and i stands for separate countries (i = 1, 2, …, N). For the purposes of this analysis, we introduce N = 2, i.e. we examine the development of the sigma-convergence over time between the euro area and one of the countries under review.[47] The coefficient σ takes only positive values in theory. The lower is σ, the higher is the level of convergence. In theory, full integration is reached when the standard deviation is zero, while high (several digit) values of σ reflect a very low degree of integration. For chart type expression, the results were filtered using the Hodrick-Prescott filter with the recommended weekly time series coefficient λ = 270,400.

The results of the beta-convergence analysis for stock, foreign exchange and bond markets indicate that there is convergence of yields on Central European markets towards yields in the euro area (or Germany in the case of bond markets, Tables III.1–III.3 Box). The absolute values of the beta coefficient are close to one for all countries, which means that the levelling of newly arising differences in yield differentials between the relevant national economy and the euro area can be described as fast. Comparing the periods of 1995–2000 and 2001–2006, the speed of beta-convergence increased on all observed markets in the Czech Republic, whereas it declined for Slovakia.[48] To sum up, the most progress in integration of financial markets with the euro area has been achieved by the Czech Republic, followed by Hungary, Poland and Slovakia.

The results of the sigma-convergence analysis for individual countries in relation to the euro area (Germany) show that the lowest degree of integration on individual financial markets at the end of the period under review had been achieved by Hungary, followed by Poland (see Charts III.2–III.4 Box). A more marked degree of integration had been achieved by the Czech Republic and Slovakia, with the highest degree of convergence having being reached by the Czech foreign exchange and bond markets. Overall, it can be seen that gradual trend sigma-convergence of stock and bond markets has been taking place in all the observed countries since 2000. Although the foreign exchange markets are more volatile, a trend toward convergence can be observed for the Czech Republic and Slovakia, whereas Hungary and Poland show rather divergent developments.[49]

47 For pairs of countries, the calculated values in each period are essentially equal to half the square of the yield differential.

48 Except for the Slovak bond market, where the trend cannot be determined due to the unavailability of pre-2002 data.

49 Analyses conducted for selected euro area countries (Austria and Portugal) show that the Czech Republic's level of financial integration with the euro area is similar to that of, for example, Austria for stock and bond markets (see *Analyses of the Czech Republic's Current Economic Alignment with the Euro Area 2006,* CNB 2006, available on the CNB website http://www.cnb.cz/).

Although the slope of the Czech yield curve remains positive, the market-expected rise in short-term rates coupled with flat long-term rates, which are very close to euro rates, might result in a flatter Czech yield curve in the future. Since the banking sector typically transforms short-term liabilities into long-term assets, a flat or inverted yield curve may squeeze profitability and increase interest rate risk. The available evidence suggests that Czech banks diversify their income between interest and non-interest income to some extent. However, interest income is a major part of total income from financial activities (see section 4.2). [50]

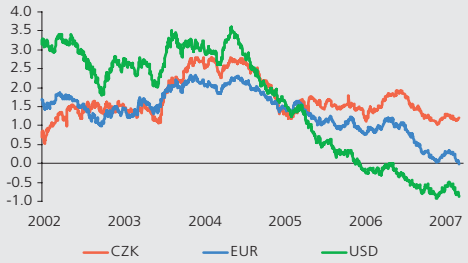
Low risk aversion and the "search for yield", which encouraged investor demand for riskier assets, persisted in 2006 and early 2007 due to low long-term returns on major world currencies and the global excess liquidity.[51] The low risk aversion was also fostered by continuing positive economic developments, corporate sector profitability, the absence of large defaults and low volatility on financial markets (see Chart III.5). The result is relatively high prices of riskier assets, low spreads for emerging economy bonds and continued growth in non-financial sector indebtedness, particularly in the euro area.

Nevertheless, several episodes took place in 2006 and early 2007 which tested the level of risk aversion of major players on the financial markets. These episodes were started by seemingly marginal events and might indicate some increased investor nervousness associated with uncertainty regarding the persistence of the current high liquidity and low risk aversion. Iceland's rating was downgraded in February 2006 and the Icelandic krona immediately weakened by around 15%. The currencies of countries with a similar macroeconomic profile (New Zealand and Hungary) responded to this depreciation and stock market indices declined in some emerging economies. The financial markets saw a significant correction in May and June 2006, which led to sales of riskier assets, including shares, commodities, emerging economy bonds and some credit derivatives. A further correction took place in February and March 2007, caused by reports of a planned clampdown on illegal activities and curbs on investment on credit in the Chinese stock market and by problems on the US mortgage market (see Chart III.6).

In all these cases, the volatility of financial markets increased only temporarily and asset prices soon returned to their original levels. This can be viewed as evidence of the robustness of current financial markets to shocks. The increased resilience can be put into the context of better risk redistribution using sophisticated financial instruments (most notably derivatives).

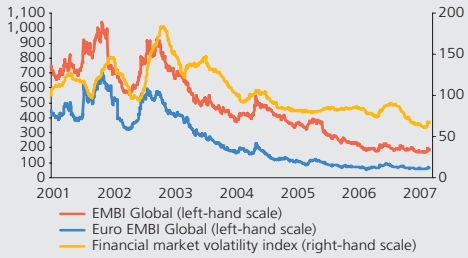
The episodes also affected yields on Central European financial markets, in particular stock and bond markets and exchange rates (see Chart III.7). However, the impact on the Czech financial markets was fairly limited. The currencies of Poland and Hungary mostly depreciated during these episodes, but the Czech koruna held steady. This could indicate a stronger tendency among investors to differentiate between individual countries of the region according to their economic fundamentals, such as GDP growth, current account deficits or inflation rates (see section 2.1). The weak reaction of the exchange rate of the Czech koruna might also be due to the low interest rates, which are motivating investors to use

CHART III.4
Yield curve slope
(10Y yield – 3M rate; percentage points)



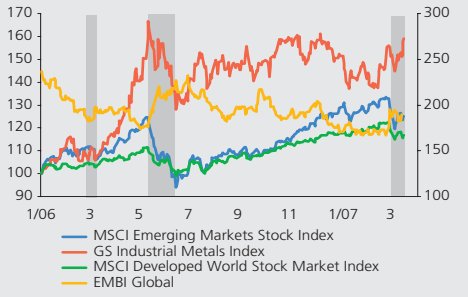
Source: CNB, Bloomberg

CHART III.5
Risky asset yields and financial market volatility index



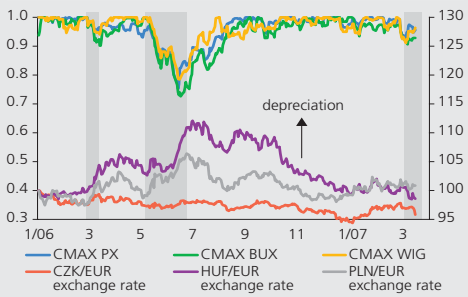
Source: JP Morgan, Bloomberg
Note: EMBI Global Index/Euro EMBI Global Index – weighted spread of yields on dollar/euro-denominated emerging markets bonds, in basis points; Financial market volatility index – sum of historical volatility of S&P500, DJ Eurostoxx, 10Y US and German bonds, EUR/USD exchange rate and YPN/USD exchange rate over past 90 days; 1 January 2001 = 100.

CHART III.6
Episodes on financial markets 2006–2007
(indices 1 January 2006 = 100, left-hand scale; EMBI Global in basis points, right-hand scale)



Source: Bloomberg, JP Morgan

CHART III.7
Financial market corrections 2006–2007 and the Central European Region
(CMAX index = ratio of current stock index value to maximum value in past 60 days, left-hand scale; exchange rates as indices, 1 January 2006 = 100, right-hand scale)



Source: Bloomberg

50 Interest profit has a stable share of around 60%. The share of profit from fees and commissions in banks' total profit from financial activities in the Czech Republic increased from around 15% in 1995–1999 to almost 30% in 2003–2006 at the expense of profit from other financial activities, such as securities transactions. See also the article *Financial stability indicators: Advantages and disadvantages of their use in the assessment of financial system stability* in the thematic part of this report, which indicates a sufficient degree of diversification of banks' income in the Czech Republic in comparison with other Central European countries.

51 The term "search for yield" is explained in the glossary.

the Czech koruna as a financing currency for carry trades.[52] Corrections on global markets thus on the one hand lead to a "flight to quality", i.e. sales of assets of riskier countries and depreciation of their currencies, but on the other hand lead to liquidation of positions in carry trades and hence appreciation of the currencies used to finance them.

The less developed markets of fast growing countries generate above-average yields for investors (see Chart II.4 in section 2.1). At the first sign of any instability, however, foreign investors pull their money out of these regions, which are perceived as riskier. Volatility on financial markets in Central Europe is thus much higher than in Western Europe or the USA. Once the situation calms down, foreign investors come back fairly quickly, causing a rapid return to the original values.

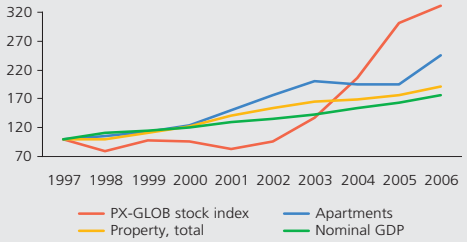
3.2 THE PROPERTY MARKET

Property prices saw comparatively rapid growth in 2006, on the back of roughly three years of stability. This growth exceeded that of wages in the economy. With respect to regions, the growth was driven primarily by the situation in Prague; the variance of prices across regions increased. The faster rise in property prices in the Czech Republic last year can be explained by the fact that in previous years they had lagged behind other EU countries. On the other hand, the rent return is decreasing, as rents are rising more slowly than apartment prices. It is therefore possible that part of the price growth is not related to fundamentals. The increasing number of flats under construction can also be viewed as a risk to financial stability, chiefly due to rising loans to property developers.

Property prices affect financial stability, as investment in property is viewed as a substitute for investment in financial assets as well as household consumption. Property prices thus show a similar profile in the business cycle as prices of financial assets (e.g. shares), although they are less volatile (see Chart III.8). Changes in property prices can affect the balance sheets of financial institutions via several channels. A fall in property prices can lead to a decline in financial institutions' assets via their own investments in real estate or in real estate investment funds. Given high growth in loans for house purchase and the resulting increased sensitivity of household balance sheets to property price movements, a decline in property prices could also have a negative effect on households' ability to repay such loans.[53] At the same time, the value of the collateral on these loans would decrease, so a negative trend in the household sector would lead to greater impacts on the banking sector. The exposure of financial institutions to companies operating in the construction and real estate businesses (property developers), which have recorded credit growth, has a similar effect (see section 4.2).

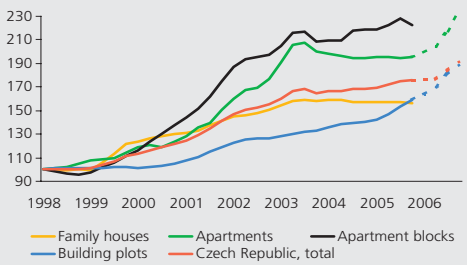
It is clear that 2006 saw an upswing in property price growth (see Chart III.9). Following a period of price stability in 2003–2005, prices of flats and building plots in particular recorded growth in 2006.[54] In some regions the price growth is very

CHART III.8
Asset prices
(absolute index; 1998 Q1 = 100)



Source: CZSO, CNB calculation, 2006 data calculated from supply prices according to IRI

CHART III.9
Property prices – transfer prices according to tax returns
(absolute index; 1998 Q1 = 100)



Source: CZSO, CNB calculation, 2006 data calculated from supply prices according to IRI

52 Unfortunately, the real degree of use of the Czech koruna as a financing currency for carry trades cannot be proved directly using data sources. However, some indirect indication is provided by the statistics on the Czech Republic's international investment position and by the banking statistics, which show an increase in Czech banks' koruna-denominated claims on non-residents in the last two years and an excess of commercial banks' short-term claims on non-residents over short-term liabilities to non-residents.

53 For example, a fall in property prices would lead to a fall in the net assets of households.

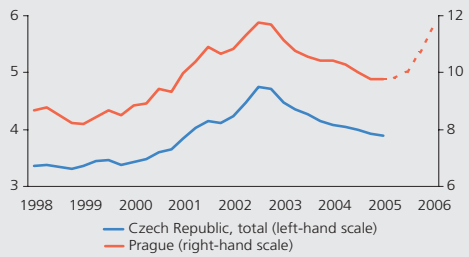
54 It should be noted, however, that the 2006 data are preliminary and not entirely comparable with the data for previous years. The data up to 2005 reflect property transfer prices published by the CZSO, whereas the 2006 data are estimated from estate agencies' supply prices. The latter, however, are not available for all regions and for all types of property.

strong in year-on-year comparison – supply prices of flats in Prague recorded year-on-year growth of 24.3% at the end of 2006, accelerating mostly in the second half of the year. This rise in prices is most probably linked with increased demand for housing, which can be put into context with the aforementioned strong growth in loans for house purchase, demographic effects[55] and with the stable macroeconomic environment (real income growth and low inflation and interest rates). Besides these relatively natural factors, the growth in prices was also due to speculation on an increase in VAT on construction work from 5% to 19% as of 1 January 2008. However, given the uncertainty regarding the definition of "social housing", which is expected to be excluded from the VAT increase,[56] and the uncertainty regarding the tax changes in general (a government proposal to increase the basic VAT rate from 5% to 9%), a question hangs over whether this price increase is natural and whether it might be supporting the formation of a property market bubble. A comparison of flat prices and incomes may indicate the beginnings of a price bubble. At the end of 2006, the ratio of flat prices in Prague to wages was approaching the level recorded at the end of 2003 (see Chart III.10), when speculation on flat price growth connected with the Czech Republic's accession to the EU peaked. This growth ultimately failed to materialise.

On the other hand, the current rapid rise in property prices can be explained quite well by catching-up of the price level in the Czech Republic with that in other EU countries. According to the annual report of the European Council of Real Estate Professions, flat prices in Prague at the end of 2005 were 87.3% of those in Berlin, 70.8% of those in Hamburg, 81.9% of those in Vienna, 45.5% of those in Rome, 26.2% of those in Madrid and 23.5% of those in Paris.[57] In 1997–2005, meanwhile, house price inflation in the Czech Republic was not very high compared to the EMU countries (see Chart III.11). Property prices in the Czech Republic grew somewhat faster than in the euro area (by 13 percentage points in 8 years in the absolute index), but this was largely because the property price index in the euro area was affected by flat or falling prices in Germany. Up to 2005, property price growth in the Czech Republic lagged fairly significantly behind that in countries with stronger GDP growth (Ireland, Greece and Spain). As regards international comparisons, it is interesting to note that the slowest property price growth in the euro area is being recorded by Czech Republic's neighbouring countries and major trading partners, namely Germany and Austria (which saw price decreases of 2.7% and 2.8% respectively in 1997–2005). Absolute property prices in Germany and Austria are still slightly higher than in the Czech Republic, but the flat price to wage ratio for Prague is already 2.5–3 times higher than that in Berlin, Vienna or Hamburg.[58]

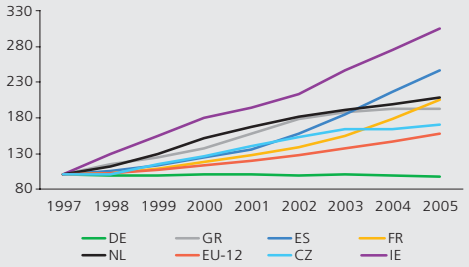
As regards regional price developments in the Czech Republic, the hypothesis of Prague as the price leader has been confirmed. Prices in other regions react with a lag. In the previous years of relatively stable price growth, there was a clear trend of price convergence across regions, with prices rising faster in regions with lower absolute prices than in those with high prices. In 2006, however, the price growth in other regions lagged somewhat behind that in Prague. This translated not only into an increase in the ratio of flat prices in Prague to the overall apartment price

CHART III.10
Ratio of apartment prices to annual wage
(ratio of price of 68 m² apartment to wage over past 4 quarters)



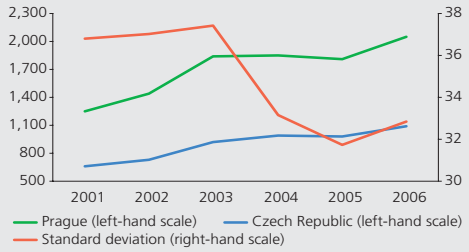
Source: CZSO, IRI, CNB calculation

CHART III.11
Property prices – international comparison
(absolute index; 1997 = 100)



Source: ECB, CZSO

CHART III.12
Price growth and price variation across regions
(average supply prices for year in CZK thousands; standard deviation in % of average)



Source: IRI, CNB calculation

55 In 2006, for the first time since 1992, the Czech Republic recorded a positive natural population increase. Coupled with high increases due to migration, the total population increase of 36,110 is the highest since 1979.

56 Originally, all flats with a floor area of up to 90 m² and family houses with a floor area of up to 150 m² were to have been excluded from the tax increase. Under the government's new proposals, these limits are to be increased to 120 m² for flats and 350 m² for family houses. This definition covers most of the housing currently under construction.

57 In Brno, flat prices were 73.3% of those in Berlin, 59.5% of those in Hamburg, 67.8% of those in Vienna, 38.2% of those in Rome, 22.0% of those in Madrid and 19.8% of those in Paris.

58 This ratio is, however, still at 68% of the level in Madrid and 88.5% of the level in Paris. Data from the annual report of the European Council of Real Estate Professions.

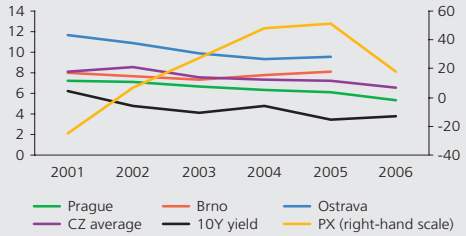
index, but also into an increase in the standard deviation across regions (see Chart III.12). This can be interpreted as an increase in uncertainty regarding property prices. At the same time, however, it suggests that the current price growth in Prague cannot yet be viewed as a general trend and we will have to wait and see whether it is confirmed by price increases in other regions.

Given the possibility of buying property more often for speculative purposes and the related potential property price bubble, it is also necessary to analyse the relationship between property prices, market rents and yields on alternative assets (e.g. long-term bonds or shares).[59] In recent years, market rents have shown consistently lower growth than prices, leading to a declining "rent return" (see Chart III.13).[60] Property supply prices in Prague, for example, increased by 24% between the end of 2004 and 2006, while rents fell by 1.5%. The rent return thus decreased by 1.2 percentage points. This widening of the gap between rents and property supply prices was recorded in a situation where long-term bond yields grew by 0.3 percentage point. A decrease in rent return is also apparent in other regions, where, however, the return is higher in absolute terms, chiefly because of lower supply prices. The dependence of rent return on the absolute price level suggests that the speculative motive is not currently dominant as regards households' investment in real estate. Given the concentration of housing construction in Prague and surrounds (see below), it is thus obvious that investors expect further growth in property prices in these regions.

The rent deregulation process under Act No. 107/2006 Coll. is new information with respect to the relationship between prices and rents. A positive aspect of the Act is that, unlike previous amendments, it aims to link the speed of rent deregulation with market factors. The rate of deregulation will thus be higher in regions with the highest degree of rent distortion (see Chart III.14). The objective of the Act is for regulated rents at the end of 2010 to reach 5% of the "target price" announced by the Czech Ministry of Finance.[61] The fact that this 5% is still below the rent return calculated in Chart III.13 and that the "target prices" are roughly 70%–80% of current market/supply prices means that distortions will remain on the property market even after the planned deregulations.[62] Nonetheless, it can be expected that in some regions the deregulation may affect unregulated rents and hence also prices (particularly in regions above the regression curve in Chart III.14, where rent deregulation is fastest relative to the current degree of regulation).

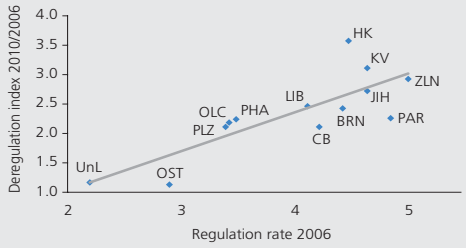
The rising property prices, together with the growing availability of loans for house purchase, has also generated a recovery in housing construction.[63] The number of housing starts is currently at its highest level since the first half of the 1990s, when the previous "social" construction of mostly prefabricated "panel" buildings (launched during the central planning period) was nearing completion (see Chart III.15). However, the number of housing completions fell by about 8% compared to 2004 and 2005. The rise in housing starts and the fall in housing completions

Chart III.13
Rent returns
(averages for year in %; comparison with yields on 10Y government bond and PX stock index)



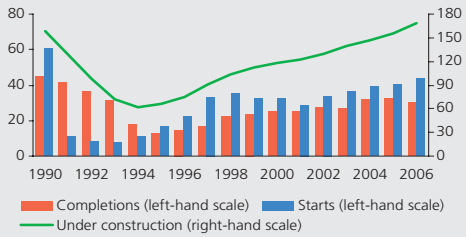
Source: IRI, CNB calculation

Chart III.14
Rent deregulation
(supply rents; deregulation calculated from Act; breakdown by regional capital)



Source: IRI, MF CR (Act 107/2006), CNB calculation
Note: City abbreviations given in abbreviations list. Regulation rate is ratio of non-regulated to regulated rent; deregulation index is ratio of calculated regulated rent in 2010 to present regulated rent.

Chart III.15
Apartment construction
(numbers of starts, completions and apartments under construction in given year in thousands)



Source: CZSO

59 A more detailed methodological discussion was given in the box *Property Price Determinants* in the 2004 Financial Stability Report, pp. 28–29.

60 Rent return = 12 * market monthly rent/supply price of flat.
This yield does not take into account wear and tear and other costs relating to ownership of the property (repairs, charges for some services etc.) or the "credit risk" associated with the tenant's potential failure to pay. Therefore, this yield should always be higher than yields on more liquid other assets, which are not burdened with such costs or risks (bonds, for example).

61 The exceptions are Prague 1 with 2.9%, Prague 2 with 3.65% and Prague 6 with 4.6% of the target price, and lower-quality flats.

62 The "target rent", i.e. rent after the deregulations in 2010, is on average 58% of the current supply rent, with a minimum of 41% in Ústí nad Labem and a maximum of 74% in Hradec Králové.

63 The feedback to prices via the increased supply of flats is not of great significance so far, as the ratio of all flats completed since the end of 2001 to the total housing stock this year is still relatively low (4.0%).

logically resulted in a rise in the number of flats under construction. This is at its highest level since 1989. An increasingly large proportion of the housing under construction is intended for sale[64] and a considerable part of it is debt financed. The increasing number of flats under construction (if the present number of completed flats were maintained it would take 5.6 years to complete the flats currently under construction) thus poses a risk. This is confirmed by microeconomic studies of specific property development projects in Prague.[65] These studies reveal a lengthening of the time it takes to sell apartments, which means additional costs for developers. These costs are of relatively low significance in the case of general growth in flat prices. If prices fall, however, they could become a risk factor as regards repayment of loans by these entities.

3.3 THE FINANCIAL INFRASTRUCTURE

Financial stability continued to be supported in 2006 by the smooth operation of the interbank payment system CERTIS and the short-term bond system SKD,[66] both of which are administered by the Czech National Bank. An upgraded version of CERTIS with greater capacity and lower running costs went live at the end of the year. Progress was also made with the SEPA (Single Euro Payment Area) project in 2006.

3.3.1 SKD and CERTIS – transaction volumes and recent developments

The Short-Term Bond System (SKD) is used for issuing and registering all book-entry securities with maturities of up to one year and for settling trades in these securities. 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. CERTIS (Czech Express Real Time Interbank Gross Settlement System) processes all domestic interbank transfers in Czech koruna in real time.

In 2006, SKD processed around 13,800 transactions with a total value of CZK 47,534 billion. Despite a decline in the number of transactions, their total value increased by 22% compared to 2005 (see Table III.1). An average of CZK 188 billion was processed every day. SKD's turnover in roughly 17 days equalled annual nominal GDP.

Smooth and stable interbank settlement is supported by the use of intraday credit (see Table III.1). The CNB uses intraday credit to provide additional liquidity to eligible entities (commercial banks in particular) in order to ensure smooth settlement of orders in CERTIS. The volume of intraday credit increased by about 90% in 2006 compared to the previous year, to CZK 6,884 billion, mainly due to pressure for use of this instrument to ensure smooth interbank payment processing. The volume of intraday credit had been increasing steadily in previous years as banks became more aware of how it can be used. Interest-free intraday credit is provided to CERTIS participants through SKD. This credit is collateralised, which reduces credit risk to the minimum possible level.

Table III.1
SKD – statistical information

Period	Total value of transactions (CZK billions)	Total number of transactions	Total volume of intraday credit (CZK billions)
2000	23,258	27,350	n.a.
2001	22,865	22,334	n.a.
2002	32,418	16,615	n.a.
2003	39,040	17,029	2,493
2004	40,713	16,214	3,055
2005	38,742	14,552	3,557
2006	47,534	13,810	6,884

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

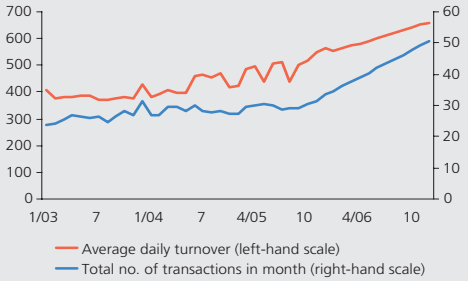
Source: CNB

64 In 2002, flats for sale after completion accounted for 19.3% of all completions, 20.4% of all starts and 14.5% of flats under construction. By 2005, the figures had risen to 34.4%, 37.9% and 19.8% respectively.

65 Housing construction is concentrated mainly in Prague and the Central Bohemia Region, which accounted for 36.9% of housing completions and 37.3% of housing starts in 2006. See Čápová, D.: *Vývoj cen bytů a nemovitostí určených pro bydlení – realitní bublina v Praze* (Flat and Residential Property Prices – A Real Estate Bubble in Prague). In: Proměny bydlení. Ostrava: VŠB-TUO, 2006, díl 1.

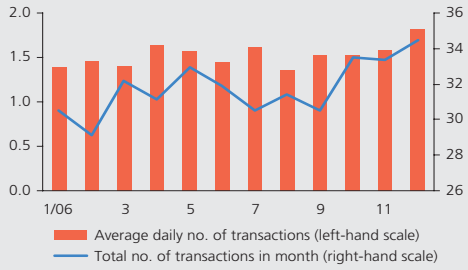
66 A more detailed description of these systems is given in the 2004 Financial Stability Report. Risk management and the evaluation of these systems against international standards is dealt with in the 2005 Financial Stability Report.

CHART III.16
CERTIS interbank payment system: Number of transactions processed in 2003–2006
(turnover in CZK billions; number of transactions in millions)



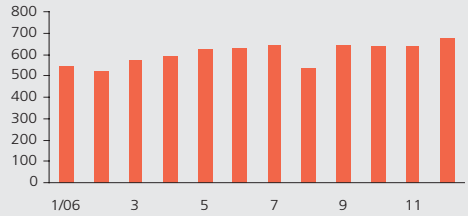
Source: CNB

CHART III.17
Number of transactions processed by CERTIS in 2006
(millions)



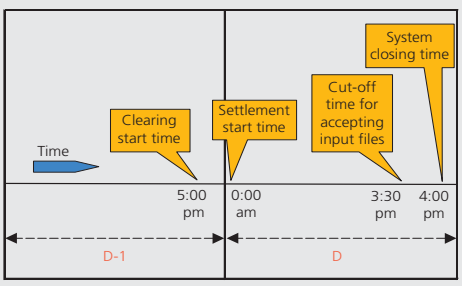
Source: CNB

CHART III.18
Average daily turnover in CERTIS in 2006
(CZK billions)



Source: CNB

CHART III.19
CERTIS interbank payment system – operating cycle



Source: CNB

SKD recorded no system-relevant failures in 2006; the percentage uptime was 99.8%. This demonstrates that the CNB also pays sufficient attention to SKD operational risk management. The business continuity plan is tested twice a year with the involvement of SKD participants.

As in previous years, CERTIS ran smoothly in 2006, with a continued upward trend in the number of payments settled (see Table III.2). CNB Clearing processed 381.7 million items totalling CZK 151,537 billion, which represents a rise of 23% compared to 2005. The average daily number of items processed was 1.52 million and the average daily value of the items was CZK 603.7 billion (see Charts III.16–III.18). These figures reveal the extent of payment settlement in CERTIS and its significance for financial stability. It took roughly five and a half working days to reach a turnover equal to annual nominal GDP.

Even the record number of items (4.949 million) processed in one day in September 2006 caused no problems and posed no threat to the smoothness of settlement, even though this figure is close to the capacity of the former CERTIS technical platform. The 2005 maximum number of items processed was exceeded by about 10%.

In November 2006, a new CERTIS system was successfully put into routine operation (see Chart III.19). CERTIS was upgraded due to increasing demands on the system's capacity and efforts to cut running costs. This made it possible to reduce prices for users. The upgrade, which involved transferring the core of the old system to a new platform, allowed the existing functions and tried-and-tested standards to be preserved while significantly reducing the risk of system overload and the risks to smooth and secure settlement. Whereas the former system had processed about 400,000 items an hour, tests of the new system proved its ability to handle up to 1 million items an hour. On 1 August 2006, the old and new systems started operating in parallel. This proved that the data processing results were the same in both systems. Since the data transfer format was unchanged, banks merely had to redirect their communications.

The CNB's fee-charging policy is managed with a view to promoting smooth settlement, enhancing payment system efficiency and increasing the number of non-cash payments executed in the Czech Republic. The fees are derived from the number of transactions entered into the system and from the time of entry. The fee per item increases as the day progresses – the fee band applied depends on when the payer's bank sends the relevant files to the CNB. The available statistics show that most client items are sent in the cheapest bands at night or in the early hours of the morning (formerly CZK 0.25 and CZK 0.65 per item respectively, and since 1 January 2007 CZK 0.22 and CZK 0.40 respectively). The other bands – the fees for which were formerly as high as CZK 200 (CZK 100 since 1 January 2007) – are used primarily for transfers covering securities transactions or transactions between banks, or for urgent interbank payments. For banks that transfer large numbers of items the central bank provides quantity discounts that depend on the total number of transactions sent for settlement per month (for monthly volumes of between 250,000 and 2.5 million the discount is CZK 0.04 per transaction; for the next band – up to 5 million – the discount is CZK 0.08 per item; and above this level it is CZK 0.13 per item).

3.3.2 Monitoring of European trends

The CNB actively monitors developments in the European infrastructure and issues associated with the EU's new payment framework. CNB representatives work in the relevant ECB committees and working groups, are involved in the preparation of the Payment Systems Directive and, together with the Czech Banking Association, monitor progress with preparations for the Single Euro Payment Area (SEPA).[67]

The establishment of SEPA is considered the most important payment systems project in Europe. SEPA will enable clients to execute any euro payment transfer from a bank account or by card under the same conditions as in the existing national payment systems. All payments should be at least as safe and efficient as in the current best national systems and should have the character of domestic services. The SEPA implementation process has been divided into several phases for 2008–2010. SEPA is a voluntary initiative of commercial banks. The main co-ordinator and decision-making body for banks in relation to SEPA issues is the European Payments Council. The Czech Banking Association has been an EPC member since 2004. The successful involvement of Czech banks' representatives in the EPC, and specifically in the direct debit working group, is evidenced by the incorporation of the Czech direct debit system into the Direct Debit Scheme Rulebook and its approval as fully SEPA-compatible.[68]

Thanks to EPC membership Czech banks obtain regular information about progress with the SEPA preparations and can prepare in good time for costly changes. For banks, however, the introduction of SEPA products will mean large investments in system modifications,[69] increased expenses and increased competition. SEPA will ultimately affect all bank clients, i.e. the whole financial sector. The CNB is working in partnership with the CBA to prepare documents governing the implementation of the main payment instruments after 1 January 2008.

The Czech Republic will have to adapt to the SEPA standards for euro payments only (both domestic and cross-border). Given also that most payments in the Czech Republic are denominated in korunas,[70] there is no danger of commercial banks active in the Czech Republic being unable to perform the tasks that the project will impose on them in 2008–2010. When the euro is adopted in the Czech Republic, all the agreed standards for cross-border payments will have to be in place. For this reason, the SEPA issue is included in the mandate of the NCG[71] Financial Sector Working Group. This group is responsible for preparing the payment and settlement system conversion plan, connecting to the European payment system and making changes to the domestic interbank payment system.

67 See also Opravilová, R. (2006): *Aktuální výzvy v oblasti finanční infrastruktury* (Current Challenges in the Financial Infrastructure Area). Bankovnictví, 20 October 2006.

68 Unlike the method usually applied in the Czech Republic, the direct debits frequently used in Germany, Italy and France are based on a high degree of trust between payers and beneficiaries, supported by strict legislation in this area. The Czech method is fully automated and risk-free for both clients and banks: consent to debit is checked by the payer's bank, and the beneficiary's bank credits the funds to the beneficiary's account only after obtaining payment from the payer's bank.

69 For example, orders and Swift messages will have to be extended to include a number of fields, e.g. the identification code of the payer and the identification code of the beneficiary.

70 SEPA applies to euro payments only. A new directive on payment services has been prepared in parallel with the SEPA project. This governs payment conditions in the EU as a whole regardless of the payment currency.

71 The National Co-ordination Group for the Introduction of the Euro.

4 THE FINANCIAL SECTOR

The financial sector recorded a strong performance and very good profitability in 2006. The banking sector's results can be viewed as above-average by international comparison, despite some decline in profitability compared to the previous year. The insurance industry saw a modest slowdown in annual premium growth. Life insurance premiums recorded renewed growth, sufficient to offset a lower rise in non-life insurance premiums. Insurance companies increased their return on equity to the level of banks. Pension funds registered a rise in the number of planholders and growth in planholder contributions. Investment companies and intermediaries headed by banks widened the supply of investments in both domestic mutual funds and foreign assets and foreign funds. These tendencies lay the groundwork for continued financial stability in the years to come.

These positive trends in the development of the financial sector simultaneously entail some potential risks. Growth in loan defaults in the event of an economic weakening or an unexpectedly large increase in interest rates may become a problem. This would increase the interest costs on debt incurred in previous periods and could thus cause repayment difficulties for some entities. This applies in particular to some groups of households showing signs of heavy credit commitments, possibly as a result of overestimating their income potential.

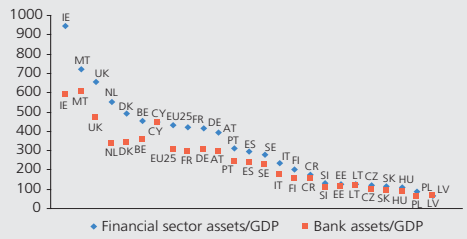
Free access to the financial market, or the recognition of licences granted in one EU member state in other EU countries and the freedom to provide services, has led to a rise in the number of branches and notifications of banks, insurance companies and investment firms on the domestic market. The financial sector's ownership and operational links with other countries are making the sector stronger, but may also mean potential transmission of elements of instability. The present economic growth and stability in the home countries of the parent companies of financial institutions in the Czech Republic are positively affecting the sector's overall financial stability.

4.1 STRUCTURE OF THE FINANCIAL SECTOR

The relative size of the Czech financial sector remains unchanged by international comparison. A comparison with the euro area countries reveals a relatively large banking sector and suggests growth potential in particular market segments. The volume of credit to households and corporations in relation to GDP still lags behind that in the euro area. As regards the structure of the financial sector, regulated banking groups (holdings), which are recording high profitability, exercise substantial influence. The concentration of the banking sector and the market shares of large banks are comparable with the EU average. A characteristic feature of the Czech Republic is the foreign ownership of a major part of the financial sector. Although the positive effects of the Czech financial sector's international links have so far predominated, a negative impact of some of the risks arising from such close links cannot be ruled out in the future.

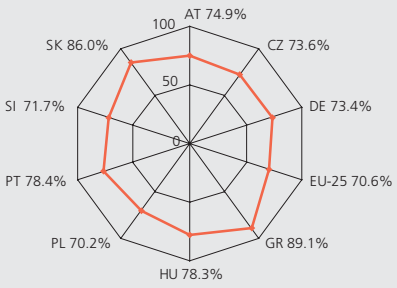
Financial intermediation in the Czech Republic, as measured by the volume of assets of financial institutions, grew by 7% year on year in 2006. Owing to similar nominal GDP growth, the depth of financial intermediation (as measured by the ratio of financial sector assets to GDP) was virtually unchanged and continued to fluctuate around 130%. This is roughly one-third of the figure for the euro area countries (see Chart IV.1). As for the banking sector itself, which constitutes the core of the Czech financial sector, the Czech Republic's ratio of total assets to GDP of 98% at the end of 2006 makes it one of the leaders among the new member states of the EU. Higher ratios are recorded only by Slovenia and the Baltic States. The roughly three-quarter share of banks in the Czech financial sector is higher than the EU average, but is comparable with Germany and Austria, for instance (see Chart IV.2).

CHART IV.1
Financial sector and bank assets
(% of GDP)



Source: CNB, CZSO, ECB
Note: Data for 2005. High figures for LU not included.

CHART IV.2
Share of the banking sector in financial sector assets
(%)



Source: CNB, CZSO, ECB, central banks
Note: Data for 2005. SK excluding pension funds. Data for CZ, HU, PL, SK, SI unconsolidated.

The Czech Republic's financial system consists of banks, credit unions, insurance companies, pension funds and other financial intermediaries, such as investment companies administering open-ended mutual funds, leasing companies, other lending companies (hire-purchase companies, factoring companies) and non-bank investment firms (see Chart IV.3). Structural changes over the last ten years have led primarily to an expansion in insurance companies, pension schemes and companies providing non-banking financial services and loan intermediation. Although bank assets have increased in absolute terms, their share in the financial sector has decreased owing to rising non-bank competition (see Chart IV.4). The share of bank assets in financial sector assets has long been gradually decreasing. The weights of investment companies and funds have also decreased due to past restructuring (see Chart IV.5).

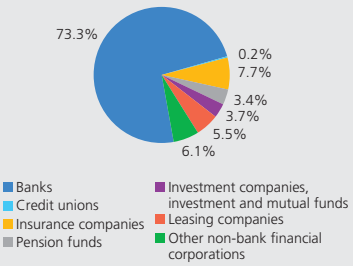
A comparison with the advanced EU economies implies growth potential for almost all segments of the Czech financial market. The Czech Republic is below the level of the euro area countries in lending, insurance and client investment. The ratios vis-à-vis the euro area did not increase year on year in 2006. The volume of loans in relation to GDP is constantly one-third of that in the euro area (see Chart IV.6) and the total financial investment of insurance companies is roughly one-fifth. The assets of pension planholders relative to GDP are still 30% of the relative size in the euro area. In the case of domestic investment and mutual funds the equivalent figure is under 10%. Financial sector assets per capita in the countries of the Central European region, including the Czech Republic, are several times lower in absolute terms than the European average (see Chart IV.7).

As regards the degree of concentration in individual sectors, the five largest banks and insurance companies had market shares of approximately 74% in the relevant markets of household deposits and life insurance premiums. Larger pension funds and investment companies offering domestic mutual funds have a relatively strong position on the relevant markets. According to the available data, the supply of foreign funds also shows higher concentration. Concentration in the leasing market is lower (see Chart IV.8).

The concentration of the Czech banking sector and the shares of the largest banks in total assets are comparable with the European average. In 2006, the concentration of the banking sector in the Czech Republic decreased slightly in year-on-year terms (see Chart IV.9).[72] In the Czech Republic, the share of the five largest banks in the sector's total assets was 64% in 2006 (compared to the EU average of 60% in 2005). Higher concentration is typical of some countries with smaller banking sectors. The degree of concentration in individual countries may also be affected by strategy changes at bank level and by the continuing process of market consolidation through mergers and acquisitions. The entry of branch offices with single European licences had no major effect on the market, and the entry of companies from the EU temporarily providing services on the host market is specified only by their registration.

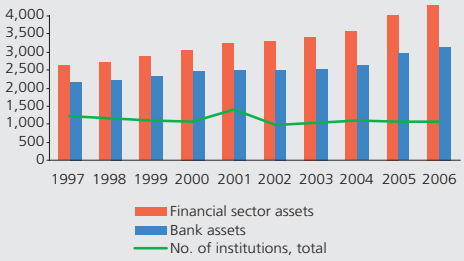
Foreign owners play an important role in the Czech financial sector.[73] At the end of 2006, foreign capital controlled 97% of the total assets of the banking sector and 75% of the total assets of the insurance sector. Foreign investors still have only a minority influence in non-bank investment firms and pension funds (40% and

CHART IV.3
Shares in financial sector assets
(as of 31 December 2006; %)



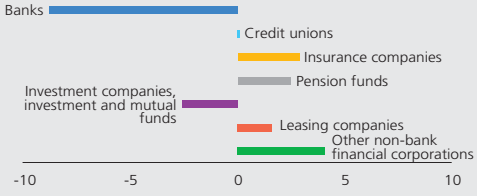
Source: CNB, CZSO

CHART IV.4
Number of institutions and volume of assets in the Czech financial and banking sectors
(CZK billions; number)



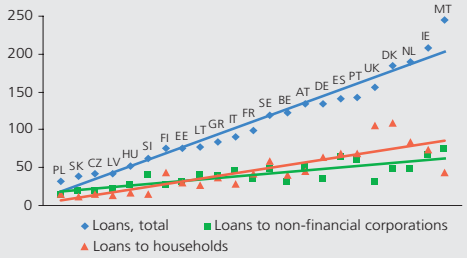
Source: CNB, CZSO

CHART IV.5
Rise/fall in share in financial sector assets, 1997–2006
(percentage points)



Source: CNB, CZSO

CHART IV.6
Comparison of loans
(% of GDP)

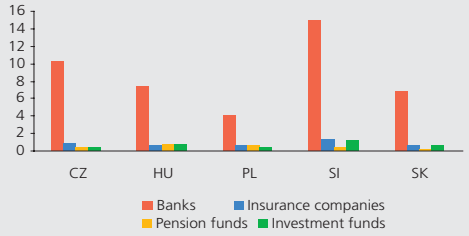


Source: CNB, CZSO,
Note: Data for 2005. Data were not available for CY. LU not included. Lines show linear fit.

72 At the end of 2006 the Herfindahl index of concentration of the Czech banking sector was 1,038, compared to 1,151 in 2005, while the EU average in 2005 was 1,153. In addition to Herfindahl index values, market shares contain information on concentration.

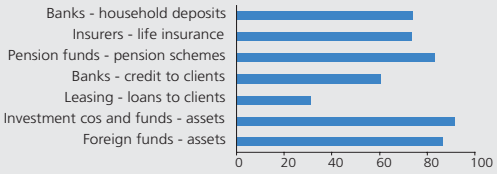
73 The benefits and risks arising from foreign ownership of financial institutions are analysed in more detail in Davidová, P., Heřmánek, J. and Opravilová, R.: *Různé aspekty zahraničního vlastnictví ve finančním sektoru* (Various Aspects of Foreign Ownership in the Financial Sector). Bankovnictví 9/2006.

CHART IV.7
Financial institution assets per capita
(EUR thousands)



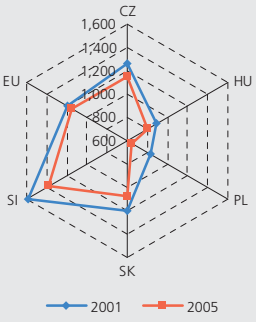
Source: CNB, ECB
Note: Data for 2005. Financial investments are shown for insurance companies.

CHART IV.8
Market shares of the five largest companies on the relevant market
(%, 2006)



Source: CNB, AKAT

CHART IV.9
Herfindahl indices for banking sector assets



Source: CNB, ECB

TABLE IV.1
Foreign ownership in banking sectors
(% of assets controlled by foreign entities)

	2001	2002	2003	2004	2005
			Foreign		
Czech Rep.	95	93	96	96	96
Hungary	64	57	57	59	59
Poland	69	67	68	67	69
Slovakia	89	95	95	97	97
Slovenia	15	16	18	19	21
EU	23	22	23	24	26
			EU		
Czech Rep.	90	88	90	91	91
Hungary	56	57	54	56	56
Poland	60	59	59	59	59
Slovakia	86	92	93	94	95
Slovenia	15	16	18	19	21
EU	16	15	15	17	18

Source: central banks, ECB

36% respectively). Most owners are registered in EU countries. In some cases the ownership structures are complicated and the direct owners of entities active in the Czech Republic are not always the final owners, i.e. the ones that make the decisions. The representation of foreign owners among banks' shareholders is also relatively high in the other new Central European members of the EU (see Table IV.1).

Some foreign institutions prefer to provide financial services in the Czech Republic through branches.[74] At the end of 2006 foreign bank branches managed 9.3% and branches of foreign insurance companies 10.2% of the total assets of the relevant sector. All bank branches carry on their activities under the single European licence. As for insurance companies, 15 of the total of 16 branches have a European licence. In the case of branches, powers and responsibilities are divided between the host and home regulator and supervisor. Most powers lie with the home authority, but a large proportion of the responsibilities remain with the host authority.

Foreign financial institutions from the European Economic Area (EEA) also operate in the Czech Republic through notifications. The number of notifications rose further in 2006, to 137 for banks, 401 for insurance companies and 293 for non-bank investment firms (see Chart IV.10). Notified institutions are subject neither to the regulations in force in the Czech Republic nor to CNB supervision.

From the point of view of the stability of the financial system as a whole, a major role is played by the links between financial institutions operating in various segments of the financial sector. The position of major banks heading financial groups and their capital participation in subsidiaries allow them to exercise an influence in the insurance and pension scheme industries, in capital market undertakings and in financial leasing and factoring, as well as to influence the real estate market via specialised companies. Domestic large banks controlled 39% of the private pension market and almost 24% of the life insurance market in 2006 (see Chart IV.11). On the capital market, banks act as investment firms and – via subsidiary investment companies – administer domestic mutual funds.

The ownership and operational links between banks and their subsidiaries and other companies in the Czech Republic is concentrated in nine banking financial groups (holdings usually headed by banks) and in one financial conglomerate headed by an insurance company. The assets of these groups after consolidation, i.e. the inclusion of also non-bank members of regulated consolidated groups, made up around 74% of the financial sector's total assets at the end of 2006 (see Chart IV.12). Regulated consolidated groups contained 133 entities and book-consolidated groups 217 entities. After set-off of mutual claims and liabilities within holdings, the capital adequacy ratio per regulated group was 10.9% on average, hence satisfying the required regulatory minimum of 8%. It was usually lower than the capital adequacy ratio on a solo basis for the individual bank and also relative to the sector as a whole. Bank holdings (headed by banks owned or controlled by foreign banks) generated extraordinary profits and high return on assets and equity (see Chart IV.13).

Regulation and supervision on a consolidated basis complements and extends the usual obligation of supervised entities to provide information about prudential business on a solo basis. It ensures that regulated entities separately as well as financial entities – in the case of the Czech Republic usually banks heading a

74 The reasons underlying decisions on legal forms of business in other countries are discussed in more detail in the 2005 Financial Stability Report, section 4.8 *International Aspects*.

group – fulfil prudential criteria for maintaining stability.[75] Supervision of regulated consolidated groups also involves monitoring credit exposure limits and compliance with those limits among regulated consolidated group members, supervising the necessary capital covering risks and potential losses in the financial group, and monitoring ownership structures, relationships within groups and the reporting obligation. The present supervision is designed to prevent any potential contagion arising inside and outside the group in good time. By complying with the credit exposure limits and capital requirements, a parent bank heading a group should be able to cover its own risks and the risks of its subsidiaries.

Owing to the concentration of capital and the owner's influence, large financial institutions (groups) may be a source of systemic risk. In this regard, an extensive discussion is under way in the EU about the supervision of such entities and the application of a unified approach in cases where such entities fail. The Commercial Code, the Act on Financial Conglomerates, the Act on Banks and other sectoral laws lay down the financial and regulatory obligations of the parent undertaking, and, where applicable, of its subsidiaries, in relation to the risks and resolution of adverse financial situations within the group.

4.2 THE BANKING SECTOR

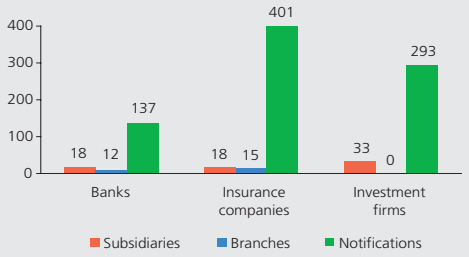
The overall assessment of the banking sector showed no major changes with regard to financial stability in 2006. The rate of growth of client loans was the highest since 1996, approaching the 20% level at the end of the year. Overall, the growth in lending is associated with the buoyant economic activity and rising household demand for financing of owner-occupied housing. The risk elements include a high proportion of loans to corporations with a floating interest rate or a rate fixed for up to one year and high growth in loans to property developers. High profitability is a precondition for maintaining the sector's stability in the years ahead. In the context of a high ratio of dividends paid there was a modest decline in the sector's capital adequacy, although this may indicate more efficient utilisation of bank capital. Stress tests confirm the current ability of banks to withstand significant macroeconomic shocks.

4.2.1 Loans and credit risk

The annual rate of growth of client loans increased during 2006 from 16.6% in January to 19.9% at the end of the year, the highest figure since 1996. Credit granted by the banking sector totalled CZK 1,413 billion at the end of 2006. The fastest growing sector in the lending area in 2006 was the household sector, followed by non-financial corporations. Households' contribution to the overall annual increase in bank loans was 49.2% and the corporate sector's contribution was 46.9% (see Chart IV.14). As regards the credit structure, corporations are still the main debtor of banks, with a 45% share of total loans. This share has remained virtually unchanged since 2003. The share of loans to households continues to increase; the current figure of 35% is almost four times higher than in 2000. Loans

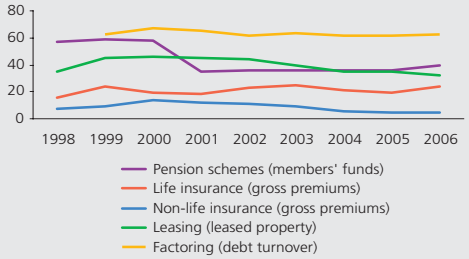
75 The EU directive on financial conglomerates, which has been incorporated into Czech law by Act No. 377/2005 Coll. on Financial Conglomerates, tightens up the prudential, and in particular capital, requirements placed by the regulator on financial groups meeting the definition of a financial conglomerate, thereby enhancing the stability of financial groups and the financial soundness of the system as a whole. At the end of 2006, a total of 81 financial conglomerates had been identified at EEA level. Although only one financial group is at present subject to the provisions regarding financial conglomerates in the Czech Republic, banks (8 banks and all 6 building societies), foreign bank branches (6) and insurance companies (11) operating in the Czech Republic are members of 15 financial conglomerates based in other EEA countries. These are major players on the domestic market. Also, some unregulated credit institutions operating in the Czech Republic are members of larger regulated groups subject to supplementary supervision of financial conglomerates in the EU.

CHART IV.10
Presence of foreign financial institutions in the Czech Republic
(numbers as of 31 December 2006; with registered offices in EU, including indirect ownership; IFs exclude banks)



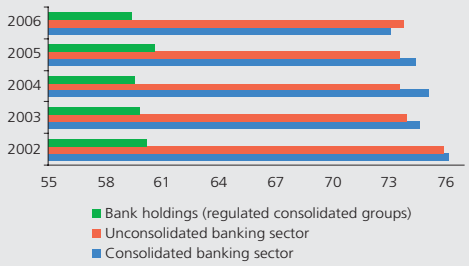
Source: CNB

CHART IV.11
Market shares of banking financial groups
(%)



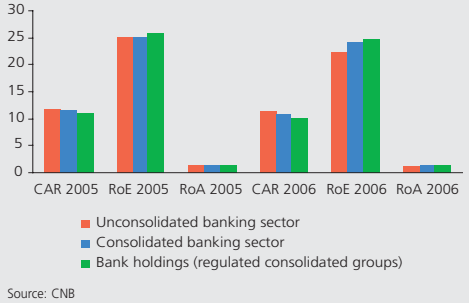
Source: CNB, APF ČR, ČAP, ČLFA

CHART IV.12
Shares of groups and the banking sector in the financial sector
(%)



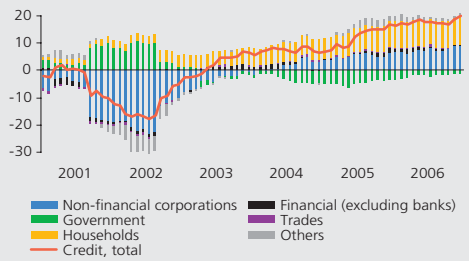
Source: CNB

CHART IV.13
Capital adequacy and profitability of groups and the banking sector
(%)



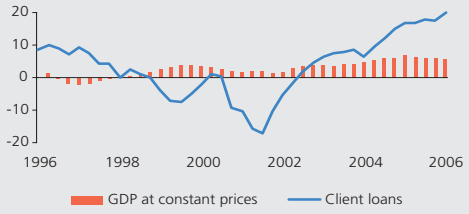
Source: CNB

CHART IV.14
Contributions of sectors to annual rate of growth of bank lending
(%)



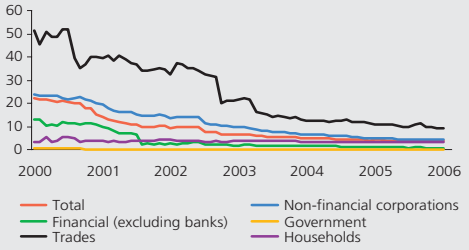
Source: CNB

CHART IV.15
Client loans and real GDP
(%; year-on-year growth)



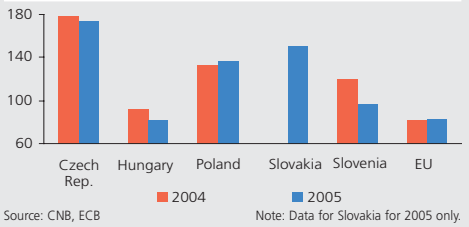
Source: CNB, CZSO

CHART IV.16
Non-performing loans by economic sector
(% of total loans of given sector)



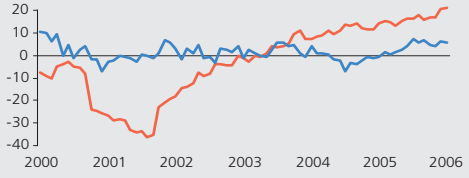
Source: CNB

CHART IV.17
Financing of client loans by primary deposits
(deposits as % of loans)



Source: CNB, ECB
Note: Data for Slovakia for 2005 only.

CHART IV.18
Loans to non-financial corporations and business confidence
(% annual changes in loans and annual differences in business confidence indicator)



Source: CNB, CZSO

were again the main driving force of growth in total bank assets; their share of banks' balance sheets continued rising in 2006.

The rise in lending also means a rise in credit risk exposure. In its ultimate form, this is the risk of default on a loan or part thereof, or of default on contract leading to delayed repayments. This is the largest risk to which banks in the Czech Republic are exposed. The current high rate of growth of bank loans and growth of the Czech economy are mutually conditional (see Chart IV.15). Economic growth is at the same time a factor that mitigates credit risk, since it tends to help individual entities meet their obligations on time and in full. The effect of macroeconomic developments on the credit risk of banks was tested as part of the stress testing exercise. The stress tests confirm banks' resilience to adverse macroeconomic shocks at the end of 2006.[76]

The favourable economic environment is increasing demand for credit and at the same time improving the financial condition of debtors. This is leading to a decline in the share of non-performing loans in total loans. At the end of 2006 this share was 3.6%, down by 0.5 percentage point year on year (see Chart IV.16). New loans are usually provided in the highest quality category, i.e. as standard loans. Problems with their repayment, leading to reclassification from the standard to the non-performing category, emerge some time later. Loan quality expressed as the percentage of non-performing loans is not the best indicator at a time of fast credit growth. The alternative flow indicator – the default rate – is a more reliable measure (see section 2.2). It suggests that the quality of loans assessed using stock variables is slightly overvalued at present owing to the buoyant growth in lending. As regards economic sectors, general government recorded the lowest share of non-performing loans in total loans at the end of 2006, with 0.14%. The worst quality was recorded by loans to small businesses (trades), where almost one-tenth of the total volume had not been repaid in compliance with the terms of contract at the end of December 2006.

Client deposits, which have long been roughly 1.5–1.8 times higher than loans to clients, are the most important source of loan financing (see Chart IV.17). The deposit/loan ratio is falling as lending gradually rises. In the future, this trend may be bolstered by a fall in deposits due to clients' efforts to achieve higher yields and, in the case of households, because of the need to provide for old age. By international comparison, financing of client loans by primary deposits is relatively high in the Czech Republic. It is more than twice the average in the EU, where banks obtain additional necessary external funds primarily on the interbank market and capital market.

4.2.2 Loans to non-financial corporations

Bank loans are a very important source of external financing for non-financial corporations. The rate of growth of such loans is gradually accelerating (see Chart IV.18). The present favourable economic climate is increasing corporations' need for external financing and thus also for bank loans. The main risks arising from the continued growth in loans to corporations include potential unfavourable developments in the balance sheets of major debtors and a potential softening of credit standards by banks owing to competitive pressures and the strong position of major clients. Another risk element is the preponderance of loans with a floating rate or a rate fixed for up to one year, which, in the case of long-term loans, may at a time of rising rates put a substantial burden on corporations in the form of interest payments and lead to a rise in defaults.

76 See the article *Credit risk and stress testing of the banking sector in the Czech Republic* in the thematic part of this report.

The annual rate of growth in loans to the corporate sector was 20.9% at the end of 2006, up by 6.6 percentage points compared to 2005. These loans totalled CZK 635 billion at the end of 2006, the largest part being channelled into manufacturing, wholesale and retail trade and the real estate business (see Chart IV.19). Nonetheless, with a share of 33% the real estate business accounted for most of the rise in loans to the corporate sector. Loans provided to companies operating in this area have been growing rapidly since the second half of 2003, and the growth rate was 35–40% throughout 2006. The volume of these loans has trebled since the end of 2002, in line with the similarly high growth in loans for house purchase in the household sector and with the trend in the residential property market (see section 3.2). The recoverability of loans provided to developers may potentially be a problem (see section 3.2).

The share of non-performing loans in total loans to non-financial corporations fell by 0.6 percentage points last year to 4.5% in December. The ratio of standard loans to non-performing loans changed during 2006 in favour of standard loans most markedly in construction (see Chart IV.20).

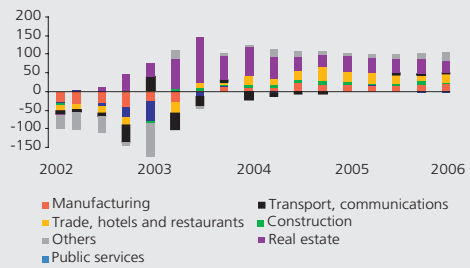
4.2.3 Loans to households

2006 saw continued buoyant growth in loans to households, which amounted to CZK 495 billion as of 31 December 2006. The annual growth rate was 30.4%, 3.6 percentage points lower than in 2005 (see Chart IV.21). Although the rate of growth slowed slightly, the total annual increase was 20% higher than in 2005. The strong dynamics caused by the low base are thus starting to subside.[77] At the end of 2006, the share of loans for house purchase was 75% and that of consumer credit was 20%. The breakdown by purpose thus remained virtually unchanged during 2006. The share of non-performing loans in total loans to households fell below 3% for the first time since 2000. Quality is being affected by the large volume of new loans and the dominant share of less risky loans for house purchase. Bank loans are a significant component of total household debt and in some cases may represent a very substantial burden for households. The growth in debt is feeding back into the overall financial condition of households and their consumption (see section 2.3).

The rising indebtedness of households in the Czech Republic in 2006 is a result of both current and expected income growth, competition between banks and persisting low interest rates. Uncertainty regarding future property prices has also probably played an important role in demand for loans (see section 3.2). This is largely due to uncertainty regarding the VAT rate on construction work as from 2008. Another factor common to all the new EU members is the still low level of household debt. The rate of growth in the new member states is thus much higher (see Chart IV.22). The volume of loans for house purchase is higher than that of consumer credit in all EU countries.

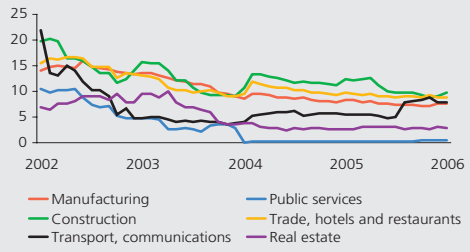
In 2006, banks attempted to increase their market shares not only by providing new loans, but also by assuming existing loans granted by other banks. In loan consolidation, clients are usually offered lower interest rates or the opportunity to increase the consolidated loan to an amount exceeding the sum of the existing loans. Competition in the lending area is increasing and is visible in a wide range of prices of comparable loans and in fee discounts. The spread of interest rates is quite wide (see Chart IV.23).

CHART IV.19
Shares of industries in total annual increase/decrease in credit to corporations
(%)



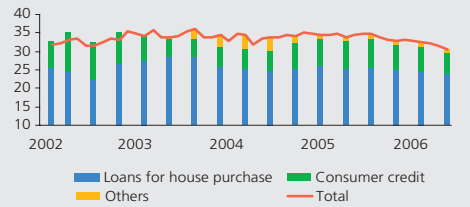
Source: CNB

CHART IV.20
Non-performing loans by industry
(% of total loans of given industry))



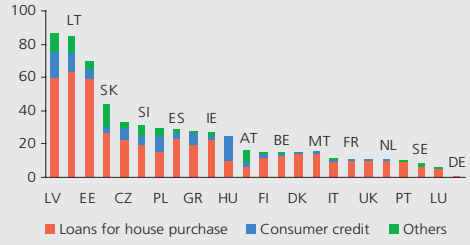
Source: CNB

CHART IV.21
Contributions to annual rate of growth of credit to households
(%)



Source: CNB

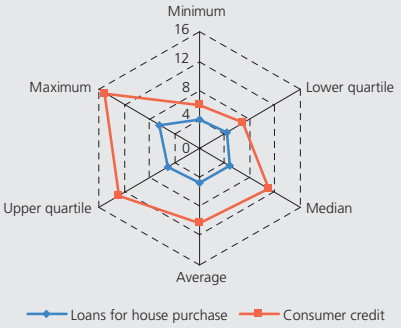
CHART IV.22
Contributions to annual rate of growth of credit to households in EU countries
(%; 2005)



Source: CNB, ECB

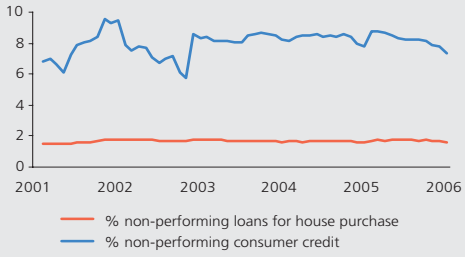
77 For comparison, the 10% increase represented CZK 21 billion in 2004 and as much as CZK 38 billion in 2006.

CHART IV.23
Rates on koruna credit to households
(%; outstanding amounts as of 31 December 2006)



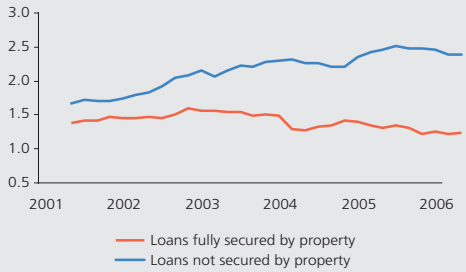
Source: CNB

CHART IV.24
Non-performing loans for house purchase and consumer credit
(% of total loans of given purpose)



Source: CNB

CHART IV.25
Non-performing loans to households for house purchase
(% of total loans of given type)



Source: CNB

From the banks' point of view, the most risky form of credit is consumer credit, which is not usually secured by collateral (see Chart IV.24). For this reason, the CZSO focused on consumer credit in its "2005 Living Conditions" survey (see Box 4). The share of non-performing loans in total consumer credit fell to 7.3% at the end of 2006.

Loans for house purchase ended 2006 with a 1.6% share in non-performing loans, which is comparable with the end of the previous year. These loans, however, do not form a homogeneous group. Roughly 64% of them are fully secured by property. Lower-volume loans usually take the form of building society loans not secured by property and special-purpose consumer credit. The quality of loans secured by property is higher than that of unsecured loans (see Chart IV.25). The share of non-performing loans is about 1 percentage point lower and stood at 1.3% at the end of 2006.

Mortgage loans are much more secure from the banks' point of view thanks not only to the existence of pledged property, but also to relatively low ratios of the value of the loan to that of the pledged property. In 2006, most banks provided mortgage loans to households for house purchase with an LTV (loan-to-value) ratio between 45% and 65%. The sector average was just under 53% at the end of 2006 (compared to 55% at the end of 2005). Property collateral is one way of reducing the risk weight of a loan when setting capital requirements for credit risk. Banks can achieve large capital savings by applying procedures under both the original Basel I framework and the new Basel II framework.

From the point of view of the financial sector, the growth in household debt cannot be viewed as particularly risky. In addition to enforcement of collateral, creditors can resolve any problems that might emerge especially in the low-income debtor segment, by means of execution of property.[78] Execution has been part of the Czech legislation for several years now. On the other hand, personal bankruptcy might provide some form of protection for households with excessive debt (see Box 3).

4.2.4 Market risk

Market risk consists in the potential to incur losses due to movements in the market prices of individual asset and liability items in banks' balance sheets. Given the prevailing types of banking operations in the Czech Republic, market risk poses a significantly smaller potential threat than credit risk. Capital requirements for market risk amount to less than one-tenth of those for credit risk. Banks are required to hold a necessary volume of capital for interest rate risk, foreign exchange risk, equity risk and commodity risk. Recent fluctuations on global financial markets suggest the risk of a rise in asset price volatility at a time of correction following a relatively long period of low interest rates and low volatility (see section 3.1). For the Czech banking sector, however, the potential loss from a decline in commodity prices or on the stock market is limited by the small volume of these assets in banks' balance sheets. As part of the stress testing exercise, banks were exposed to shocks simulating significant negative changes to interest rates and exchange rates. The tests confirm banks' resilience to such shocks at the end of 2006.

78 This topic is analysed in Box 3: *Enforcement of Claims against Corporations and Households – Bankruptcies and Executions* in the 2005 Financial Stability Report.

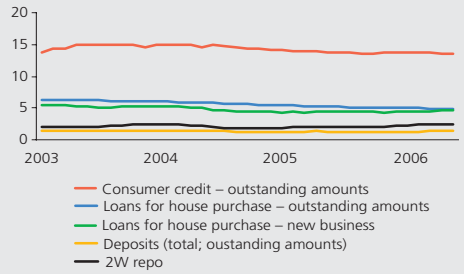
Interest rate risk, namely the risk of incurring losses due to a change in interest rates, is the most significant market risk of the Czech banking sector.[79] From the point of view of the regulatory requirements for the creation of a sufficient capital cushion to absorb potential losses, this is the largest – roughly 86% – item of the capital requirements for market risk coverage (3.4% of the total capital requirements). The central bank's key rate, which in the Czech Republic is the two-week repo rate (see Chart IV.26), is the most important rate as regards market behaviour. In commercial banking, however, there is typically a lag in the pass-through of changes in the CNB's monetary policy interest rates, mainly due to the level of competition on the market. Long-term interest rates are also affected by the expected path of interest rates.

Banks manage their interest rate risk using methods of varying sophistication, ranging from volume limits, gap analyses, durations, changes in interest income and PVBP (present value of a basis point) through to scenario analyses or Value at Risk. Fixing interest rates for a pre-set period makes it easier for banks to manage interest rate risk in client transactions. Over 90% of loans to the corporate sector are provided with a floating rate or a rate fixed for up to one year, for example (see Table IV.2). For loans to households for house purchase, the corresponding figure is just 38.7%. This method of setting interest rates enables banks to react flexibly to market developments. From the financial stability point of view, however, a floating rate or a short fixation can also have a negative impact, since more defaults can be expected in times of interest rate growth, particularly in the case of long-term loans.

Foreign exchange risk is the risk of incurring losses due to negative movements in exchange rates. A bank's exposure to foreign exchange risk depends on the frequency, volume and type of transactions it executes. In 2006, the average representation of foreign currencies in banks' balance sheets was just under 20% on the asset side and just over 16% on the liability side. Foreign exchange risk is one of the most significant types of market risks for Czech banks, although from the quantitative point of view it is currently low. The overall foreign exchange position is almost balanced on a long-term basis and the net positions of individual currencies relative to overall foreign currency assets are very low (see Chart IV.27). The limits set for open currency positions, which are designed to minimise any negative effects relating to foreign exchange risk, are currently substantially higher than the actual positions.

Bank use derivatives transactions to hedge their open risk positions. In such cases banks are immune to risks stemming from the underlying instruments or are exposed to such risk only to the extent of inefficient hedging, i.e. residual risk. Banks can also trade in order to speculate on favourable movements in prices of underlying assets. Nonetheless, institutions in the Czech Republic tend to enter into derivative contracts for the purpose of hedging their positions, and so the risks to banking sector stability arising from derivatives transactions can be viewed as low. However, there are some risks associated with these transactions, too. Leaving aside the possibility of ineffective hedging, during transaction settlement banks are exposed to counterparty default risk, particularly in OTC operations. Losses can also be incurred due to operational risk connected with shortcomings in the transaction processing and settlement process directly in the bank. Another possible risk element for financial system stability is the transfer of risks to non-bank counterparties that do not have the necessary experience in managing derivative-related risks.

CHART IV.26
Rates on household loans and deposits and the reference rate
(%)



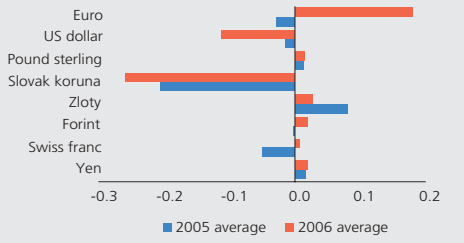
Source: CNB

TABLE IV.2
Structure of new koruna loans to corporations
(%; excluding overdrafts)

Fixation period	2004	2005	2006
Floating and fixation of up to 1 year	87,6	87,8	92,3
Fixation of 1-5 years	8,7	6,3	3,9
Fixation of over 5 years	3,7	5,9	3,8

Source: CNB

CHART IV.27
Net positions of selected currencies as a percentage of foreign currency assets
(%)



Source: CNB

79 Interest rate risk plays a significant role in the assessment of banking sectors by means of financial stability indicators, as stated in the article *Financial stability indicators: Advantages and disadvantages of their use in the assessment of financial system stability* in the thematic part of this Report.

4.2.5 Operational risk

Operational risk can be defined as the risk of incurring losses due to shortcomings or failures of internal processes, the human factor or systems and also the risk of incurring losses due to external events.[80] One component of operational risk is legal risk, where a loss may be incurred due to infringement of, or non-compliance with, a legal rule. Operational risk is present in all activities performed by banks. In contrast to credit or market risk, it is not associated with specific types of transactions or instruments. Operational risk has always existed in the banking sector and has often generated significant losses. Examples include Barings Bank's almost one billion dollar loss in 1995 and ČSOB's more than two billion koruna loss in 2003. Both losses occurred as a result of internal control mechanism failures that allowed dealers to engage in unauthorised speculation.

The need for systematic management of operational risk, including quantification of the potential related losses, is expressed in the new Basel II capital adequacy framework. The new capital requirements for operational risk will contribute to banks' stability by creating a cushion for risks which previously were not explicitly covered by capital. However, any banks that are unable to compensate for the rise in the capital requirement for operational risk by reducing the requirements for other types of risks could face a decrease in funds for further development or a reduction in profit available for distribution outside the bank.

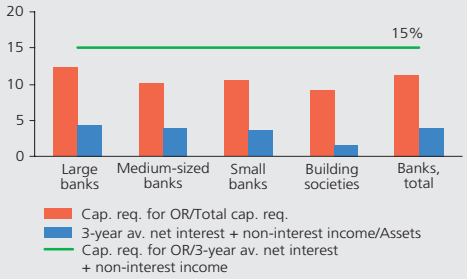
Judging from the statements made by domestic banks, which were gearing up for the new capital requirement calculation rules during 2006, it can be expected that less than half of them will include operational risk in the calculation of their total capital requirement as early as 2007. This will probably cover roughly 50% of the banking sector's total assets. In 2007, most banks are considering using one of the simpler approaches.[81]

The Basic Indicator Approach[82] allows relatively precise estimation of the rise in capital requirements resulting from the incorporation of operational risk. Applying this basic method across the board to the end-2006 values, the capital requirement for operational risk is highest (in relation to the real total capital requirement) in large banks and lowest in building societies. Compared to the calculation under the current rules, i.e. Basel I, the increases in the total capital requirement fluctuated around 10% in individual banks (see Chart IV.28). Under Basel II, banks will compensate for this increase to a greater or lesser extent by reducing their capital requirements for credit risk. Large banks also had the highest ratio of capital requirement for operational risk to assets; the figures for building societies were almost three times lower. These results are consistent with the assumption that banks performing a wider range of more sophisticated transactions are exposed to greater operational risk.

4.2.6 Profit and capital

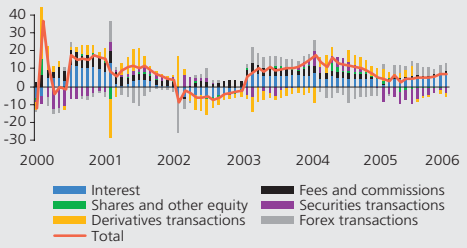
The Czech banking sector ended 2006 with a net profit of CZK 37.9 billion, thus extending its several-year series of high net earnings, albeit with a decline of 3.1% compared to 2005. The net profit achieved in 2006 is the second highest ever

CHART IV.28
Capital requirement for operational risk – Basel II back-projection
(%; as of 31 December 2006; Basic Indicator Approach)



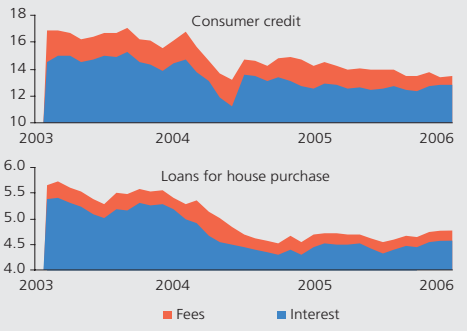
Source: CNB

CHART IV.29
Contributions to annual rate of growth of profit from financial activities
(%)



Source: CNB

CHART IV.30
Decomposition of average annual percentage rates of charge on credit to households
(%; rates on new koruna loans)



Source: CNB

80 Examples of operational risk include internal embezzlement, cyber crime (a risk that is growing as electronic banking expands), supplier default, (un)intentional staff error, payment, settlement or other system failure, and natural disasters.

81 The various approaches are defined in a draft decree of the CNB on the prudential rules for banks, credit unions and investment firms implementing Basel II. The decree is published on the CNB website http://www.cnb.cz/.

82 The Basic Indicator Approach sets the capital requirement equal to 15% of the three-year average of the sum of adjusted net interest and non-interest income.

recorded. The main source of profit for most banks was growing income from financial activities. However, there was simultaneous growth in administrative expenses and costs stemming from asset impairment. Sufficient profit generation is one of the most significant factors strengthening the financial stability of individual institutions and the sector as a whole. However, balanced profit distribution remains a necessary condition.

Year-on-year growth in profit from financial activities increased by 2 percentage points to 7.3% in 2006. The growth was driven primarily by interest profit, with annual growth of 13% and an almost 62% share of the total profit from financial activities. Profit from fees and commissions also contributed to the growth, recording an annual rise of 3.5% and a share of 28% (see Chart IV.29).

Interest on loans to corporations and households was the main component of interest income in 2006. Loans to corporations are larger in volume, but lower in price. The average interest rate on new koruna loans to households was 10.8% at the end of 2006, whereas corporations obtained credit at 5.9% on average. This makes the resulting full-year ratio of interest received from households to interest received from corporations roughly 3:2. Loans to non-banking clients were the source of more than half the total interest income. Besides interest income, bank loans are also a significant source of fee revenue (see Chart IV.30). However, the payment system remains the most important generator of profit from fees and commissions, with a 54% share.

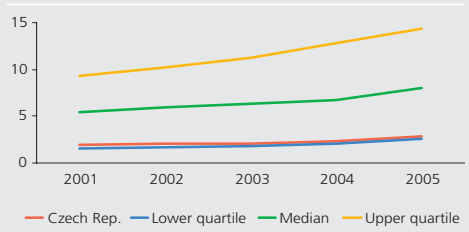
Operating cost management is a significant factor as regards net profit generation. Personnel expenses are the main component of operating costs. They recorded growth in 2006, as did some other operating expense items. Banks operating in the Czech Republic need more employees to manage their assets than their counterparts in most other EU countries (see Chart IV.31). By comparison with the new EU member states, however, the productivity of Czech bank employees as measured by average volume of assets managed is the third highest behind Malta and Cyprus.

Return on assets amounted to 1.2% and return on equity 22.4% in 2006. Both indicators declined compared to 2005. A comparison of European banking sectors reveals that the return on assets of banks in the Czech Republic was above the upper quartile in 2004 and 2005 (see Chart IV.32). The current profitability of banks is comparable with those achieved in other financial sectors and higher than in the corporate sector (see sections 2.2, 4.3 and 4.4).

The capital adequacy ratio fell from 11.86% in 2005 to 11.41% in 2006, mainly because of the slightly lower net profit, a high volume of dividends paid and growth in capital requirements due to the rising lending. There was also a parallel decline in Tier1 capital adequacy to 8.17%. However, all the individual banks exceeded the 8% regulatory minimum for total capital adequacy. The decline in the capital adequacy ratio in 2006 signals a further fall in the level of risk coverage by disposable capital, although it may also signify more efficient capital utilisation. Among the European banking sectors the Czech Republic was ranked in the middle as regards overall capital adequacy ratio (CAR) and in the top 25% in terms of Tier 1 CAR in 2005 (see Chart IV.33).

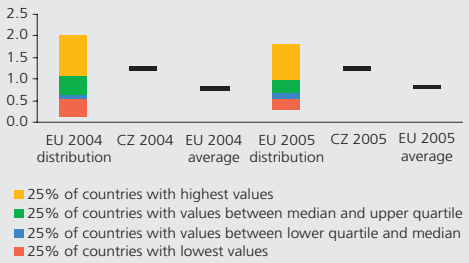
Dividends totalled CZK 27.4 billion in 2006, the highest figure ever recorded. The ratio of dividends to net profit of the previous year was 70%, i.e. the second-highest value behind 2004 (79%). Most of the dividends were repatriated to the home countries of the owners of banks operating in the Czech Republic (see Box 7). Dividend payments abroad affect the current account of the balance of payments and hence also have implications for the external imbalance of the Czech economy (see section 2.1). Although capital was greatly strengthened year on year by retained profit and subordinated debt, its 17% rate of growth was below that of the capital requirement, which was almost 22% (see Chart IV.34).

CHART IV.31
Assets managed per employee in EU banking sectors
(EUR millions)



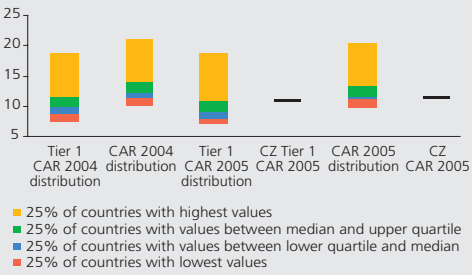
Source: CNB, ECB

CHART IV.32
RoA distribution of EU banking sectors
(%)



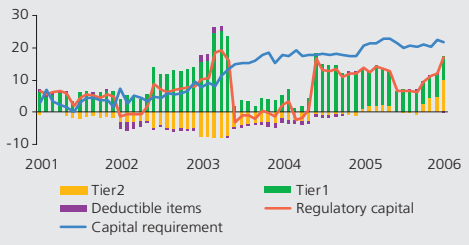
Source: CNB, ECB

CHART IV.33
Capital adequacy and Tier 1 CAR distribution of EU banking sectors
(%)



Source: CNB, ECB

CHART IV.34
Contributions to annual rate of growth of regulatory capital and rate of growth of capital requirement
(%)



Source: CNB

Box 7: Foreign investment in the banking sector and repatriation of profits

Repatriation of profits has two significant consequences, both of them potentially affecting the financial stability of the entire system. As regards the prudential business of financial institutions, there is the question of maintaining a sufficient capital cushion to cover risks. But a no less significant aspect of dividend payment is the effect of the outflow of capital abroad in the form of dividends on the current account of the balance of payments.

Foreign investors acquired the largest share in the Czech banking sector by purchasing state-owned stakes during the privatisation of large banks. Further market shares passed to foreign owners through purchases of existing private banks owned by Czech capital. Other companies were granted completely new banking licences. Except for 2005, the participation of foreign entities in the capital of Czech banks has been growing continuously since the end of 2000 (see Table IV.1 Box). The process of change in the ownership structure of banks continued in 2006, when, in addition to several transfers among foreign owners, a bank with a Czech shareholder was sold to a foreign buyer. The changes in the ownership structure of banks and non-banking financial institutions to some extent reflect the situation abroad, where a process of consolidation has been a major feature for years.

The most important European shareholders of Czech banks are registered in Belgium, France and Austria (see Chart IV.1 Box). This corresponds to the ownership structure of the largest domestic banks. The USA is the most significant owner from outside the EU. The EU's share in total investment in the Czech banking sector has risen from less than one half to more than 70% in the last six years, while the USA's share has remained roughly constant at around 8%. In terms of ownership, the Czech banking sector is strongly dependent on developments in the EU in particular. However, the international financial groups to which domestic banks belong operate in many other regions.

Foreign shareholders of 17 banks, including all 6 building societies, have so far decided to pay dividends on investments in the Czech banking sector. The number of banks paying dividends has gradually risen in recent years. In each of the last three years 13 banks have paid dividends, although their composition has differed. The volume of dividends paid has also gradually risen, growing roughly five-fold between the end of 2000 and 2006 (see Table IV.2 Box). Dividends totalling CZK 27.4 billion were paid in 2006, the highest ever amount. Owing to the definition of FDI as an investment amounting to at least 10% of capital, FDI-based dividends paid abroad are somewhat lower than the total volume of dividends paid to other countries. In 2006, a total of CZK 25.8 billion was paid abroad, of which return on FDI was CZK 20.2 billion. Dividends from banks accounted for 22.5% of total dividends paid on FDI in the Czech Republic in 2006.[83]

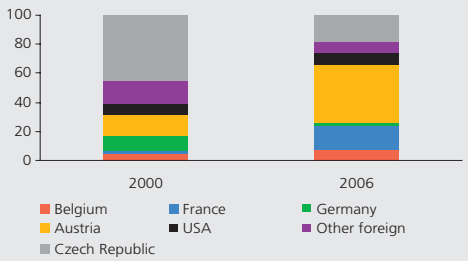
The geographical structure of the flow of dividends to some extent reflects the shareholder structure, since banks whose state-owned stakes were sold

Table IV.1 (Box)
Changes in foreign investment in bank equity capital in the Czech Republic
(CZK millions; direct ownership)

Year	Foreign, total	EU	USA	Other foreign
2001	8,845	9,028	-1,679	1,496
2002	350	-598	460	488
2003	350	2,097	-156	-1,591
2004	38	247	-107	-102
2005	-1,148	-1,641	364	129
2006	353	497	-221	77

Source: CNB

Chart IV.1 (Box)
Geographical structure of shareholders of banks active in the Czech Republic
(%; direct ownership)



Source: CNB

Table IV.2 (Box)
Dividends paid in the banking sector by year
(all shareholders; direct ownership)

Year	No. of banks/ % of total excl. branches	Volume (CZK millions)	Paid abroad (%)	Paid to EU countries (%)
2001	9/32	5,109	91	73
2002	12/43	6,018	82	81
2003	12/46	7,483	92	90
2004	13/50	23,902	94	92
2005	13/54	13,635	94	91
2006	13/54	27,390	94	86

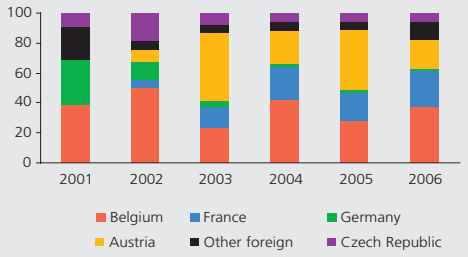
Source: CNB

83 An analysis of the effect of German FDI on the sector of non-financial corporations is given in the article *Foreign direct investment and the Czech corporate sector: Potential risks to financial stability* in the thematic part of this Report.

to foreign buyers in the past have been achieving high net profits for several years now. The dividends are thus heading mainly to EU countries (see Chart IV.2 Box). In some years, the structure has also been affected by strategic decisions made by major shareholders on whether to distribute dividends at all and, if so, in what amount. In the privatisations of the three large banks, investors in all cases paid more than the total value of the dividends paid so far.[84] When assessing the returns on these FDIs, however, one should not overlook other financial flows, which in some cases have decreased the value of the initial investment.

Over the past six years, the foreign shareholders holding more than 5% of the equity capital of dividend-paying banks have come from nine countries in all. Only three of these countries are non-European. However, the following two factors should be taken into account when assessing a shareholder's home country and thus also the country to which repatriated profits ultimately flow. First, the current opportunities for legal and tax arbitrage make some countries more attractive for company registration. Second, there is sometimes a chain of ownership leading to the final owner.

CHART IV.2 (BOX)
Geographical structure of dividend flows
(%; shareholders with more than 5% of equity capital; direct ownership)



Source: CNB

4.3 INSURANCE COMPANIES AND PENSION FUNDS

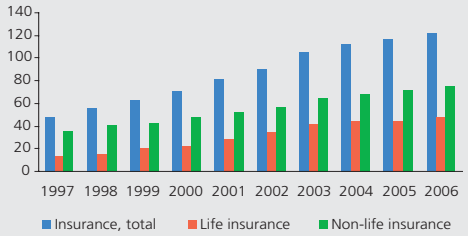
Insurance companies have significant long-term potential for further development in the life insurance and non-life insurance segments. Insurance penetration is low compared to the euro area countries. Insurance companies meet the required solvency criteria. Pension funds also have further growth potential, as evidenced by increasing interest in private pension plans. Planholders' contributions increased by almost 18% year on year in 2006.

4.3.1 Insurance companies

A total of 49 insurance companies[85] were active in the Czech market in 2006, of which 6 were life insurance specialists and 26 non-life insurance specialists and 17 were universal insurers keeping separate accounts for life insurance and non-life insurance (2 insurance companies simultaneously also operate as reinsurance companies). There was an increase in the presence of entities operating under the freedom to provide services and the right to establish branches (see section 4.1).[86]

Traditional segments are the most important categories on the insurance market. These include permanent life insurance and combined term and permanent insurance (54% of life insurance premiums). As regards non-life insurance, the most important categories are vehicle liability insurance (30% of non-life insurance premiums), property insurance for entrepreneurs and private individuals (24%), vehicle accident insurance for entrepreneurs and private individuals (21%) and business insurance (19%).

CHART IV.35
Life and non-life insurance (premiums written)
(CZK billions)



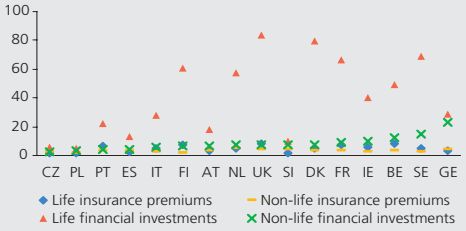
Source: CNB

84 At the end of 2006 the dividends paid so far amounted to 50% of the initial investment in these three banks on average.

85 Of which 33 are domestic insurance companies and 16 are branches of insurance companies from the EU and third countries.

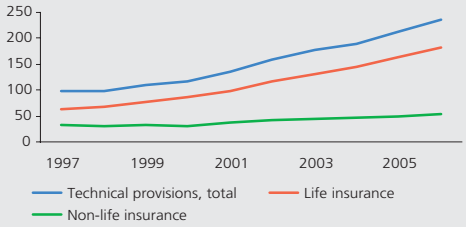
86 Developments in the Czech insurance market are discussed by Heřmánek, J., and Davidová, P. (2005): *Finanční stabilita bank a pojišťoven je pro finanční sektor rozhodující* (Financial Stability of Banks and Insurance Companies is Crucial for the Financial Sector). Pojistný obzor, 11/2005.

CHART IV.36
Insurance premiums and financial investments in selected EU countries
(% of GDP; data for 2005)



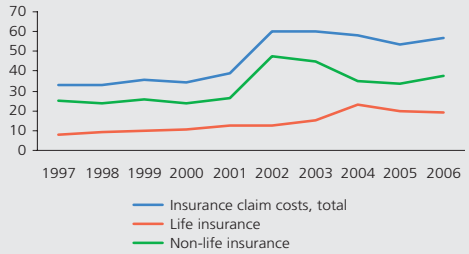
Source: CNB, CEA, CZSO
Note: Premiums correspond to annual premiums written.

CHART IV.37
Total technical provisions
(CZK billions)



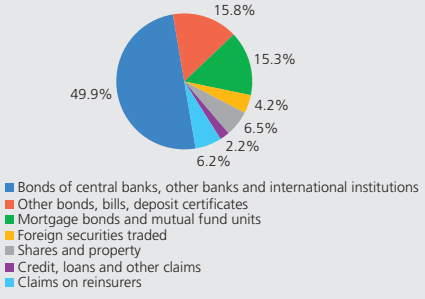
Source: CNB
Note: The data relate to net technical provisions, i.e. net of the share of reinsurers in creation of provisions, and exclude the Czech Insurers' Bureau.

CHART IV.38
Insurance claim costs
(CZK billions)



Source: CNB

CHART IV.39
Financial investment in assets
(% of financial investments, 2006)



Source: CNB

Growth in premiums written has slowed in recent years. A significant factor underlying this slowdown is non-life insurance price competition linked with the freedom to provide services and the entry of new players to the market (prices of motor vehicle insurance, for instance, have come down). On the life insurance market, the original medium-term permanent life policies with single premium payments and payment of the policy amount have been terminated. The new policies reflect market conditions and interest rates and usually stipulate a longer investment period. Premiums written increased in 2006, although at a slower pace than prior to 2005 (see Chart IV.35).

An international comparison suggests that the Czech insurance market has further long-term growth potential. The Czech insurance market ranks seventeenth among the 25 EU countries in terms of both premiums written and financial investment as a percentage of GDP. In 2006, the ratio of premiums written to GDP was 3.8% for the Czech insurance market, roughly half the average for the EU countries (see Chart IV.36).

In developed countries with a tradition of life insurance, the ratio of financial investment from life insurance to financial investment from non-life insurance was 445% in 2005, while the ratio of life insurance premiums to non-life insurance premiums was 160% (the respective ratios for the Czech Republic increased from 202% to 215% and from 62% to 63% at the end of 2005). According to these ratios, domestic insurance companies have potential for developing life insurance services and products.

At 2.1% of GDP, financial investment in life insurance in the domestic insurance sector is low in relation to the selected EU countries (see Chart IV.36). Given the factor of growing climate volatility,[87] a review of non-life insurance policies and insurance schemes can be expected in the future.[88]

Insurance companies are setting aside higher technical provisions to cover their liabilities (see Chart IV.37). Claim costs increased in 2002 following the floods and the payment of insured losses (see Chart IV.38). Reinsurers account for 17% of total claim settlement costs, of which 2% in life insurance and 25% in non-life insurance. Claim payments were most often related to life insurance (33% of total claim payments), vehicle liability (19%), vehicle accidents (17.8%) and natural disasters, including damage to property (16.6%).

Technical provisions are a source of funds for investment in financial assets. Insurance companies invested 50% of their funds in risk-free bonds and 6% in reinsurance companies. Other investments are made in mortgage bonds and mutual fund units, property and marketable shares and bonds (see Chart IV.39).

Insurance companies were compliant with the solvency criteria (according to audited 2005 results), i.e. their internal funds were greater than or equal to the required solvency margin. The aggregate available margin was 3.4 times the required solvency margin on the life insurance market and 3.8 times that on the non-life insurance market. Insurance company stability was fostered by high return on equity, which reached 25.1% in 2006. Return on assets was 4.5%.

87 The European Insurance and Reinsurance Federation's (CEA) Annual Report 2005–2006 examines the recent record-high insured losses due to natural catastrophes and presents the differences in rates of insurance coverage for natural catastrophes in insurance products across EU countries. The European market is very heterogeneous as regards insurance schemes in this area. For some natural catastrophe risks the insurance coverage is low, while for others insurance is only optional and not contractually obligatory.

88 Insurance companies are taking a more prudential approach to the insurance of risks by using weather charts and flood maps, reinsuring themselves and using the services of international reinsurance companies. They calculate their premiums using technical and actuarial methods, and they raise those premiums in the event of more frequent insured losses.

Box 8: The stress test methodology for insurance and pension funds

This box summarises the draft methodology and results of the first stress tests conducted by the CNB for insurance companies and pension funds. Similar tests form part of the financial system stability analyses performed by central banks and supervisory institutions in numerous European countries and also in the FSAP reports of the International Monetary Fund and World Bank.[89]

The stress tests presented in this box use the solvency calculation method applicable to insurance companies (under the Solvency I framework) and the ratio of the minimum required solvency margin to the available solvency margin. They used data on balance sheet and off-balance sheet positions to assess the resilience of insurance companies and pension funds to adverse shocks. Furthermore, the capital adequacy calculation methodology valid for banks in 2006 was also applied to insurance companies and pension funds in order to compare the resilience of individual groups of financial institutions to shocks. The effects of these shocks and of combinations thereof were assessed by comparing the capital adequacy ratio (CAR) before and after the shocks. These tests have significant limitations which must be taken into consideration when assessing the results.

The test scenarios take into account international practice and the Czech conditions. They consist of combinations of adverse changes in interest rates, the exchange rate, loan quality and share prices. The size of the decrease in share value is derived from the volatility of share prices and is also related to equity mutual fund portfolios. Investments in bond funds are also differentiated. In the tests this covers the equity and interest rate risks[90] arising from investing in traded shares and mutual fund units. The calculation of the effect of the exchange rate shock in the test should be viewed as approximate, since it is based on only partial information on foreign currency assets derived from the available information on securities portfolios. Due to the incompleteness of the information sources, liquidity risk is not tested. This first version of the tests does not include the effect of longevity risk. The tests covered 33 domestic insurance companies. The tests on pension funds cover 11 entities.

Scenarios I and II are derived from similar scenarios used by the CNB for stress tests in banking (see the 2004 and 2005 Financial Stability Reports) and add further assumptions to them. Table IV.3 Box gives a survey of the chosen scenarios, shock sizes and differences in portfolio stress for banks, insurance companies and pension funds in the Czech Republic.

Table IV.3 (Box)
Scenario type and shock size in stress test

Scenario type	Scenario I			Scenario II		
	Banks	Insurers	Pension funds	Banks	Insurers	Pension funds
Interest rate rise	1 p.p.	1 p.p.	1 p.p.	2 p.p.	2 p.p.	2 p.p.
Exchange rate depreciation	15%	15%	15%	20%	20%	20%
Increase in NPLs	30%	30%	30%			
Increase in NPLs/total loans				3 p.p.	3 p.p.	3 p.p.
Interbank contagion risk	x			x		
Decrease in share value		10%	10%		15%	15%
Increase in risk in LI (risk of epidemic)		3%			5%	
Increase in risk in NI (risk of climate change)		50%			50%	
of which change in sector structure:						
... motor vehicle insurance[1)]		5%			12.5%	
...act of God and property damage[2)]		200%			200%	

Note: Potential initiation changes in sector structure arising from [1)] an increase in motor vehicle insurance costs, [2)] an increase in costs resulting from climate change and property damage.

Table IV.4 (Box)
Summary of results of stress tests, June 2006: Insurance – solvency, scenario I
(%; percentage points)

Scenario type / Insurance type	Scenario I Total	Life	Non-life
SOLVE [1)] (%)	**333**	**325**	**339**
Total effect of shocks from exposures (p.p.)	-67	-36	-91
Interest rate shock	-33	-9	-52
Exchange rate shock	16	0	29
Credit shock	-23	-26	-21
... indirect effect of exchange rate shock	-2	-2	-2
Share shock	-27	-1	-47
Total effect of shocks in insurance (p.p.)	-20	-7	-30
Life insurance	-3	-7	0
Non-life insurance	-17	0	-30
...motor vehicle insurance	-8	0	-14
...climate change, act of God, property	-7	0	-13
Profit allocation and equalisation provisions (p.p.)	79	29	119
Post-test SOLVE (%)	**325**	**311**	**337**
Capital injection (percentage of GDP)	0.1	0.0	0.1

Note: [1)] SOLVE is the ratio of the available solvency margin to the required solvency margin (%).

Table IV.5 (Box)
Summary of results of stress tests, June 2006: Insurers – capital adequacy, scenario I
(%; percentage points)

Scenario type / Insurers (institutions)	Scenario I Total	Life	Non-life	Universal
CAR [1)] (%)	**14.2**	**38.9**	**46.0**	**11.1**
Total effect of shocks from exposures (p.p.)	-4.2	-5.4	-2.1	-4.4
Interest rate shock	-2.1	-2.7	-1.5	-2.1
Exchange rate shock	1.0	0.6	0.2	1.1
Credit shock	-1.4	-0.4	-0.1	-1.6
... indirect effect of exchange rate shock	-0.1	0.0	0.0	-0.1
Share shock	-1.7	-2.8	-0.7	-1.7
Total effect of shocks in insurance (p.p.)	-0.4	0.0	0.0	-0.4
Life insurance	-0.1	0.0	0.0	-0.1
Non-life insurance	-0.3	0.0	0.0	-0.3
...motor vehicle insurance	-0.1	0.0	0.0	-0.1
...climate change, act of God, property	-0.1	0.0	0.0	-0.1
Profit allocation and equalisation provisions (p.p.)	3.7	-3.2	1.4	3.9
Post-test CAR (%)	**13.3**	**30.3**	**45.3**	**10.2**
Capital injection (percentage of GDP)	0.1	x	x	x

Note: [1)] CAR is the capital adequacy ratio, defined in accordance with the relevant CNB regulations governing the capital adequacy of banks in 2006.

89 Central banks and authorities supervising insurance companies in numerous EU countries currently engage in stress testing of insurance companies. Some publish the results of their tests in financial stability reports. The results of stress tests for insurance companies and pension funds conducted as part of the Netherlands FSAP are given in the relevant report (IMF Country Report No. 04/312, 2004). The French FSAP report describes the results of tests structured similarly for insurance companies as for banks (IMF Country Report No. 05/185, 2005). The basic stress testing procedures for individual insurance companies are contained, for example, in the International Association of Insurance Supervisors (2003) document: *Stress Testing by Insurers.*

90 A simplifying assumption of an interest rate shock affecting only the asset side of insurance companies' balance sheets was adopted for the first version of the stress testing. In practice, a change in interest rates would also affect the liability side, particularly in life insurance. Following a rise in market interest rates, the fixation of the technical interest rate would limit the interest rate shock to insurance companies' balance sheets.

Table IV.6 (Box)
Summary of results of stress tests, June 2006: Insurance – solvency, scenario II
(%; percentage points)

Scenario type / Insurance type	Scenario II Total	Life	Non-life
SOLVE [1] (%)	**333**	**325**	**339**
Total effect of shocks from exposures (p.p.)	-92	-28	-143
Interest rate shock	-65	-18	-103
Exchange rate shock	21	0	38
Credit shock	-8	-9	-8
… indirect effect of exchange rate shock	-3	-3	-2
Share shock	-40	-2	-70
Total effect of shocks in insurance (p.p.)	-22	-12	-30
Life insurance	-6	-12	0
Non-life insurance	-17	0	-30
…motor vehicle insurance	-8	0	-15
...climate change, act of God, property	-7	0	-13
Profit allocation and equalisation provisions (p.p.)	88	18	143
Post-test SOLVE (%)	**307**	**303**	**310**
Capital injection (percentage of GDP)	0.2	0.0	0.1

Note: [1] SOLVE is the ratio of the available solvency margin to the required solvency margin (%).

Table IV.7 (Box)
Summary of results of stress tests, June 2006: Insurers – capital adequacy, scenario II
(%; percentage points)

Scenario type / Insurers (institutions)	Scenario II Total	Life	Non-life	Universal
CAR [1] (%)	**14.2**	**38.9**	**46.0**	**11.1**
Total effect of shocks from exposures (p.p.)	-5.9	-9.2	-4.7	-6.0
Interest rate shock	-4.2	-5.5	-3.1	-4.3
Exchange rate shock	1.4	0.8	0.3	1.5
Credit shock	-0.6	-0.2	-0.8	-0.5
… indirect effect of exchange rate shock	-0.2	0.0	0.0	-0.2
Share shock	-2.5	-4.3	-1.1	-2.6
Total effect of shocks in insurance (p.p.)	-0.4	0.0	0.0	-0.4
Life insurance	-0.1	0.0	0.0	-0.1
Non-life insurance	-0.3	0.0	0.0	-0.3
…motor vehicle insurance	-0.1	0.0	0.0	-0.2
...climate change, act of God, property	-0.1	0.0	0.0	-0.1
Profit allocation and equalisation provisions (p.p.)	4.7	-2.3	2.8	4.9
Post-test CAR (%)	**12.6**	**27.3**	**44.1**	**9.5**
Capital injection (percentage of GDP)	0.2	x	x	x

Note: [1] CAR is the capital adequacy ratio, defined in accordance with the relevant CNB regulations governing the capital adequacy of banks in 2006.

Capturing the aforementioned market risks and credit risk in combination with shocks specific to insurance[91] constitutes a relatively new approach to the stress testing of insurance companies. The risks concern life and non-life insurance (the risk of natural catastrophes and their consequences, and the risk of occurrence and consequences of epidemics). The tests entail shocks that could adversely affect insurance companies' asset portfolios and induce additional costs, and calculate the capital requirements needed to increase the solvency and capital adequacy of insurance companies. The effects of specific shocks are calculated separately for life and non-life insurance. In the case of non-life insurance the shock concerns climate change and the property consequences of natural catastrophes (the risk of catastrophic events). The hypothetical shock to life insurance is associated with the risk of occurrence and consequences of epidemics.

Universal insurance companies should withstand the shocks to both life and non-life insurance. The life insurance shock was defined as an increase in premium provisions, premiums written or gross technical provisions depending on the category of life insurance. These items were in all cases increased by 3% (scenario I) or 5% (scenario II). In non-life insurance, the shock for both scenarios was set as a 50% rise in gross insurance claim costs in a reference (usually three-year) period and was derived from historical experience (the insured losses during the floods in the Czech Republic in 2002).

The calculation includes payments made by reinsurance companies. The proportion of such payments after a shock remains the same as prior to it. Where current reserves or payments by reinsurance companies are not sufficient for insurance companies and the required solvency margin would fall, the uncovered part of the effect of the shock represents the capital requirement. The calculation is, however, fairly conservative, because the proportion of claim payments made by insurance companies themselves would very probably be lower in reality. However, the calculation of the required solvency margin under Solvency I requires minimum coverage by insurance companies themselves of 50% for non-life insurance and 85% for life insurance. Owing to these parameters the regulator would require an increase in insurance companies' reserves even if they were fully secured against adverse events.

The effects of the shocks may negatively affect the solvency of insurance companies. Therefore, the capital requirements created by the combination of the credit shock and market shocks enter the so-called available solvency margin. The specific shocks simultaneously enter the required solvency margin of insurance companies. The total solvency (SOLVE) – the ratio of the available solvency margin to the required solvency margin – is given for life and non-life insurance. The effects of the shocks and the combinations thereof were assessed by comparing the observed SOLVE values before and after the shocks.

To balance any losses, insurance companies would use profits (which are assumed to reached the average amount of the last two years in the absence of shocks) and equalisation provisions (in non-life insurance), if available, to prevent a decline in solvency in life and non-life insurance below the set minimum of 100% or to prevent a decline in capital adequacy (see Tables IV.4–IV.7 Box).

91 The new Solvency II regulatory framework in the insurance industry will affect not only the technical risk for life, non-life and health insurance, but also market risks and credit and operational risks. The first draft general directive should be adopted by the European Commission in July 2007, and implementing regulations will be prepared in a process organised by CEIOPS (Committee of European Insurance and Occupational Pensions Supervisors). The directive and its implementing regulations can be expected to take effect in 2011.

The stress test results indicate that the insurance company sector as a whole would be able to withstand even relatively strong shocks, taking into account their current capitalisation and the role of collateral. However, the effect of scenario II on non-life insurance in universal insurance companies would be considerable.

Insurance companies would be able to withstand the extreme stress ensuing from the specific shocks (climate change, epidemics) with an impact of CZK 60 billion (even though this figure exceeds the clean-up costs of the 2002 floods by roughly one-third). This is thanks to the volume of technical provisions, the spreading of claim payments over several years, the involvement of, and payments by, reinsurance companies, and part payment of losses by policyholders. Insurance companies are capable of responding to an increasing frequency of climate change manifestations and potential rising losses and claim costs by changing their procedures, particularly in non-life insurance.

The stress test also calculates the negative effects of macroeconomic shocks to assets. Nevertheless, this involves some simplification, since the effect on the liability side is ignored.[92] The effect of the exchange rate shock in the test, given the depreciation under consideration, is opposite to the decrease in share value considered. The effect of the aggregate shock is therefore not as sizeable.

In the case of pension funds, only the effects of shocks which might affect the prices and quality of funds' assets and have a negative effect on capital adequacy are considered. The credit shock was widened to include claims on other credit institutions. As in the stress tests for banks, the allocation of profit to cover any negative effects of the shocks is considered.

The stress tests on pension funds indicate that they are able to withstand adverse shocks. The aggregate effect of the shocks would be very strong for them if the appreciation of the currency were accompanied by a fall in the value of their investments, i.e. a decline in prices of the shares and bonds they hold (see Table IV.8 Box).

4.3.2 Pension funds

At the end of 2006, a total of CZK 136.4 billion in contributions was registered on the accounts of private pension planholders. State contributions accounted for CZK 18.9 billion of this amount. Funds from employers totalling CZK 13.7 billion, to which the state contribution does not apply, receive preferential treatment in terms of taxation and the social insurance assessment base. Overall, around CZK 58.2 billion has been paid in benefits since 1994, of which CZK 39.8 billion as lump-sum settlement and CZK 6.6 billion as termination settlement. The other items paid include retirement, service, survivors' and disability pensions and other payments.

Contributions from planholders increased in the last period, recording 17.5% year-on-year growth at the end of 2006. This growth in funds is motivated by the state contribution and tax deductions and by a stronger motivation among individuals to provide for their old age (for more details see Chart IV.40).

The growth potential of pension schemes compared to the available data for euro area countries (around 17% of GDP in 2005) is considerable. The ratio of pension

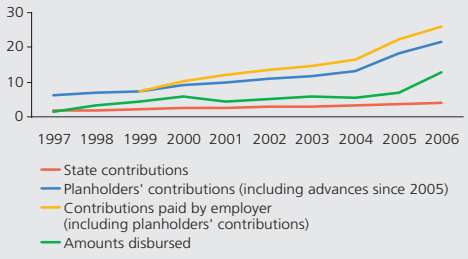
92 While a macroeconomic shock will affect assets immediately, the effect on the liability side will emerge some time later.

TABLE IV.8 (BOX)
Summary of results of stress tests, June 2006: Pension funds
(%; percentage points)

Scenario type	Scenario I	Scenario II
CAR [1] (%)	**8.3**	**8.3**
Total effect of shocks (p.p.)	-0.9	-3.1
Interest rate shock	-1.9	-3.7
Exchange rate shock	3.9	5.3
Credit shock	0.0	-0.1
... indirect effect of exchange rate shock	0.0	0.0
Share shock	-3.0	-4.5
Profit allocation (p.p.)	0.4	1.7
Post-test CAR	**7.7**	**6.9**
Capital injection (percentage of GDP)	0.02	0.03

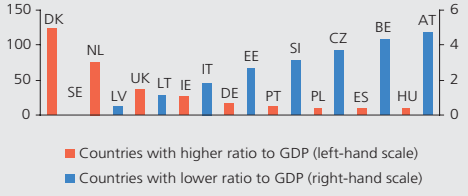
Note: [1] CAR is the capital adequacy ratio, defined in accordance with the relevant CNB regulations governing the capital adequacy of banks in 2006.

CHART IV.40
Pension fund sources and amounts disbursed in given year
(CZK billions)



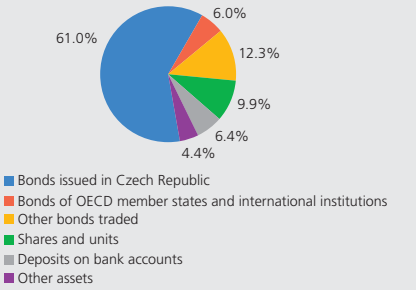
Source: CNB

CHART IV.41
Pension planholders' funds
(% of GDP)



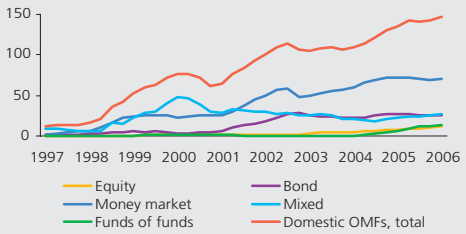
Source: CNB, ECB
Note: Data for 2005. Selected EU countries.

CHART IV.42
Structure of pension fund investments in 2006
(%)



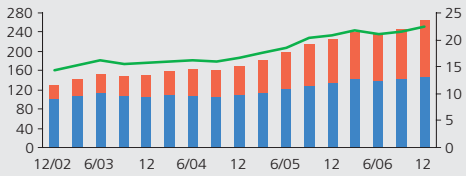
Source: CNB

CHART IV.43
Assets of domestic open-ended mutual funds
(CZK billions)



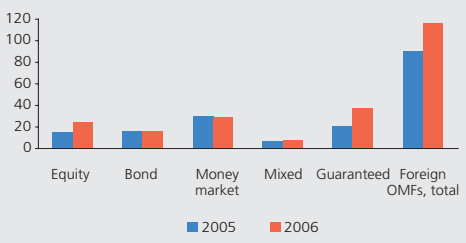
Source: AFAM ČR

CHART IV.44
Assets of open-ended mutual funds
(CZK billions; %)



Source: CNB, AFAM ČR, AKAT

CHART IV.45
Assets of foreign open-ended mutual funds
(CZK billions)



Source: AKAT

schemes in the Czech Republic was almost 5% of GDP in 2006. Even though this is still relatively low, it sends out a signal of changing household preferences. Due to demographic trends, further growth in private pensions is expected as a supplementary pillar to the pay-as-you-go state pension system (see Chart IV.41).

Under the limits set by law, pension funds invest the funds they raise from planholders in relatively safe assets. At the end of 2006, 86% of assets were invested in less risky bonds issued by general government, deposits with domestic banks and other bonds. 9.9% of funds were invested in shares and units, which can be more volatile (see Chart IV.42).

Pension funds have achieved a sustained high return on assets from net profits, which in 2006 stood at 2.8%. The profits have helped to increase the value of investors' contributions.

The existing pension funds are designed to provide a non-negative annual yield which, after coverage of fund administration costs, should ensure that the client's contribution (and also the state contribution to the client's account) gains in value. In the case of bank-owned funds, capital coverage sufficiency and risk liability pertain to banks as shareholders.

The possibility of introducing investment plans with a risk profile excluding any guarantee to provide a return on investors' contributions has been discussed in recent years as an alternative to the current pension plans with guaranteed positive annual yields. This type of plan would offer riskier, but probably also more profitable investment allocation.

4.4 OTHER FINANCIAL INTERMEDIARIES

Mutual funds remain an attractive form of household investment. Last year saw growing interest in higher-yield funds and foreign guaranteed funds. The growing volume of transactions and the strong performance and profitability of non-bank investment firms send out a signal of stable financial intermediation on the capital market. Leasing companies and other lending companies – primarily hire-purchase companies providing non-bank loans to households – continued lending to the non financial sector.

4.4.1 Investment companies and mutual funds

In 2006,13 investment companies were operating on the capital market, three of which were controlled by resident banks. The companies maintained a high RoE of 29% and RoA of 19.8%. Investment companies administer domestic open-ended mutual funds. The accounts and transactions of these funds are separate from transactions on the company's own account.

Domestic open-ended mutual funds are a form of collective investment designed mainly for individual investors. At the end of 2006, 77 funds, with assets of CZK 158 billion, were active. Of this number, 8 funds, with assets of CZK 78 billion, were money market funds (see Chart IV.43). 47 funds, with assets of CZK 132 billion, were administered through domestic subsidiary banks. Open-ended mutual funds invested in government bonds (28%) and other bonds (41%), as well as in units (13%) and shares (17%). The funds channelled less investment into domestic securities (40%), and invested their remaining funds in foreign securities. In doing so, they may have been motivated by prospects of higher returns, risk diversification and the limited investment opportunities in the Czech Republic.

Foreign mutual funds offer products on the domestic market through registered investment intermediaries and investment firms (see Chart IV.44). The investment

itself is carried out by investment companies (funds) registered abroad. The total invested in foreign funds in the Czech Republic in 2006 was CZK 117 billion, 90% of which was intermediated by banks (see Chart IV.45).

At CZK 9 billion, net sales of domestic funds' units were lower in 2006 due to a shift in household interest to higher-yield funds and funds with larger guarantees (see Chart IV.46). Interest in bond funds and money market funds decreased, while that in equity funds and funds of funds increased. There was growing interest in guaranteed funds offered from abroad.[93]

Mutual fund units are an important alternative to bank deposits. The expansion of funds' assets is not connected solely with investments motivated by short-term factors. Medium-term and long-term investments, which are of a saving nature and also require higher minimum deposits, are also on offer. Banks are heavily involved – through their subsidiary investment companies – in the intermediation of transactions in this market segment.

4.4.2 Investment firms

There were 13 bank investment firms and 38 non-bank investment firms active in the capital market at the end of 2006. Some non-bank investment firms are members of banking groups. Non-bank investment firms recorded around CZK 21 billion in total assets, as in 2005. Bank and non-bank investment firms carried out twice the volume of transactions for their clients compared to the previous year – around CZK 1,890 billion a day on average. The vast majority were realised by non-bank investment firms.[94] Most transactions involved interest rate forwards and futures (i.e. FRA contracts – 93%) and transactions in bonds and bills (2.6%).

Non-bank investment firms generally achieved higher profitability (RoE 22.2% and RoA 4.2%). The capital ratio of investment firms was high (average 99%, median 54%), but the values were dispersed over a wide range (from the required 8% through to 405%). This is mainly because only some investment firms trade actively on their own account and have positions in their trading portfolios for which capital requirements are calculated (see Chart IV.47). The volatility of their results is due to the nature of their activities, which entails frequent changes in trading portfolio positions (see Chart IV.48).

4.4.3 Leasing companies and other lending companies

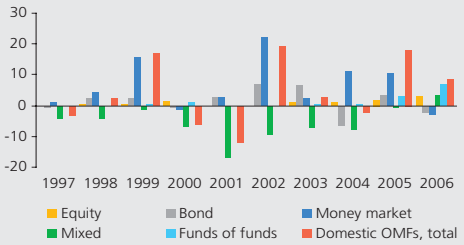
There were 230 leasing companies (with assets of CZK 238 billion) and 57 other lending companies (with assets totalling CZK 90 billion) active on the non-bank credit market at the end of 2006. CZK 193 billion had been lent in leasing, of which CZK 131 billion to corporations and CZK 58 billion to households (see Table IV.3). The low overall year-on-year growth in loans of 5.3% (as compared to growth in non-bank loans to non-financial corporations of 21%) was due to cuts in the tax breaks offered on lease financing. Consumer credit, hire-purchase loans and credit card loans from other lending companies totalled CZK 66 billion, the overwhelming majority of which was provided to households (or individuals). Their annual growth of 17% was below that of bank consumer credit provided to households (22%).

A potential risk arising from the activities of non-bank credit institutions is the fact that they are not subject to direct supervision. Many leasing companies, however, are controlled by banks or other large financial institutions, i.e. they belong to banking groups (see section 4.1).

93 Guaranteed funds offer a contractual guarantee of return of principal and minimum yield.

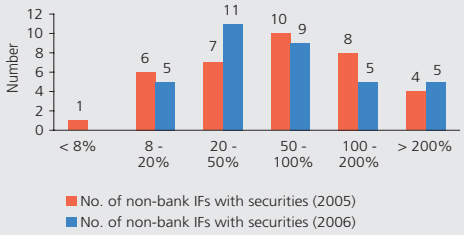
94 For derivative transactions the notional value is used. This significantly overvalues the transaction volume in comparison with securities transactions.

Chart IV.46
Net sales of domestic open-ended mutual fund units
(CZK billions)



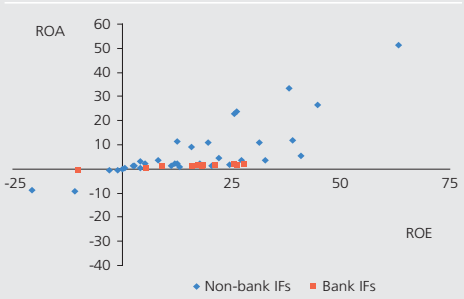
Source: AFAM ČR

Chart IV.47
Distribution of investment firms by capital adequacy



Source: CNB

Chart IV.48
Returns of investment firms
(%, 2006)



Source: CNB

Table IV.3
Activity of leasing companies and other lending companies
(CZK billions; %)

	2005	2006	Change in %
Leasing companies			
Loans, total	183.0	192.8	5.3
Loans to households	53.9	57.5	6.7
Loans to non-financial corporations	126.9	131.7	3.7
Other lending companies			
Loans, total	54.1	66.5	23.0
Loans to households	51.1	59.6	16.7
Loans to non-financial corporations	2.2	3.6	63.6

Source: CNB

PART II – THEMATIC ARTICLES

CREDIT RISK AND STRESS TESTING OF THE BANKING SECTOR IN THE CZECH REPUBLIC

Petr Jakubík and Jaroslav Heřmánek, CNB

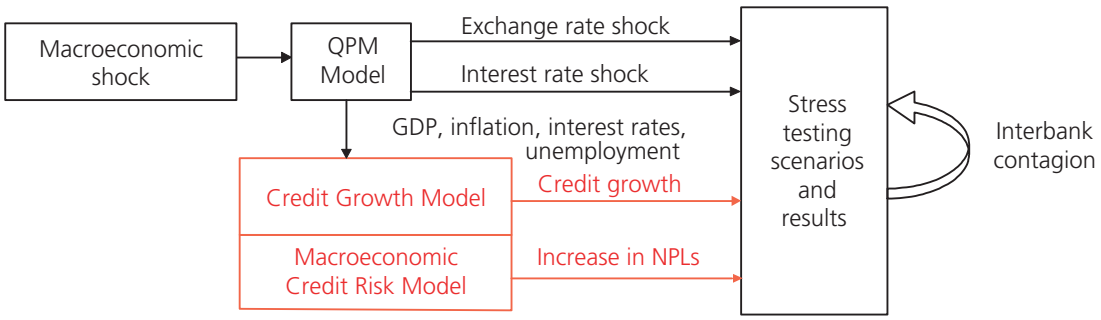
This article presents the results of stress tests of the Czech banking sector conducted using models of credit risk and credit growth broken down by sector. The use of these models enables the stress tests to be linked to the CNB's official quarterly macroeconomic forecast. In addition, the article updates the stress scenarios, including simple sensitivity analyses of credit risk for individual sectors. Based on the analysis, an answer is sought to the question of whether the observed growth in credit to the corporate sector and households poses any threat to the stability of the banking sector. The analyses conclude that the banking sector as a whole seems to be resilient to the macroeconomic shocks under consideration.

1. INTRODUCTION

The creation of model scenarios and the stress testing methodology in this article follows up on the previous method applied in the 2004 and 2005 Financial Stability Reports.[95] In these reports, the basic stress tests with historical scenarios[96] were complemented by an interbank contagion test. These tests were followed by model scenarios with in-built estimated macroeconomic factors from the CNB's quarterly forecast and estimated growth in non-performing loans (NPLs) from the macroeconomic credit risk model.[97]

The dynamic growth in the household credit market and the renewed growth in loans to non-financial corporations requires that the previous tests of aggregate credit portfolios be supplemented with credit growth models. The different growth rates of loans in these sectors are also leading to change in the structure of banks' loan portfolios. The different sensitivities of corporations and households to the macroeconomic environment, along with the changing structure of the loan portfolio, calls for an extension of the credit risk model to include separate estimates for individual sectors. The estimated models of sectoral credit risk and credit growth serve for revision of the stress tests both for the aggregate loan portfolio and for the separate portfolios of the household and non-financial corporation sectors. The predictions obtained from the estimated models are used in simple tests of loan portfolios and in a stress test linked to the CNB's quarterly macroeconomic forecast. The incorporation of the newly developed credit growth and credit risk models into the stress testing methodology is described in Chart 1.[98]

Chart 1 – Architecture of incorporation of stress tests with consistent model scenarios



Note: Red parts of the scheme are newly included or have been updated.
QPM (Quarterly Prediction Model) stands for the CNB official macroeconomic forecast.

The article looks first at credit growth modelling (section 2) and the extension of the credit risk model (section 3). In section 4, these models are used to calculate the effects of shocks in a stress testing exercise. Sections 4.1 and 4.2 update the basic historical scenarios from the past, including simple sensitivity tests of credit risk broken down

95 The stress testing methodology is explained in CNB (2006).

96 The historical scenarios (described as Scenarios I and II) are based on extreme values from the past. These tests reflect the specific development of the Czech economy in 1997–1999.

97 The macroeconomic credit risk model is described in Jakubík (2006).

98 For a more detailed account of the stress testing methods, see Čihák, Heřmánek and Hlaváček (2007).

by sector. In section 4.3, the models of credit growth and credit risk are used to abstract from other types of risks (interest rate risk, exchange rate risk, interbank contagion). Section 4.4 presents a complete set of stress tests, while maintaining the link to the CNB's quarterly macroeconomic forecast. This section considers credit risk in relation to other commonly analysed risks. The last section sums up the results and assesses the potential risks for the banking sector.

2. CREDIT GROWTH MODELLING

The strong credit growth observed in recent years calls for the inclusion of a credit growth model, given the one-year horizon of the stress tests. This extension of the stress tests affords a more realistic view of banks' loan portfolios.

The models used most frequently for the loan portfolio growth rate, which are based on panel regressions, were applied to the countries of Central and Eastern Europe.[99] The vector error correction (VEC) model[100] is generally used for estimates for individual countries. It captures the long-term and short-term relationships between the observed variables. The model does not explicitly address the causality of the observed variables. It is estimated as a system of equations, where each variable is both explanatory and dependent. Where the motivation is to obtain a direct estimate of one of the variables, a single-equation version of the model is used.

In many studies the volume of loans in the economy is expressed as a ratio of loans to the private sector to GDP and is often estimated on the basis of a set of macroeconomic variables. Other studies try to model directly the rate of growth of the absolute volume of loans in the economy, which is considered an important indicator for the assessment of financial stability.[101]

As regards the long-term credit growth model, the variables used most frequently in the literature are GDP growth, interest rates and the inflation rate. Variables such as the property price index and the trade balance are also often considered, as are a number of qualitative variables such as the maturity of the banking sector, characteristics of the legal environment, the quality of accounting standards, etc. The estimate of the long-term relationship is used to find the equilibrium level of credit growth. Under the standard methodology this long-term relationship is estimated by cointegration analysis.[102] If the current value is higher, "error correction" occurs, i.e. the value should decline in the future period, and vice versa. In this article we seek the equilibrium level of real credit growth in the economy, taking into account both the demand and supply sides of the credit market. Indicators on the demand side include, for instance, GDP growth and the current level and expected evolution of interest rates. The banks' loan supply depends on variables such as loan portfolio quality, as measured by the default rate or the distance to default,[103] the interest rate margin or the cost-revenue ratio.

2.1 The credit growth model estimated

The vector error correction (VEC) model was used to estimate real growth in bank loans granted to residents.[104] Quarterly time series of loans and other macroeconomic variables from 1997 Q1 to 2006 Q3 were used to estimate the VEC model.

A number of macroeconomic variables were taken into account in the estimate for the Czech Republic.[105] A long-term relationship could not be proved for some of them. In some cases, the signs of the estimated variables were

99 Credit growth for Central and Eastern Europe based on panel regressions is examined, for example, by Cottarelli, Dell'Ariccia, Vladkova-Hollar (2003) and Duenwald, Gueorguiev, Schaechter (2005).

100 VECs are used both for estimates for individual countries and for aggregate data for several countries – e.g. Hofmann (2001) and Schadler, Murgasova, Elkan (2005).

101 Growth in the absolute volume of loans for the countries of Central and Eastern Europe is modelled, for instance, by Fabrizio, Igan, Mody, Tamirisa (2006).

102 The cointegration relationship in the VEC model can be tested, for example, using the Johansen cointegration test.

103 The distance to default expresses the likelihood of the value of the assets being lower that that of the debt.

104 In the calculation of real credit growth, nominal credit growth was deflated by the consumer price index (CPI).

105 Variables such as the output gap, the interest rate gap, the unemployment rate, the share of non-performing loans in the total loan portfolio, real interest rates, the real output growth rate, the inflation rate, growth in real investment and consumption, the exchange rate, the differential between long-term and short-term interest rates, the level of privatisation of the banking sector, etc. were considered when searching for the long-term relationship.

not in line with the economic theory, probably due to the transformation changes that occurred in the Czech economy or to quite specific events on the credit market. In the end, the long-term real credit growth rate was explained by means of the real GDP growth rate and the default rate of the aggregate credit portfolio of banks.[106] As the current default rate affects a bank's future decisions, we worked with the time series of the default rate lagged by two quarters. The cointegration relationship between the credit growth rate, the real output growth rate and the default rate was significant at the 1% significance level.[107] Based on the results achieved, we considered the credit growth rate as a positive function of real GDP and a negative function of the default rate in the economy.

In addition, when choosing the explanatory variables we took into account their possible use for the forecast and hence also the link to the CNB's quarterly macroeconomic forecast. As the model was to be incorporated into the stress testing of the banking sector, an appropriate response of the model to adverse economic developments was also highly desirable. The following model was chosen with regard to these objectives and econometric properties:[108]

$$\Delta loanstr_t = \delta(\alpha + loanstr_{t-1} + \beta_1\, rgdpr_{t-1} + \beta_2\, dft_{t-3}) + \gamma_1 \Delta rnewgap_{t-3} + \gamma_2 \Delta rgdpr_{t-1} + \gamma_3 dum, \quad (1)$$

where *loanstr* is real credit growth, *rgdpr* the annual real GDP growth rate, *df* the aggregate default rate in the economy, *rnewgap* the interest rate gap on new loans[109] and *dum* a dummy variable taking the value of 1 for the period of massive clean-up of banks' loan portfolios. A lag of two quarters was applied to the interest rate gap time series, as it usually takes some time before a change in rates in the economy passes through to the credit demand and supply sides. Forecasts for all the variables used, excluding the default rate, can be obtained from the CNB's quarterly macroeconomic forecast. The macroeconomic credit risk model for the aggregate economy expressed by equation (2) can be used for the default rate.[110]

$$df_t = \psi(-2.0731 - 4.9947\, gdp_t + 2.7839 R_{t-4} - 2.4364\, \pi_{t-2}) \quad (2)$$

The default rate is expressed as a distribution function of a linear combination of GDP, nominal interest rates and inflation. This implies a negative dependence of the default rate on GDP and a positive one on real interest rates.

Equations (1) and (2) can be used to obtain a forecast for the loan portfolio growth rate. Incorporating this forecast into the stress testing can reduce its stationarity. Tables 1 and 2 show the results of the estimated model (1). The coefficient of determination of the error correction model (1) was 78%, while the adjusted coefficient of determination was 76%.[111]

Table 1 – Error correction model for credit growth

Variable	Coefficient	Standard error	t-statistic	Pr<|t|
Cointegration long-term				
relationship (δ)	-0.268	0.053	-5.047	<0.0001
Difference in interest rate gap of				
new loans (γ_1) - $\Delta rnewgap_{t-3}$	-1.381	0.317	-4.353	0.0001
Difference in real GDP				
growth (γ_2) - $\Delta rgdpr_{t-1}$	2.618	0.817	3.205	0.0031
Dummy (γ_3) - *dum*	0.029	0.009	-3.381	0.0020

Table 2 – Estimate of cointegration relationship

Variable	Standardised coefficient	Standard error
Real credit growth – $loanstr_t$	1.000	
Real GDP growth (β_1) - $rgdpr_t$	-3.639	0.609
Aggregate default rate		
(β_2) - df_{t-2}	3.647	1.327
Constant	0.047	

106 The literature also uses the distance to default as one of the determinants of credit growth. See, for example, Fabrizio, Igan, Mody and Tamirisa (2006).

107 Stationarity of time series was also tested. All the series under consideration were I (1). Although the cointegration relationship was highly significant, a change in the time series length changed the significance. The instability of this relationship over time corresponds to a number of specific features of the Czech transforming economy.

108 Only variables whose coefficients were statistically significant in the estimate are included in equation (1).

109 The interest rate gap is defined as the difference between real and equilibrium interest rates. The interest rate gap forms part of the CNB's quarterly macroeconomic forecast – see CNB (2003).

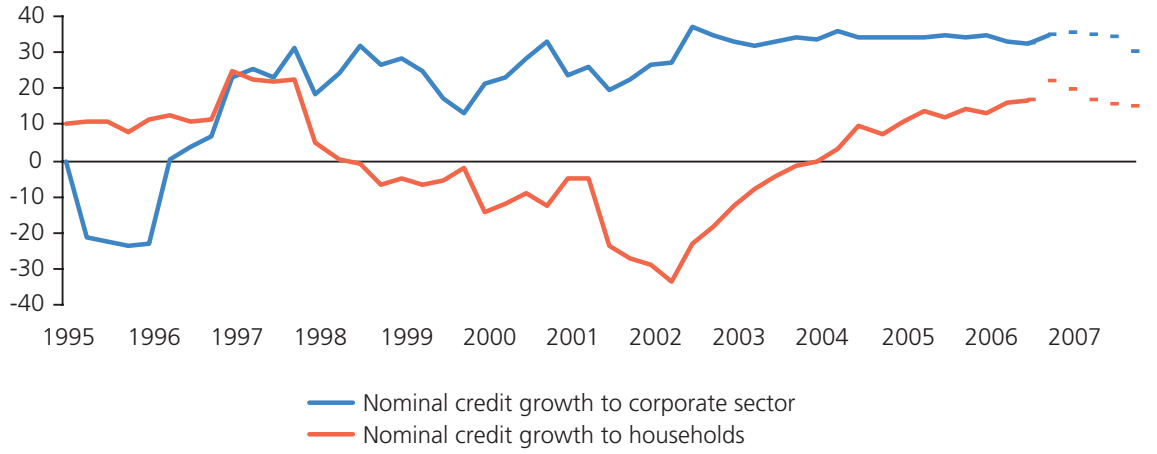
110 A full description of the macroeconomic credit risk model used for the purposes of stress testing in the CNB, estimated last year, can be found in Jakubík (2006) and Jakubík (2007).

111 The good statistical properties of the model are confirmed by the Durbin-Watson statistic, which was 1.98.

2.2 The use of the credit growth model for the forecast

Equation (2) implies that we must have forecasts of the nominal interest rate and inflation in order to be able to estimate the model. Forecasts for loans to corporations and households were derived from the forecast for aggregate credit growth. The share of loans to households in the total portfolio was modelled using a simple linear regression equation estimated for the time series in 2003–2006. This was used to obtain a forecast for the nominal volume of loans to households.[112] The volume of loans to corporations was then estimated as a residual. Chart 7 shows the evolution of nominal annual credit growth, including a forecast for 2007 obtained using equation (1).

Chart 2 – Nominal annual credit growth
(%)



Source: CNB
Note: 2007 data denote prediction.

Based on the estimate of the future evolution of macroeconomic variables and equations (1) and (2), the second half of 2007 should see some easing in real credit growth owing to a falling GDP growth rate and a widening positive interest rate gap. When interpreting the results, one should keep in mind that there is some uncertainty surrounding not only the estimate of the model (1), but also the forecasts of the key macroeconomic variables. The considerable instability of long-term relationships over time and the numerous specific features of a transforming economy are a general problem of credit growth modelling in the Czech Republic.

3. CREDIT RISK MODELS

In a stress testing exercise, it is necessary to assess the change in the credit risk of a loan portfolio in relation to change in the macroeconomic environment. To this end, a macroeconomic credit risk model for the aggregate loan portfolio (see equation (2)) was developed in the CNB in 2006.

One disadvantage of model (2) is that it cannot capture the different sensitivities of corporations and households to change in the macroeconomic environment. The structure of the loan portfolio has changed considerably over the past five years. The share of loans to households in banks' total loan portfolio increased from 10% in 2001 to almost 40% at the end of 2006. It is thus apparent that the household sector is becoming increasingly significant in the total loan portfolio. For this reason, it would be appropriate to estimate the macroeconomic credit risk model separately for the corporate and household sectors. The main obstacle to the estimation of such models is the non-availability of data on the dependent variable.

112 Throughout this article, the term "households" refers to private individuals excluding trades.

The aggregate risk model was estimated on quarterly data on the inflow of non-performing loans (NPLs).[113] However, such data is only available on an aggregate basis and cannot be obtained separately for the household and corporate sectors. The sectoral breakdown shows NPL stocks, not flows. To obtain flows, one has to estimate the outflow of NPLs as a result of write-offs, sales or enforcement of such classified liabilities of banks. The following relationship applies to the stock of NPLs, the default rate and the rate of outflow.

$$NPL_2 = NPL_1 - u\,NPL_1 + df\,(Loans_1 - NPL_1), \tag{3}$$

where NPL is the stock of NPLs in the relevant period, u the rate of outflow, df the default rate and $Loans_1$ loans at the beginning of the period under review. This enables us to derive the following relationship (4) for the default rate.

$$df = \frac{\Delta NPL + u\,NPL_1}{Loans_1 - NPL_1} \tag{4}$$

Depending on the frequencies monitored, equation (4) can be used to compute the quarterly or annual default rate. Except for the rate of outflow, all the variables in relationship (4) are usually known. Volumes of total loans and NPLs are available for the Czech economy broken down by sector. The rate of outflow was only available for aggregate loans. This figure is highly volatile, mainly due to non-recurring massive write-offs at the end of the 1990s and at the beginning of the new millennium as a result of clean-ups of large banks' balance sheets. It can be assumed that most of the problem loans related to corporations rather than households and that the rate of decrease for the household sector is relatively stable over time. The period of write-off, sale or enforcement of NPLs to households was chosen to be two years as an expert estimate. If we work with the annual default rate, the corresponding rate of decrease is 0.5.[114] Based on this assumption, the default rate of households in the economy was derived using relationship (4). If we assume that the aggregate default rate is a weighted average of the default rates for corporations and households, the default rate for corporations can then be derived.

3.1 The macroeconomic credit risk model for the household sector

To model the credit risk for the household sector the same methodology was used as for estimating the aggregate model expressed by equation (2).[115] The resulting model was estimated for the annual default rate time series from 1996 Q3 to 2006 Q3.[116]

A whole range of macroeconomic indicators were considered for the estimate. The model chosen as the statistically best model, in line with the economic theory, was one containing the unemployment rate and the real interest rate.[117] The unemployment rate was lagged by four periods, which corresponds to the lagged impact on payment discipline in the event of loss of employment.[118] The statistically best results were achieved with a lag in the real interest rate of three quarters. This result expresses the lagged impact of an interest rate change on debtors resulting from interest rate fixation. The resulting estimated model corresponds to equation (5). The estimate of the coefficients is shown in Table 3.

$$df_t = \psi(c + \beta_1 u_{t-4} + \beta_2 r_{t-3}) \tag{5}$$

113 NPLs are loans with a classification of 3 or higher, i.e. substandard, loss and doubtful.

114 Parameter u in the equation (4) may not in fact be constant over time. Nonetheless, we believe that the level of 0.5 is relatively realistic and consistent with anecdotal evidence.

115 The estimate is based on a single-factor latent model. This methodology can be found, for instance, in Jakubík (2006) and Jakubík (2007).

116 The quarterly time series of the annual default rate was generated from the monthly series of the annual default rate calculated using relationship (4) by averaging the three monthly figures corresponding to the relevant quarter. Although the default rate obtained using equation (4) was available from 1994, the time series on which the model was estimated had to be shortened as a result of some lags in the model and due to the shorter series of the other macroeconomic indicators included in the model.

117 The real interest rate was calculated by deflating the annual PRIBOR by the CPI. Also considered for the estimation of the model were nominal interest rates, inflation, the interest rate gap, the real GDP growth rate, the output gap, the ratio of interest paid to income or disposable income, etc. Disposable income was modelled using average wages and household consumption, while interest paid was modelled as the product of the credit volume and the annual PRIBOR increased by a certain interest rate spread.

118 The loan is initially repaid from savings or the redundancy payment; payment discipline is affected only after that.

Table 3 – Default rate model for the household sector

Description of variable corresponding to estimated coefficient	Notation	Estimate	Standard error	Pr>|t|
Constant	c	-2.142	0.048	<0.0001
Unemployment (β_1)	u_{t-4}	2.956	0.563	<0.0001
Real interest rate (β_2)	r_{t-3}	1.204	0.522	0.0262

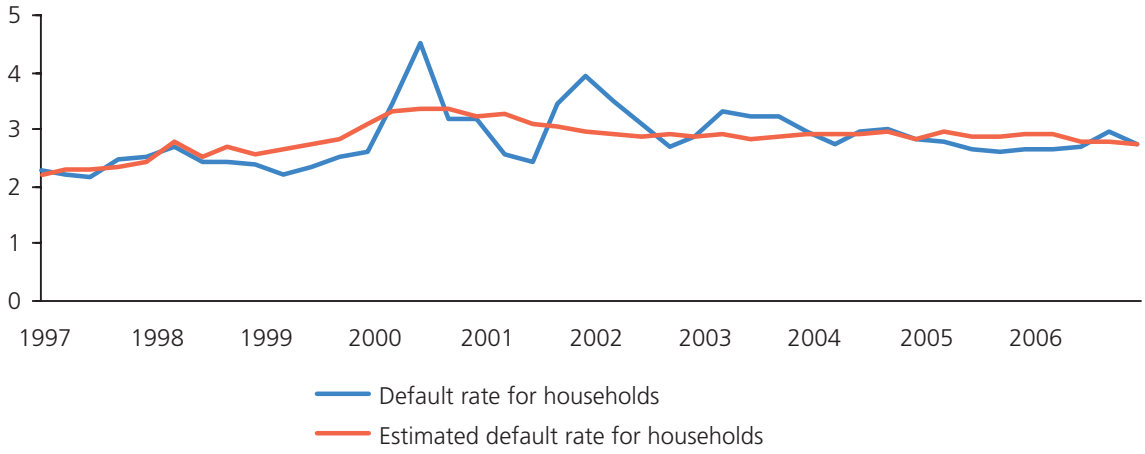
3.2 The model for the corporate sector

The estimate of the macroeconomic model for the corporate sector is not yet available. Unlike in the household sector, the outflow of non-performing loans from banks' balance sheets is not easy to estimate. A historical time series of the default rate is lacking for the estimate of the model. This could be resolved in the future by the Central Register of Credits run by the Czech National Bank, which has been in operation since October 2002. The register contains data on legal entities and individual entrepreneurs and can be used to obtain information on the payment discipline of banks' clients. However, this data is currently of no use for credit modelling due to short time series. In the end, the default rate for the corporate sector was estimated as a weighted difference between the default rates for the aggregate economy and the household sector.[119]

3.3. The forecast for credit risk of households

The CNB's quarterly macroeconomic forecast for the unemployment rate, the 12-month PRIBOR and the CPI can be used to predict credit risk in the household sector.

Chart 3 – Default rate for the household sector
(%)



Source: CNB

119 The aggregate default rate was considered as a weighted average of the default rates for corporations and households. The weights were derived from the shares of the credit volume for the individual sectors in the total loan portfolio.

4. USE OF THE MODELS AND STRESS TESTING RESULTS

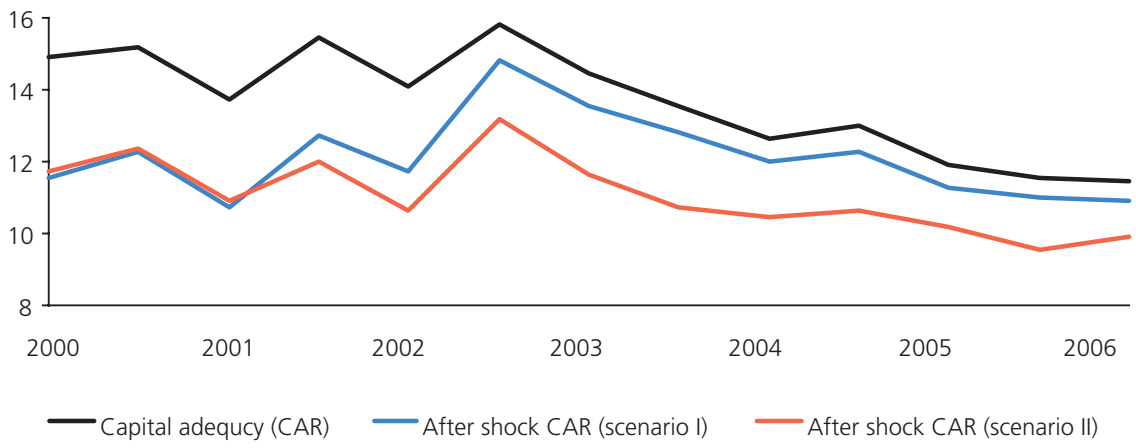
4.1. Basic stress tests with historical scenarios

In the stress testing exercise we first consider basic tests based on a methodology of two scenarios (Scenario I and Scenario II) representing two different types of stress in banks' portfolios. The values of the parameters in each scenario are identical to those used in previous Financial Stability Reports.[120] These scenarios take into account the prevailing international practice and the specific conditions of the Czech economy. The selected parameters reflect the historical experience from the currency crisis and subsequent recession in 1997–1999.

The tests demonstrate the evolution of capital adequacy and the resilience of banks' portfolios to extreme shocks in the long term. The test results are comparable over the period 2000–2006. The stress tests are based on the bottom-up methodology – they use financial data for individual banks and subsequently aggregate them for the banking sector as a whole.

The impacts of the two scenarios are assessed by comparing the capital adequacy ratio (CAR)[121] before the hypothetical shocks and after the impact of these shocks on the banks' portfolios (the post-test CAR, see Chart 4).

Chart 4 – Results of stress test scenarios for the Czech banking sector
(capital adequacy; %)



Source: CNB
Note: The scenarios differ due to the fact that they use different methodologies for the growth in non-performing loans (NPLs), hence the resulting CAR for each scenario develops differently over the monitored time horizon. The results exclude the effect of interbank contagion.

Capital adequacy declined by 3.5 percentage points in 2000–2006. This decline reflects the fact that some banks used their profits for the payment of dividends. In addition, risk-weighted assets recorded an increase. In the same period, the post-test CAR decreased by just 0.6 percentage point for Scenario I and 1.8 percentage points for Scenario II. The impacts of both shock scenarios are thus decreasing over time, which suggests a decrease in the exposure of the banking sector to basic types of risk. The post-shock CAR complied with the required 8% regulatory minimum for both scenarios. However, some banks could be below the required minimum and would need a capital injection to return to this threshold. For these banks, the effects of adverse changes would have a negative impact on the payment of dividends and bonuses. Overall, the banking sector proved resilient to the extreme stress of the shocks based on historical scenarios.

120 Scenario I consists in the combination of a hypothetical increase in interest rates of 1 percentage point, a depreciation of the exchange rate of 15% and an increase in the share of NPLs of 30% by reclassification of loans. Scenario II uses the combination of an increase in interest rates of 2 percentage points, a depreciation of 20% and an increase in the share of NPLs in total loans of 3 percentage points (a detailed description of these scenarios can be found in CNB (2006)).

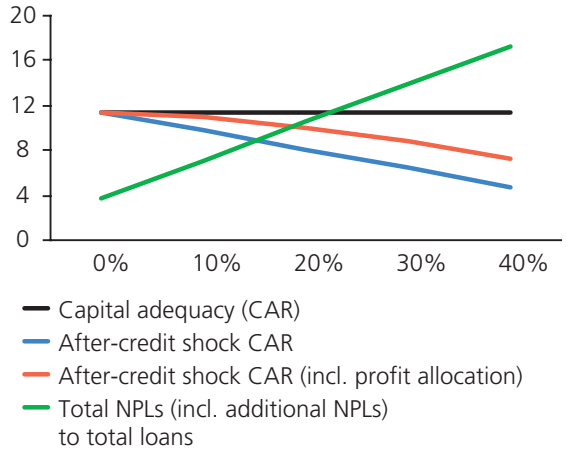
121 That is, the current CAR measured as the ratio of capital to risk-weighted assets of the banking sector.

4.2 Simple credit risk sensitivity tests

The modelling of credit growth and credit risk for the household and non-financial corporation sectors (section 4.3) was preceded by simple sensitivity tests on portfolios of loans granted by banks. These tests used credit shocks based on the hypothesis of conversion of a certain volume of consumer credit and housing loans into NPLs, which corresponds to an increase in credit risk vis-à-vis households (private individuals). The hypothesis of conversion of a certain volume of loans into NPLs was tested in the same way in the non-financial corporations sector (see Chart 5 and Chart 6).

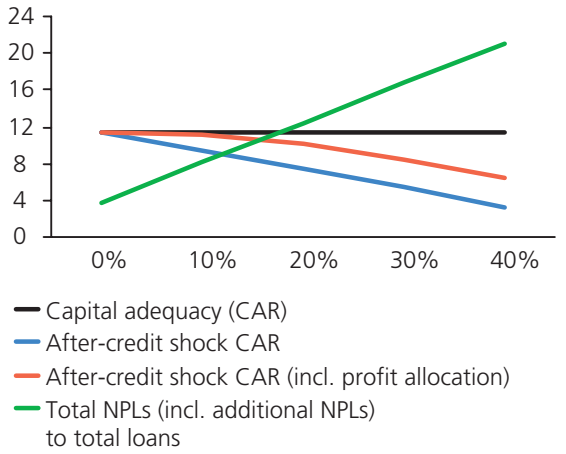
The simple sensitivity tests capture the effects of the one-off conversion of 10–40% of total loans in the given sector into NPLs. The tests analyse the tolerability of such shocks in banks' portfolios and in aggregated form for the banking sector as a whole. The shocks imply additional growth in NPLs, which generate an additional need for capital to cover the credit risk. The tests assume that the banks will create provisions equally for both existing and additional NPLs. The impact of the type and amount of collateral is not taken into account separately in the tests.

Chart 5 – Results of tests with credit risk scenarios for households, 2006
(capital adequacy; %)



Source: CNB
Note: Five scenarios of additional NPLs as 0–40% of consumer and housing loans becoming non-performing loans.

Chart 6 – Results of tests with credit risk scenarios for non-financial corporations, 2006
(capital adequacy; %)



Source: CNB
Note: Five scenarios of additional NPLs as 0–40% of non-financial corporation loans becoming non-performing loans.

Banks are able to withstand the simple credit shock which was tested for the individual sectors. In the case of an isolated shock to the household sector only, the banking sector was able to withstand[122] the conversion of up to 35% of existing loans into NPLs. The analogous figure for the corporate sector was 30%. The results correspond to the larger volume of loans and risk undertaken in the corporate sector. As for the total loan portfolio, banks would be able to withstand the risk of the conversion of around 16% of loans into NPLs. The expected further growth in loans to households and corporations presents a potential accumulated risk of subsequent loan defaults in the two sectors.

4.3 Credit risk tests using credit growth models

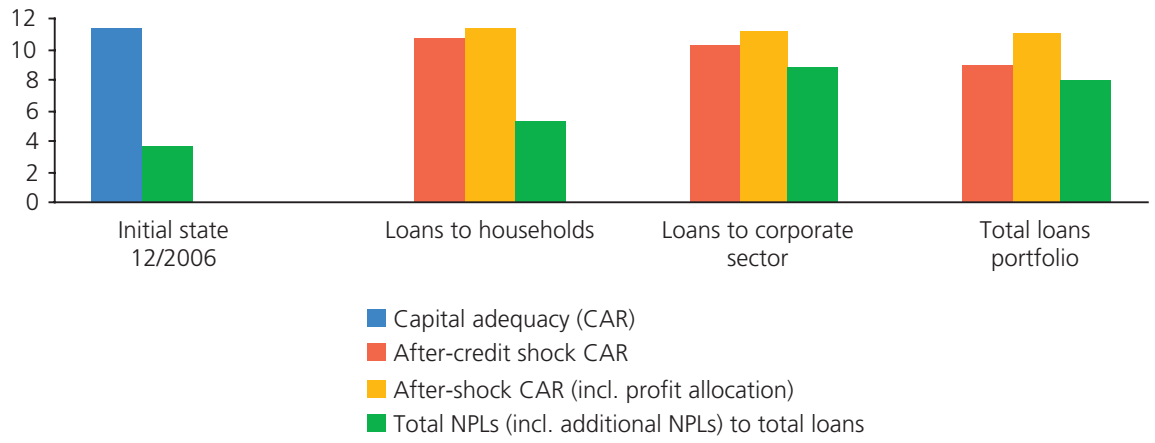
The following tests examine the effects of a credit shock separately for the household sector and the non-financial corporations sector. Other types of shocks (interest rate shock, exchange rate shock, interbank contagion) are not taken into account. The models of credit growth and credit risk as described in sections 2 and 3 are used for this purpose. The credit shock is based on the assumption that at the one-year horizon banks will hold a quantity of

122 That is, the post-test CAR was maintained above 8%.

NPLs dating from the previous period and that a proportion of the loans will be converted into NPLs at the same time. The new growth in NPLs was estimated from the credit risk model and the CNB's quarterly macroeconomic forecast for the following year. Estimated credit growth is also taken into account for the calculation. The tests assume that banks will create provisions equally for both existing and additional NPLs, and collateral is not taken into account.

The tests were based on the forecast of the annual credit growth rate for 2007, amounting to 30% for households, 15.5% for corporations and 16% for total loans for the banking sector. The scenarios (for loans to households and corporations, and total loans) tested the credit risk forecasts in the form of shocks for the 2007 horizon.

Chart 7 – Results of stress tests with incorporation of credit growth and credit risk models
(%)



Source: CNB
Note: The chart shows the results of the sole credit risk shock, firstly for loans to households, secondly for loans to the corporate sector and finally for the total loans portfolio. The other types of shocks are not considered. Scenarios of additional NPLs shocks and credit growth in 2007.

The effect of the credit shock on capital for the household sector was relatively small (see Chart 7). The impact on the corporate sector would be higher, but still tolerable (10.3% CAR). The credit shock considered for all loan portfolios of the banking sector would result in an 8% share of NPLs in total loans in the banking sector, while the CAR would probably be 11%.

4.4 Macro stress test with consistent model scenarios

This section follows up on the methodology of scenarios derived from macroeconomic models presented in the Financial Stability Report 2005. The macro stress tests are based on forecasts for macroeconomic variables obtained from the CNB's quarterly forecast, which are then used in macroeconomic models of credit growth and credit risk (see sections 2 and 3 hereof). Unlike in the Financial Stability Report 2005, credit risk is thus tested on separate portfolios for households and non-financial corporations, with credit growth forecasts also being newly added for the two sectors.

The baseline model scenario uses the CNB's quarterly macroeconomic forecast of April 2007, which estimates the developments in the Czech economy in 2007 and 2008. Besides the baseline model scenario, three alternative scenarios (A, B and C) were applied which reflect less probable shocks. The shocks in these scenarios take into consideration the history of real economic growth and its links to other macroeconomic variables. The parameters of these scenarios are identical to those in the scenarios included in the Financial Stability Report 2005 in order to preserve the comparability of the tests over time. The differences between the alternative scenarios and the baseline scenario reflect different hypotheses and shocks for the individual scenarios; the aforementioned period is relevant for the choice of the parameters tested (see Table 4).

Table 4 – Differences of alternative scenarios from baseline scenario

Type of scenario	period	Scenario A	Scenario B	Scenario C
Real GDP growth (% y-o-y)	2007 Q4	-1.0	-1.0	-3.1
Inflation rate - CPI (% y-o-y)	2007 Q4	0.4	-0.3	-0.7
Nominal growth of loans (%)	2007 Q4	-2.0	-3.3	-10.3
Interest rate (percentage points)	2007 Q2	0.8	-0.6	-0.7
Exchange rate (percentage points)	2007 Q2	3.2	-5.4	1.8

Baseline scenario

The baseline scenario is derived from the CNB's April 2007 forecast,[123] which expects real GDP growth of 5.7% in 2007 and 5.3% in 2008. The baseline scenario does not contain any risks that would pose an immediate threat to the stability of the banking sector. Inflation will be below 3.6% at the end of 2007 and decrease slightly to 3.3% in 2008. Consistent with the forecast is a gradual rise in interest rates. Relatively low interest rates, the positive outlook for investment activity and GDP growth will boost growth in lending to households and corporations. The low interest rate differential will prevent growth in debt in foreign currencies.

Alternative scenario A

Alternative scenario A analyses the potential response of the domestic economy to a significant global negative demand shock. Such a shock is not very likely, but it might hypothetically occur in a situation where global imbalances associated with a loss of confidence in the main economic zones suddenly correct and interest rates of the main world currencies, i.e. the dollar and the euro, start to rise. GDP growth rates in 2007 and 2008 would be about 1 percentage point lower than in the case of the baseline scenario, and interest rates would be higher.

Alternative scenario B

Alternative scenario B combines the effects of the development of the nominal exchange rate and the development of inflation. The scenario assumes a sudden appreciation of the exchange rate and a negative supply shock, which would, ceteris paribus, result in a rise in inflation. Overall, however, the stronger exchange rate would cause a fall in GDP growth and a slight decline in inflation compared to the baseline scenario. The monetary policy response would be to cut interest rates.

Alternative scenario C

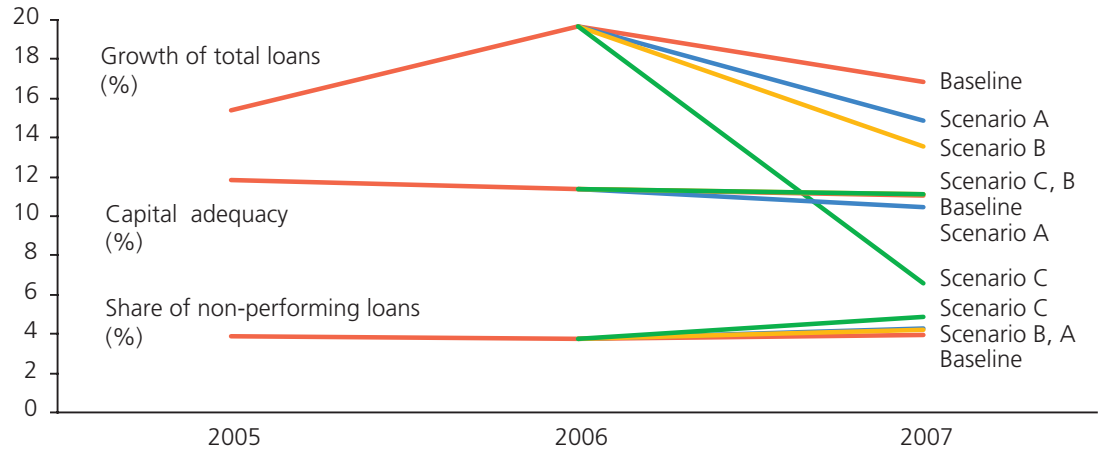
Alternative scenario C reflects the risks associated with a possible drop in domestic demand and assumes a gradual decline in GDP growth between 2007 Q2 and 2008 Q1. A negative shock to GDP growth would cause the output gap to widen and inflation to fall. Simultaneously, credit growth would be reduced compared to baseline scenario. The monetary policy response would be a significant easing, which would help to revive economic activity, in particular in 2008. The lower interest rates compared with other countries would also foster a slight depreciation of the exchange rate, which, in turn, would further ease the monetary conditions.

Test results for the model scenarios

The capital adequacy ratio in the baseline scenario would be 11.1% in 2007 (on the December 2006 banking sector data and the volume of loans modelled). The share of new NPLs in the volume of claims modelled would be 4%. The capital adequacy ratio would be 0.6 percentage points lower in Scenario A and at the same level in Scenario B and Scenario C compared to the baseline scenario for 2007. The new NPLs of the banking sector would be 4.3%, 4.2% and 4.9% in scenarios A, B and C respectively at the one-year horizon (see Chart 8).

123 A detailed description of the CNB macroeconomic forecast is given in CNB Inflation Report (2007), available from www.cnb.cz.

Chart 8 – Results of scenarios of macro stress testing
(%)



Source: CNB
Note: Growth in total loans is defined as the average annual rate of growth. The share of new non-performing loans (NPLs) is related to the estimation of the loan volume at the end of 2007.

The results for the model scenarios are contained in the joint summary of the stress test results for the banking sector together with the historical scenarios (see Table 5). The banking sector as a whole seems to be resilient to the effects of the macroeconomic tests under consideration, including the alternative credit risk tests. The banking sector displays an ability to withstand shocks corresponding to the two scenarios based on historical experience and the scenarios based on the macroeconomic model.

Table 5 – Summary of results of stress tests: Banking sector
(data in % unless stated otherwise)

Scenario type	Baseline		Scenario A	Scenario B	Scenario C	Scenario I		Scenario II	
	6/2006	2006	2006	2006	2006	6/2006	2006	6/2006	2006
Capital adequacy (CAR) [1]	11.5	11.4	11.4	11.4	11.4	11.5	11.4	11.5	11.4
Results for the chosen scenario type									
Overall impact of shocks (percentage points CAR)	-2.3	-2.4	-3.7	-1.9	-1.5	-2.3	-2.0	-5.2	-4.9
Interest rate shock	0.0	0.0	-1.2	0.9	1.0	-1.6	-1.5	-3.3	-3.0
Exchange rate shock	0.0	0.0	0.3	-0.4	0.1	1.1	1.2	1.5	1.7
Credit shock	-2.2	-2.1	-2.5	-2.2	-2.5	-1.6	-1.5	-3.0	-2.7
… households	-	-0.6	-0.6	-0.6	-0.5	-	-	-	-
… non-financial corporations	-	-1.5	-1.6	-1.6	-1.8	-	-	-	-
… indirect impact of exchange rate shock	0.0	0.0	-0.2	0.0	-0.1	-1.1	-1.0	-1.4	-1.3
Interbank contagion [2]	-0.1	-0.2	-0.3	-0.2	-0.2	-0.1	-0.2	-0.4	-0.8
Profit allocation (percentage points CAR) [3]	2.0	2.0	2.7	1.7	1.2	1.7	1.5	2.9	2.9
Post-test CAR	11.2	11.1	10.5	11.1	11.1	10.9	10.9	9.2	9.4
Capital injection (percentage of GDP) [4]	0.0	0.1	0.2	0.1	0.1	0.1	0.1	0.6	0.6
Share of banks with negative capital after shock [5]	0.0	0.0	0.2	0.0	0.0	1.2	1.3	5.1	11.3
Impact on dividends and bonuses [6]	-62.9	-74.3	-100.0	-60.8	-42.6	-68.6	-65.5	-100.0	-100.0

Notes:
[1] CAR means the capital adequacy ratio defined in accordance with the relevant CNB regulations (in particular those governing the capital adequacy of banks and other prudential business rules).
[2] Test integrated with interbank contagion for Method 1 (see Financial Stability Report 2005), expected level of loss given default (LGD) 100% and chosen probability of the banks' failure (default) on the basis of the CAR.
[3] The scenarios assume that in the absence of shocks each bank would generate profit (or loss) equal to the average for the previous five years and that it would use any profit as a first line of defence against a declining CAR.
[4] The capital needed to ensure that each bank has a post-shock CAR of at least 8%.
[5] Market share of banks with negative capital after the impact of the assumed shocks (as a percentage of total assets).
[6] As a percentage of dividends and bonuses of the previous calendar year.
Scenarios: baseline, A, B and C are based on the macroeconomic forecasting model of the Czech National Bank and the credit risk model.
Scenario I and Scenario II are based on the chosen hypothetical and historical shocks (see the methodology in the Financial Stability Report for 2004).
They differ from the results set out in Chart 4 since they include the impact of interbank contagion.

5. CONCLUSIONS

The stress tests confirmed that the current rapid rise in household indebtedness does not pose any significant risk of banking sector instability. However, the dynamic growth in loans to households should be viewed in the context of faster growth in lending to corporations, a preponderance of long-term loans and the prevailing low interest rate level. A combination of continuing credit growth and an unexpected increase in interest rates might lead to higher capital requirements and the need to cover a rise in credit risk. High household indebtedness could necessitate higher provisioning in the banking sector if banks misjudge the ability to repay debts and other risks. The expected development of the banking sector and the model-based stress tests signal a need to further increase banks' regulatory capital for more than one year into the future.

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FINANCIAL STABILITY INDICATORS: ADVANTAGES AND DISADVANTAGES OF THEIR USE IN THE ASSESSMENT OF FINANCIAL SYSTEM STABILITY

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This article sets out to describe and discuss the methodology of selected financial soundness and financial stability indicators, including the attempts to construct an aggregate financial stability indicator. The article also presents to the public for the first time the values of the IMF's core Financial Soundness Indicators for the Czech Republic and other selected countries and tries to construct an aggregate financial stability indicator for the Czech banking sector.

1. INTRODUCTION

In response to the global financial crises in the 1980s and 1990s, national and international institutions started to monitor the soundness of the financial system more intensively. A wide range of instruments is used to assess financial system stability in analytical practice. These include in particular analysis of quantitative indicators of financial system soundness and stability, including stress testing. These indicators strive to cover the issue of financial stability as a systemic phenomenon and therefore concern not only financial institutions and markets, but also the real and government sectors as the main debtors of financial institutions, and also the financial infrastructure (IMF and WB 2005).

Unlike price stability, financial stability has neither an established definition nor an aggregate indicator that the central bank can use as a measure of financial instability. Whereas at least some consensus has been reached on the definition of financial stability, the construction of an aggregate financial stability indicator is still in the research and experimental phase.

This article discusses the financial soundness indicators used (sections 2 and 3) and some of the existing efforts to construct an aggregate financial stability indicator (section 4). Based on the international experience, an aggregate financial stability indicator is then experimentally compiled for the Czech Republic, focusing on the stability of the banking sector (section 5). As most of the indicators relate primarily to banks (deposit takers) as key institutions in the financial system, the quantitative assessment of financial stability concentrates on indicators of the soundness of the banking sector.

2. IMF FINANCIAL SOUNDNESS INDICATORS AND ECB MACRO-PRUDENTIAL INDICATORS

The objective of the set of financial stability indicators is to provide users with a rough idea of the soundness of the financial sector as a whole. It would be ideal, of course, if these indicators were comparable at the international level. To achieve this objective, the International Monetary Fund (IMF) in co-operation with national authorities in 1999 (concurrently with the launching of the FSAP project) launched an initiative focused on formulating a definition and single methodology for the compilation of Financial Soundness Indicators (FSIs).[124] This initiative resulted in the creation of a Compilation Guide on Financial Soundness Indicators, which was discussed in detail in 2002 and 2003 and the final version of which was published in March 2006 (IMF 2006).

The total of 39 FSIs are divided into two groups (see Table 1). The first group consists of the main indicators (the core set) relating to the banking sector (12 indicators). The remaining 27 recommended indicators belong to the second group (the encouraged set), which includes some other banking sector indicators, but also indicators from non-bank financial institutions, non-financial corporations, households, financial markets and property markets. The inclusion of non-banking sector indicators in the FSIs reflects the interconnection of the financial and real sectors, as, for example, unfavourable developments in the corporate sector pass through to the loan portfolio of banks and may thus have a negative effect on financial stability.[125]

124 The Financial Sector Assessment Program (FSAP) is a joint IMF/WB program focused on the assessment of the soundness and development of the financial sector.

125 Within the FSAP the IMF and the World Bank use far more indicators of financial soundness, stability and structure, see IMF and WB (2005). The FSIs thus represent just a selection of the most important indicators in order to cover the largest possible number of countries (this is why, for example, some market indicators are missing, since they are not available in numerous countries).

Table 1 – Core and encouraged financial soundness indicators according to the IMF

Category	*Indicator*
Core set	
Deposit Takers (DTs)	
Capital adequacy	Regulatory capital to risk-weighted assets
	Regulatory Tier I capital to risk-weighted assets
	Nonperforming loans net of provisions to capital
Asset quality	Nonperforming loans to total gross loans
	Sectoral distribution of loans to total loans
Earnings and profitability	Return on assets
	Return on equity
	Interest margin to gross income
	Noninterest expenses to gross income
Liquidity	Liquid assets to total assets
	Liquid assets to short-term liabilities
Exposure to FX risk	Net open position in foreign exchange to capital
Encouraged set	
Deposit Takers (DTs)	Capital to assets
	Large exposures
	(i) total number of large exposures
	(ii) total exposure of 5 largest DTs to 5 largest resident entities to capital
	(iii) total exposures of DTs to affil. entities & connected parties to capital
	Geographical distribution of loans to total loans
	Gross asset position in financial derivatives to capital
	Gross liability position in financial derivatives to capital
	Trading income to total income
	Personnel expenses to noninterest expenses
	Spread between reference lending and deposit rates (in basis points)
	Spread between highest and lowest interbank rate (in basis points)
	Customer deposits to total (non-interbank) loans
	Foreign currency-denominated loans to total loans
	Foreign currency-denominated liabilities to total liabilities
	Net open position in equities to capital
Other Financial Corporations (OFCs)	OFCs assets to total financial system assets
	OFCs assets to Gross Domestic Product (GDP)
Nonfinancial Corporations (NFCs)	Total debt to equity
	Return on equity
	Earnings to interest and principal expenses
	Net foreign exchange exposure to equity
	Number of applications for protection from creditors
Households (HHs)	Household debt to GDP
	Household debt service and principal payments to income
Market Liquidity	Average bid-ask spread in the securities market (percentage of mid-point price) [1)]
	Average daily turnover ratio in the securities market [1)]
Real Estate Markets	Residential and commercial real estate prices (annual percentage increase)
	Residential real estate loans to total loans
	Commercial real estate loans to total loans

Note: See Compilation Guide for Financial Soundness Indicators (IMF 2006) for a detailed definition of indicators.
[1)] Or in other markets that are most relevant to bank liquidity, such as foreign exchange markets.

The core FSIs relate to five basic areas relevant from the point of view of banking business and are compatible with the so-called CAMELS methodology for the assessment of the soundness of individual financial institutions

(Capital adequacy, Asset quality, Management soundness, Earnings, Liquidity, Sensitivity to market risk).[126] The capital adequacy indicators measure the banking sector's ability to absorb sudden losses and are thus closest to the "resilience to shocks" concept, whereas the asset quality indicators are directly associated with potential risks to banks' solvency. The profitability indicators measure the ability to absorb losses without any impact on capital, while the liquidity indicators measure banks' resilience to cash flow shocks. Foreign currency exposure is an indicator measuring a bank's risk exposure with regard to movements in asset prices on financial markets. The management quality indicators were ultimately not included in the FSIs owing to difficulties connected with quantifying indicators that are qualitative in nature (Sundararajan et al. 2002).

The main goal of the FSIs is international comparability, which should be guaranteed by the fact that all countries publishing FSIs will use the same methodology. International comparability is, however, still limited by some differences at national level, particularly in accounting standards but also in the data collection formats needed for calculating the FSIs.[127]

In parallel with the work on the FSIs, the European System of Central Banks (ESCB) in 1999 launched a project to prepare an EU Banking Sector Stability Report (ECB 2006a). To this end, the European Central Bank (ECB) in co-operation with national central banks and banking supervisors started working on a methodology for and collection of so-called macro-prudential indicators (MPIs) for monitoring the financial soundness of the banking sector.[128] The motive, i.e. to identify risky developments in the financial sector, and especially the banking sector, is similar as in the case of the IMF Financial Soundness Indicators. There are, however, two major differences. First, the set of MPIs contains far more indicators. It is clear from the overview of the areas and categories monitored that the MPIs try to identify and measure quite a large number of factors affecting the financial soundness of the European banking sector (see Table 2).

Table 2 – Categories of macro-prudential indicators monitored by the ECB

Categories of indicators	*Areas and number of indicators*
I. INTERNAL FACTORS	
1. Profitability, balance sheet quality and capital adequacy	38 indicators (income and cost developments and composition, efficiency, profitability, income
	and costs as percent of total assets)
	18 indicators (balance sheet – coverage as share per the banking sector, asset and liability
	composition; off-balance sheet items)
	18 indicators (capital adequacy, asset quality, provisions)
2. Demand and supply (competitive) conditions	7 indicators (interest receivable and interest payable, average margin and overall margin)
3. Risk concentrations	25 indicators (credit growth and sectoral concentration, aggregate lending, aggregate new
	lending, lending to non-MFI private sectors, industry exposures)
	18 indicators (composition of other assets - aggregate fixed income securities holdings,
	aggregate equity holdings, aggregate balance sheet, currency and maturity structure of
	domestic lending, global credit exposures)
	14 indicators (liquidity risk, exposures of EU-15 to new EU member countries, exposures
	towards emerging and developing countries, market risk exposures)
4. Market assessment of risks	8 indicators (all bank share price index, yield spread, bank rating, distance to default of major
	EU banks)
II. EXTERNAL FACTORS	
5. Financial fragility	15 indicators (total debt corporate sector, household total debt, household saving ratio, median
	expected default frequencies for key industries)
6. Asset price developments	5 indicators (stock indices, real estate prices)
7. Cyclical and monetary conditions	10 indicators (rate of growth of GDP and its components, developments in unemployment,
	interest rates, exchange rates, consumer price index)
III. CONTAGION FACTORS	
8. Interbank markets	3 indicators (interbank liabilities, share of assets of 3 and 5 banks with the largest interbank exposures)

Note: For more information about the indicators see Mörttinen et al. (2005).

126 For a discussion of the FSIs within the CAMELS methodology, see, for example, Evans et al. (2000), Sundararajan et al. (2002) and IMF and WB (2005).

127 Deviations from the recommended IMF methodology also exist in advanced countries; see Deutsche Bundesbank (2006).

128 For a detailed discussion of the MPIs see Mörttinen et al. (2005). In addition to the MPIs, which are used to monitor financial system soundness and stability, the ESCB compiles structural indicators for monitoring EU banking sector developments; see ECB (2006b).

Second, within the ESCB most bank-related MPIs are compiled and published on a consolidated basis, i.e. the indicators for banks in one country also include their branches and subsidiaries in other EU countries, as well as other financial institutions controlled by them. This concept allows aggregate data to be constructed for the EU as a whole and thus provides a view of the banking system in the European context. However, it leads to some loss of the link between economic developments based on the territorial principle and the evolution of the MPIs published for the "purely domestic" banking sector in countries where foreign banks from the EU are heavily represented (e.g. new Member States, including the Czech Republic).[129]

A comparison of the structure of the IMF and ECB indicators reveals that they overlap. Nonetheless, they display some methodological differences (e.g. as regards consolidation) and overlap only partially or differ in terms of the coverage of the data monitored. Although the MPI set includes far more indicators than the FSI set, Mörttinen et al. (2005, pp. 54–57) demonstrate that some FSIs (particularly in the set of encouraged indicators) have no equivalent MPIs within the ESCB. When monitoring financial stability, it is therefore appropriate to combine the two sets of relevant indicators.

The method of assessing the financial or banking stability indicators is a separate question. Although for some indicators there exist certain "optimal" values, which are even anchored in national regulations (e.g. a threshold of 8% for capital adequacy, a value close to zero for net open positions in foreign exchange), many other indicators have no such absolute "benchmarks". The assessment should thus focus on the evolution of indicators over time and on comparisons with other countries.

The FSIs may, however, be used in stress testing.[130] A big advantage of stress tests is that they provide a link between individual FSIs and, unlike the indicators, which are relatively static in nature, also allow us to take into account the potential losses that the financial sector would suffer in the event of a shock (Craig and Sundararajan 2003). The results of regular stress testing, especially of the banking sector, may thus also serve as an additional financial soundness indicator. Another area where stress testing offers substantial value added compared to the monitoring of simple indicators is the analysis of the systemic risk associated with interbank contagion.

3. IMF FINANCIAL SOUNDNESS INDICATORS FOR THE CZECH REPUBLIC AND SELECTED COUNTRIES

In 2004, the project to prepare a single methodology for the IMF Financial Soundness Indicators was supplemented with a FSI compilation pilot project in some 60 countries (Coordinated Compilation Exercise). The results of this exercise, including the values of individual indicators at the end of 2005 and the metadata, i.e. the statistical methodology, were published by the IMF in January 2007. The Czech Republic took part in this pilot study.

The set of FSIs published allows us to make quite a reliable comparison of banking sector FSIs across countries, despite some methodological differences and slight discrepancies due to national limitations as regards data collection. Table 3 presents the core set of FSIs, i.e. banking sector indicators, for the Czech Republic as compared to other Central European countries in 2005.[131]

Although the comparison of the data across individual Central European countries is complicated by rather different data consolidation methods used for the calculation of the indicators (most of the Czech data are on a consolidated basis, whereas the underlying data for the other countries are not subject to cross-border or cross-sector consolidation), some assessment of the indicators is possible. This is confirmed by the relatively similar values of some indicators available for the Czech Republic on both a consolidated and unconsolidated (solo) basis (see Table 3).[132] Table 3 shows that for some indicators (capital adequacy, non-performing loans to total gross loans, liquid assets to total assets) the Czech Republic was ranked roughly in the middle in 2005, whereas for others its position was extreme (a higher share of net non-performing loans in regulatory capital vs. high return on equity).

129 The IMF Financial Soundness Indicators are also compiled on a consolidated basis; see IMF (2006). Nonetheless, the *Compilation Guide* offers several possible types of consolidation when compiling FSIs, including on an unconsolidated basis on the territorial principle (i.e. including foreign-controlled banks operating in the domestic market).

130 For the stress testing methodology see Čihák (2004a, 2004b). The CNB regularly uses stress testing, develops it and publishes the results; see CNB (2004, 2006a) and the article *Credit risk and stress testing of the banking sector in the Czech Republic* in the thematic part of this report.

131 For simplicity we present here the results for the core FSIs only. The IMF website, however, also provides data for some encouraged indicators; see http://www.imf.org. Large files describing the metadata, i.e. the methodology for the construction of the individual indicators, were also disclosed.

132 However, the other comparisons use the official FSI figures published on the IMF website.

Table 3 – The IMF's core financial soundness indicators for Central European countries
(%; 2005)

		CZ	HU	PL	SK	SI
Capital adequacy	Regulatory capital to risk-weighted assets	11.6 (11.9)	11.9	14.6	12.3	10.5
	Regulatory Tier I capital to risk-weighted assets	11.1 (9.4)	11.8	14.4	13.1	8.9
Asset quality	Nonperforming loans net of provisions to capital	12.5	5.6	11.8	6.4	5.4
	Nonperforming loans to total gross loans	2.8	2.2	4.8	5.0	3.0
	Sectoral distribution of loans to total loans	…	…	…	…	…
Earnings and profitability	Return on assets	1.7 (1.4)	2.1	1.6	1.1	1.0
	Return on equity	32.1 (25.2)	27.0	20.6	13.7	13.5
	Interest margin to gross income	51.8	61.6	57.7	65.4	52.9
	Noninterest expenses to gross income	50.1	58.7	72.3	69.1	62.4
Liquidity	Liquid assets to total assets	32.1	19.7	19.9	33.5	4.8
	Liquid assets to short-term liabilities	87.7	33.7	27.5	40.3	8.8
Exposure to FX risk	Net open position in foreign exchange to capital	-0.1	-22.8	2.5	-49.1	21.8

Source: IMF, CNB
Note: The data for individual countries are not entirely comparable owing to a different base. For the Czech Republic most of the data is on a consolidated basis (including affiliated domestic financial corporations and foreign branches and subsidiaries), except for asset quality and exposure to FX risk, which are on a solo basis. For the other countries the data are on a solo basis (excluding domestic and foreign subsidiaries). The CZ data in parenthesis are CNB data for banks in the Czech Republic on a solo basis.

The indicator of coverage of short-term liabilities by liquid assets recorded high values in 2005, due to the still high excess liquidity in the Czech banking sector. In 2005, banks in the Czech Republic also showed a very low net open position in foreign exchange, which probably reflects their lower involvement in foreign exchange trading compared to banks in Hungary or Slovakia.[133] The Czech Republic also recorded the lowest values among the five Central European countries for the ratios of interest margin and non-interest expenses to gross income.[134] This indicates that banks in the Czech Republic in 2005 relied more on non-interest income for profit generation than banks in the other countries. At the same time, however, they succeeded in curbing their administrative expenses. However, the interpretation of all cross-country differences is hampered, in addition to different data consolidation, by a different methodology used for compiling some of the indicators (in the case of the Czech Republic, for instance, the liquidity indicators do not take into account some short-term deposits on both the assets and liabilities sides).

Given the different results of the individual countries for various indicators, it is not easy to make an overall evaluation of the financial soundness of the banking sector. One of the methods allowing us to compare the financial soundness of the banking sector in a simplified way on the basis of several indicators is to determine the ranking of the individual countries for the individual indicators and then somehow aggregate this ranking for the individual countries. According to this method, each country is assigned a ranking for each indicator based on the comparison (so, using Table 3 as an example, in the case of return on assets, the Czech Republic would be assigned a ranking of 2 and Hungary 1) and the individual rankings for the various indicators are then summed for each country. The country with the lowest total is then assessed as the best and is assigned an overall ranking of 1. A disadvantage of this non-parametric method is that minimal differences between values have the same weight as big differences.[135] In addition, this simple method is rather mechanical and the assessment of the individual countries is heavily dependent on the total sample of countries.

Table 4 shows the results of this method, assigning rankings to the Czech Republic, the other Central European countries and some other EU countries. To construct the final ranking we used a sample of all available EU countries (excluding Denmark and Finland, which did not participate in the pilot project, i.e. 25 countries including Bulgaria and Romania) and the core FSIs excluding interest margin to gross income and the sectoral distribution of loans, whose effect on financial stability cannot be simply assessed. A linear approach (i.e. the more – or for some indicators the less – the better) was applied for the other indicators, except for net open position in foreign exchange, where we took the absolute distance from the balanced position (i.e. from zero).

133 In 2005, according to the FSIs, the share of foreign currency-denominated loans in total loans was roughly 25% in the Czech Republic, compared to almost 30% in Slovakia and more than 45% in Hungary. Similar proportions are apparent when comparing the share of foreign currency-denominated liabilities in total liabilities of banks. The high proportion of foreign currency-denominated loans in Hungary is due largely to a high interest rate differential between the domestic currency and the euro or Swiss franc, in which a relatively large number of loans are denominated in Hungary.

134 Gross income is defined as interest margin plus non-interest income.

135 An alternative, possibly more robust method would be to determine the ranking on the basis of quantiles of the individual indicators.

The results show that compared to the other EU countries the Czech Republic was placed quite well in the overall assessment of the financial soundness of the banking sector in 2005. The results must be interpreted with caution, however, mainly because of the different consolidation of the underlying data used in calculating the indicators for the individual countries.[136]

Table 4 – Rankings of EU countries according to the IMF's core financial soundness indicators
(2005; rankings among 25 countries; min 1; max 25)

		CZ	HU	PL	SK	SI	AT	DE
Capital adequacy	Regulatory capital to risk-weighted assets	17	15	5	13	21	16	14
	Regulatory Tier I capital to risk-weighted assets	9	8	3	4	15	19	22
Asset quality	Nonperforming loans net of provisions to capital	17	10	16	12	9	19	23
	Nonperforming loans to total gross loans	15	11	20	21	16	13	19
Earnings and profitability	Return on assets	6	1	7	11	12	21	25
	Return on equity	1	2	7	22	23	18	21
	Noninterest expenses to gross income	3	14	24	21	17	23	16
Liquidity	Liquid assets to total assets	10	21	20	9	24	14	3
	Liquid assets to short-term liabilities	6	21	23	17	25	8	4
Exposure to FX risk	Net open position in foreign exchange to capital	1	21	7	22	20	10	17
Overall ranking	Ranking of sum of rankings for individual indicators	4	12	13	19	24	21	23

Source: IMF, authors' calculations
Note: The number indicates the ranking among the 25 EU countries, i.e. a lower number means a better result.

The difference in ranking between the new and original EU member countries may reflect a different level of financial intermediation and illustrate some trade-off between financial sector stability and financial sector development (Hlaváček, 2007). The banking sectors in the new member countries are dominated by foreign-owned banks with sufficient capital, minimal bad assets (which were cleared out from banks' balance sheets prior to their privatisation), high liquidity and a prudential approach to the financing of post-transition economies. This contrasts with the banks in the original EU member countries, with high exposures to the real economy and deep financial intermediation in all sectors, to the detriment of capital adequacy and liquidity. The difference between these two groups' results may also be due to a different level of risk. This motivates banks operating in post-transition countries to maintain a certain capital and liquidity cushion, contributing to better results in the assessment of financial soundness.

4. ATTEMPTS TO CONSTRUCT AN AGGREGATE FINANCIAL STABILITY INDICATOR

Some central bank publications have recently attempted to construct a single indicator to indicate the level of stability of the financial system in the country concerned. This is a very tough task given the complex nature of the financial system and the existence of numerous links between financial market participants, non-financial sectors and financial institutions. The attempts to date can therefore be viewed as preliminary testing of alternative approaches to the construction of this indicator, not as consensual standards at the international level as is the case for the FSIs and MPIs.[137] Most of the attempts focus on constructing an aggregate indicator for the banking sector, which is the most important part of the financial system with respect to financial stability.

A relatively simple aggregate indicator of banking sector stability can be constructed as a weighted average of partial indicators of the financial soundness of banks. Such an index is used, for example, by the Turkish central bank (CBRT, 2006). Its financial strength index consists of six sub-indices covering asset quality, liquidity, foreign exchange risk, interest rate risk, profitability and capital adequacy. Before aggregation the individual sub-indices are normalised in order to achieve the same variance *(variance-equal weighting scheme)*.

136 The Czech Republic has particularly good results in net open position in foreign exchange and return on equity. For a more detailed discussion of these two indicators in 2005, see CNB (2006a, 2006b).

137 The use of an aggregate indicator for financial stability assessment is criticised, for example, by Schinasi (2006, pp. 89, 125–126).

An alternative method is to construct an aggregate financial soundness indicator using daily data from the financial markets (such as prices of banking shares and other financial assets). The reason is that such data can signal any difficulties in the financial sector in advance, as indicated by market perceptions about their probability. The financial fragility indicator presented by experts from the US Federal Reserve System (Nelson and Perli 2005) and the financial stress index calculated by experts of the Canadian central bank (Illing and Liu 2003) are examples of such an approach.

A sensible approach is to combine information from the financial markets with information from the financial statements of financial institutions. This approach has been adopted, for example, by the Swiss central bank in the construction of a "stress index" for the banking sector (SNB, 2006). Along with indicators derived from banks' balance sheets and performance (change in profitability, capital, asset quality and the number of bank branches), this approach thus also uses market indicators (change in prices of banking shares and bonds) and other indicators such as interbank exposure and additional supervisory information (the share of bank assets in the regulator's "watch list").

Experts from the Netherlands central bank have opted for quite an original approach to the construction of the index (van den End 2006). The financial stability conditions index is constructed on the basis of an enlarged monetary conditions index and thus contains interest rates, the effective exchange rate, real estate and stock prices, the solvency of financial institutions and volatility of the stock index of financial institutions. An innovation in this index is, however, the introduction of upper and lower critical limits to take account of potential non-linear effects. Too low an index value means increased instability, whereas too high a value may result in the accumulation of financial imbalances, since very positive developments and minimal market volatility may lead to distortion of relative prices, inefficient fund allocation and lower prudence and risk limits. Therefore, the ideal evolution of the index is one within a particular financial stability band.

A new approach to the construction of an aggregate financial stability indicator consists in calculating default risk at the level of the entire financial system, or its main sectors, for instance using the Merton model (Van den End and Tabbae, 2005).[138] A similar systemic risk indicator based on the stochastic default risk distribution of individual institutions as an operational financial stability indicator is proposed, for example, by Čihák (2007). The advantage of these indicators lies in their close linkage with problems in the financial sector (default of major financial institutions or a sector) and with the business cycle. The disadvantages include, however, demanding analysis and in some cases also the existence of a liquid stock market with a good representative sample of individual sectors.

5. THE CHOICE OF A BANKING STABILITY INDEX FOR THE CZECH REPUBLIC

On the basis of the debate above we try to construct experimentally a simple aggregate banking sector stability index and discuss its advantages and disadvantages. The use of market indicators in the case of the Czech Republic runs into the problems of a limited number of listed banks, a minimal number of listed bank bonds and a relatively shallow capital market in general. To construct the index, whose working name is the *banking stability index,* we thus have the traditional ratio indicators only.

Table 5 shows the partial indicators that were chosen for the construction of the aggregate index, including their weights. The selection of the individual partial indicators was governed by current international practice. Capital adequacy and profitability indicate the cushion which a bank has at its disposal against potential risks. Asset quality evaluates the degree of credit risk. Liquidity measures a bank's reserve against potential liquidity problems. Interest rate risk measures the time mismatch between assets and liabilities and indirectly measures the potential losses caused by a potential rise in interest rates.[139] Foreign exchange risk covers banks' exposure to exchange rate movements in both directions. All the partial indicators were normalised before aggregation so that they have the same variance.

138 For an explanation of the Merton model and its use in financial stability analyses in the CNB, see, for example, Jakubík (2006).

139 In the terminology of the capital adequacy framework (Basel II), this risk is termed interest rate risk in the banking book and is sometimes also referred to as the time mismatch between assets and liabilities (CNB 2006b). This risk arises when a rise in interest rates forces a bank to pay higher interest on the liability side (e.g. remunerated demand deposits or deposits with a short interest rate fixation period) without it being able to charge higher rates on the asset side (e.g. loans with longer fixation periods). This time mismatch in possible refixation leads directly to losses. In addition, there is interest rate risk in the trading book, which expresses the potential losses in the trading portfolio (e.g. bonds and other assets held for trading and sensitive to interest rate changes) caused by movements in market interest rates.

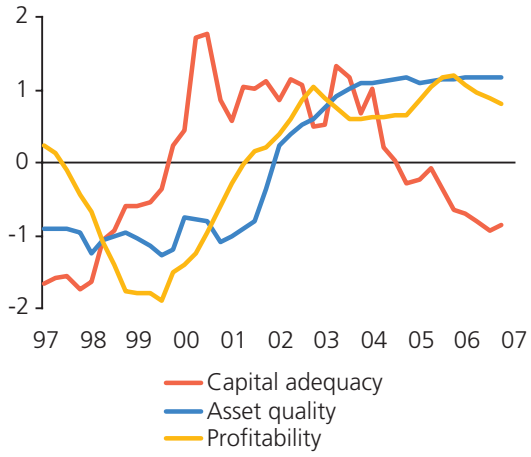
Table 5 – Partial indicators comprising the banking stability index

Partial indicator	Weight in index	Adjustments	Variables	Impact
Capital adequacy	0.05	Normalisation	Capital adequacy (%)	+
Asset quality	0.25	Normalisation	Nonperforming loans/total loans (%)	-
Profitability	0.25	Mean of normalised values	Return on assets (%) Return on equity (%)	+
Liquidity	0.25	Mean of normalised values	Quick assets/assets (%) Quick assets/client deposits (%)	+
Interest rate risk	0.1	Normalisation	Cumulative net balance sheet position to 3 months/assets (%)	+
Foreign exchange risk	0.1	Mean of normalised values	Absolute value of open total position in foreign exchange/Tier 1 capital (%) Absolute value of open balance sheet position in foreign exchange/Tier 1 capital (%)	-

The weights of the partial indicators were set by expert judgment and do not take into account the potential correlation between individual partial indicators. The starting point was the assignment of identical weights to all the partial indicators; nonetheless, the weakening of the capital adequacy, interest rate and foreign exchange risk indicators reflects a motivation to consider some specific features of the Czech banking sector. The lowest weight assigned to capital adequacy weakens its effect on the total index due to excessively high values in 2000–2003, which were generated by temporary factors (clear-outs of bad assets from the banking sector, privatisations, necessary capital increases by foreign owners, etc.). These high values artificially increase the average, and the current fall in capital adequacy towards more reasonable figures was thus overvalued with respect to risk growth. Interest rate risk was assigned a lower weight for two reasons: first, the time mismatch between assets and liabilities in terms of short-term liabilities and long-term assets is a typical feature of banking business, and the widening of this mismatch reflects deepening financial intermediation in a post-transition economy. Second, banks successfully manage part of this risk using interest rate derivatives, which are not included in the indicator. The low weight on exchange rate risk reflects the relatively low exposure of banks to this risk and also a lack of reliable data, since data on the total foreign exchange position have been collected only since 2001.

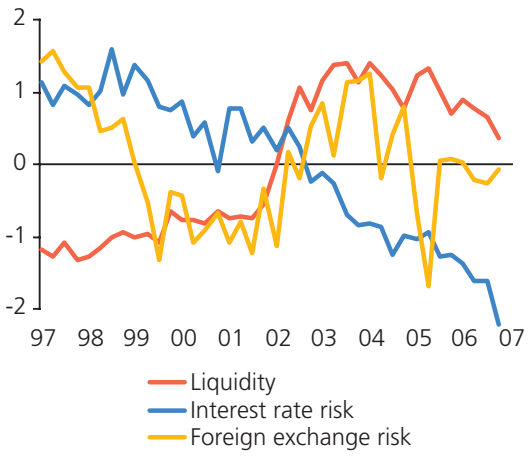
Charts 1 and 2 illustrate the evolution of the partial indicators in 1997–2006. All the indicators were converted so that an increase means an improvement and a decrease means a deterioration. A positive value means that an indicator is above its historical average (calculated from 1997–2006) and a negative value means it is below its historical average. The charts indicate that in the last 4–5 years there has been an improvement in asset quality, profitability and liquidity, and, by contrast, some deterioration in capital adequacy and interest rate risk (in terms of a decline in partial indicators). Foreign exchange risk has been rather volatile, but with some interruptions it has moved around the historical average of an essentially balanced foreign exchange position.

Chart 1 – Partial indicators of banking sector stability



Source: CNB

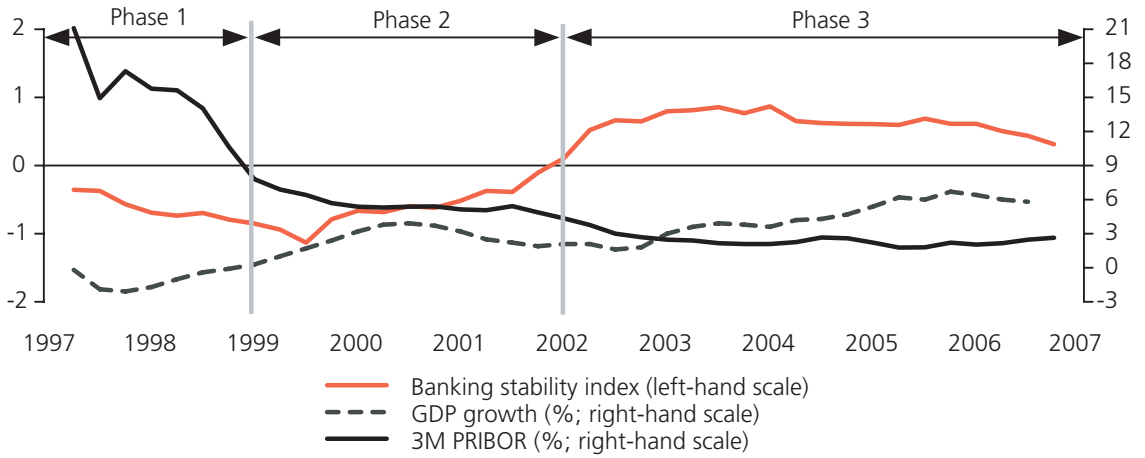
Chart 2 – Partial indicators of banking sector stability



Source: CNB

Chart 3 shows the evolution of the resulting banking stability index together with the evolution of the economic environment in the Czech Republic, which of course has affected the banking sector. We can identify three basic phases in the evolution of the index. The low and falling index values in 1997–1999 are due to economic problems and a banking crisis in the Czech Republic in the second half of the 1990s. That period was characterised by poor asset quality, low profitability and liquidity of banks and relatively low capital. At the time, the economy was in recession and banks and debtors were adversely affected by high interest rates.

Chart 3 – Banking stability index



Source: CNB

In 1999–2001, there was a modest economic recovery and interest rates fell gradually, which had a positive effect on the economy and on the banking sector. However, the improvement in the index in this period was driven more by structural and institutional changes, since the banking sector was being cleaned up and consolidated, bad assets were being cleared out, and essential ownership changes were being made (privatisation to foreign strategic owners, see Bárta, Geršl and Singer, 2007). Since 2002 the index has been fluctuating in positive values. Another reason for the improving stability is the favourable phase of the business cycle, associated with economic growth and low interest rates. Only in this phase is it probably meaningful to interpret developments on the basis of standard financial soundness and stability indicators.

The slight fall in the banking stability index recently can be explained by a combination of falling capital adequacy and liquidity and increasing interest rate risk amid unchanged asset quality and profitability. This evolution of the total indicator and the partial indicators is largely due to credit expansion in a situation of low interest rates in recent years. The rise in lending binds more capital to risk-weighted assets, thereby decreasing capital adequacy. This decrease is also due in large part to repatriation of bank earnings in the form of dividends paid to foreign owners. Low real interest rates support growth in long-term loans, but at the same time reduce the opportunity costs of holding money in the form of sight deposits, which leads to a short time position for liabilities, a widening of the time mismatch between assets and liabilities and a rise in interest rate risk.

The decline in the banking stability index can also be interpreted as a return to average values and capital adequacy optimisation in a situation of credit growth. The fall in the index may also reflect a smaller need for "cushions" against potential risks in an environment of increased financial and economic stability. The evolution of the index is not inconsistent with stress tests, which indicate that the banking sector has good resilience to potential shocks.[140]

That said, the present evolution of the banking stability index may signal some risks going forward. Should the credit expansion continue at a similar rate as in the previous three years, banks will be forced to strengthen their

140 See the article *Credit risk and stress testing of the banking sector in the Czech Republic* in the thematic part of this report.

capital adequacy and decrease the time mismatch between assets and liabilities, probably using interest rate derivatives and other instruments. In the event of a cooling of economic activity or a rise in interest rates, banks may also face more danger from an increase in unpaid loans. Some banks have already started to react to this situation in advance by increasing their capital or changing their profit distribution strategy.

6. CONCLUSIONS

To assess the stability of the financial system and its most important part, i.e. the banking sector, it is appropriate to use a number of quantitative indicators and combine various approaches, including the calculation of financial soundness indicators, stress testing and some aggregate view of the development of the financial or banking sector based on a simple aggregate indicator.

Financial stability indicators compiled at the level of international institutions such as the IMF or the ECB facilitate the assessment of financial soundness and stability in international comparison thanks to their single methodology. Recently published data from an IMF pilot project for the compilation of financial soundness indicators indicate that the Czech banking sector compares quite favourably with the other EU countries.

An aggregate financial stability indicator may serve as a first step towards better operationalising the concept of financial stability and building a more appropriate framework for assessing financial stability. The experimentally compiled banking stability index for the Czech Republic constitutes one of the alternative methods for constructing an aggregate financial stability indicator. The discussion of its pros and cons, however, suggests that it cannot simply be used to assess financial stability without knowledge and use of other supporting instruments and indicators. Nonetheless, it may serve as the basis for further efforts to construct quantitative indicators that better reflect the nature of the financial system and its links with the real sector and other countries.

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FOREIGN DIRECT INVESTMENT AND THE CZECH CORPORATE SECTOR: POTENTIAL RISKS TO FINANCIAL STABILITY

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This article discusses the potential risks to price stability stemming from the influence of foreign direct investment on the economy. The analysis uses corporate data from a unique Deutsche Bundesbank database containing an almost complete sample of German enterprises that invested in the Czech Republic between 1996 and 2004. Attention was given to two issues: the role of intra-group financing in foreign-owned corporations, including its potential effect on financial intermediation in the economy as a whole, and the life cycle of an investment as an indicator of possible investment outflows in the future.

1. INTRODUCTION

The inflow of foreign direct investment (FDI) into the Czech Republic has been high in recent years. On average, it reached around 6.5% of GDP in 1995–2006. Although part of the inflow has been due to the privatisation of state-owned enterprises, especially in the 1990s, a relatively large proportion of this investment has come in the form of acquisitions of private corporations or green-field investments, particularly in recent years.

This article discusses two FDI-related phenomena that may directly or indirectly affect financial stability, namely the sources of finance in companies founded by FDI, and the life cycle of an investment. The analysis uses corporate data on individual German direct investments in non-financial corporations in the Czech Republic between 1996 and 2004 from the MiDi database, administered by Deutsche Bundesbank for the purposes of calculating Germany's financial account of the balance of payments and its international investment position.

The focus on risks associated with FDI inflows is not very common in the contemporary literature. So far, the theoretical and empirical research has mainly discussed and quantified the positive effects of FDI on the performance of the domestic economy, including indirect effects on domestic companies, especially in the framework of supplier-customer relations ("spillovers"). The available evidence suggests strong direct positive effects on investment activity, employment, export performance and output growth (Jones and Wren, 2006). The existence of indirect effects of FDI in the new EU Member States, including the Czech Republic, is suggested by a number of studies as well as by the available anecdotal evidence (Javorcik, 2004; Torlak, 2004; Geršl et al., 2007).

However, foreign direct investment can also introduce certain risks into the economy. The strengthened export orientation due to FDI increases the dependence of the domestic economy on the external environment and possibly also on global developments in those sectors where the investors operate, which may lead to higher volatility in the economy's performance (Bergin et al., 2006). In addition to other macroeconomic risks such as the current account deficit due to transfers of profit from foreign-owned corporations and the related effect on the exchange rate, FDI can affect financial stability in an indirect way, particularly in two areas.

First, the tendency of foreign companies to obtain funding for their operations within their group rather than from local banks may reduce the demand of large foreign-owned companies for loans on the local market. This slows the development of the domestic financial sector. Banks can respond to this by shifting to riskier small and medium-sized domestic enterprises, which often act as foreign companies' suppliers. This may increase credit risk within the loan portfolios of local banks.[141]

Second, a strong dependence of the economy on the performance of foreign companies founded as part of the relocation of production to lower-cost countries raises concerns regarding the effect of a potential outflow of these investments into countries with even lower wage and other costs. The available evidence suggests that a foreign investment can go through a life cycle, at the final stage of which the optimum solution for the investor may be to liquidate or relocate the investment. This could adversely affect the domestic economy's performance and hence also the financial sector. The potential negative effects of FDI outflows can also be aggravated by existing links to domestic suppliers, who can lose an important customer as a result of the relocation. In that case

141 Local banks mean domestic banks, which of course can be largely owned by foreign institutions, as is the case, for example, in the Czech Republic. We are also interested in the effect on domestic banks in this case, not only because of their role in financial intermediation in the domestic economy, but also from the viewpoint of supervision of the domestic banking sector.

the number of bankruptcies of domestic enterprises might grow and problems in banks' loan portfolios might arise, multiplied by the increased focus of banks on small and medium-sized enterprises.

The article is structured as follows: section 2 describes the characteristics of German foreign direct investment. Section 3 discusses the role of intra-group financing of foreign-owned companies and summarises the most important findings of the empirical analysis. Section 4 analyses the life cycle of a foreign direct investment. Section 5 concludes by summarising the results.

2. FOREIGN DIRECT INVESTMENT FROM GERMANY: EVIDENCE FROM CORPORATE DATA

Germany is one of the biggest investors in the Czech Republic. At the end of 2005 the share of Germany in the stock of FDI was around 20% (making it the second largest investor behind the Netherlands with 29%), although a number of German corporations had invested in the Czech Republic indirectly via third parties registered, for example, in the Netherlands. In this article we focus only on non-financial corporations (i.e. excluding investment in banks, insurance companies and other financial intermediaries, where German enterprises are also active). The share of Germany in the stock of FDI in the non-financial sector was roughly 24% at the end of 2005, again behind the Netherlands (with around 32%).[142]

The Deutsche Bundesbank's MiDi database covers all FDI of German companies in the Czech Republic according to a standard definition (a share in the company's capital of 10% or more), including indirect holdings.[143] However, only foreign direct investments in companies with total assets exceeding CZK 3 billion are recorded.[144] The MiDi database is a unique database containing corporate information on the performance, assets and liabilities of the subsidiaries of German corporations abroad, including information on the financial relations between companies linked by participating interests.[145] Although using only a sub-sample of FDI (with a German investor) reduces the information content of the results of the analysis for the whole sector of foreign companies operating in the Czech Republic, the relevance of Germany in the FDI stock allows us to some extent to apply the results to the economy in general.

As at the end of 2004 the MiDi database included 718 Czech non-financial corporations with a German direct investor, around 50% of which were active in manufacturing, 25% in trade and roughly 20% in transport, communications and services.[146] Table 1 shows the relevance of companies with a direct investor from Germany compared to the aggregate data for the Czech corporate sector.[147] Companies with a German investor accounted for around 25% of assets in the Czech non-financial sector at the end of 2004, their shares in total turnover and employment being roughly 20% and less than 15% respectively. The relevance of German investment differs depending on industry; German enterprises have particularly high shares in manufacturing, electricity, gas and water supply, trade and some services. The sectoral breakdown of foreign investment can to a certain extent determine how high the potential risk of an investment outflow can be. The risk of outflow is smaller in industries where the investor's entry was motivated by efforts to gain market share (services, energy, trade) than in those where the main motivation was to benefit from the low wage costs in the Czech Republic (manufacturing).

142 Data for 2006 were not available at the time this article was prepared.

143 See Lipponer (2006) for a description of the Deutsche Bundesbank MiDi (Microdatabase Direct Investment) database. The MiDi database has the advantage that it also includes companies indirectly owned by a German company, e.g. through holding companies or other entities founded, for example, for tax reasons in third countries such as the Netherlands. For indirect FDI holdings to be recorded, the German owner must have a majority participating interest in the intermediary company. If the investment is held through two intermediaries, it will be recorded in the database only if the first (majority-owned) intermediary owns 100% of the second intermediary. The database also contains data on foreign direct investment in Germany.

144 This threshold has applied since 2001 but was changed frequently prior to that year. For example, between 1999 and 2001 all investments had to be reported wherever the total assets of the foreign company exceeded DM 1 million (for majority-owned companies) or DM 10 million (for investments representing more than 10% but less than 50% of capital). For this reason it is not possible simply to observe the evolution of aggregate data over time.

145 Individual data are protected and must not be published. Researchers and experts working with this database in Deutsche Bundesbank may – with the prior consent of Deutsche Bundesbank – publish only aggregate data and analyse results in a manner preventing the calculation of individual data.

146 2004 is the last year for which data are available; data for 2005 will be available in the MiDi database in the second half of 2007.

147 The data for the Czech corporate sector are published by the CZSO and only include companies with 100 employees or more. Thus, Table 1 slightly overestimates the relevance of German companies. For example, this is visible in the services sector, where many smaller enterprises are likely to operate. On the other hand, the reporting threshold for MiDi (total assets exceeding EUR 3 million) corrects this distortion somewhat, as large companies are likely to be recorded in the MiDi database as well.

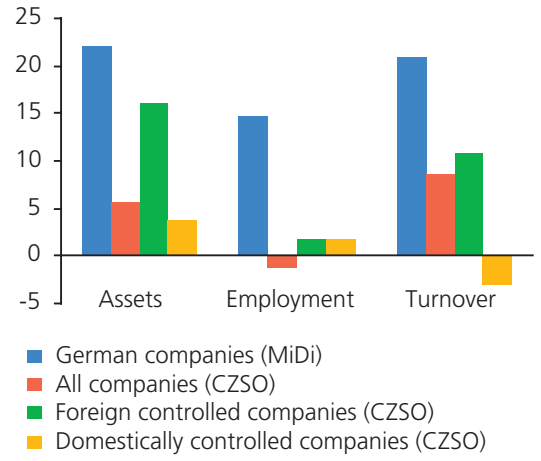
Table 1 – Relevance of companies with a German foreign direct investor in the Czech corporate sector
(corporations from MiDi in % of corporations with 100 employees or more from CZSO)

	Assets	Turnover	Employment
Mining and quarrying	4.5	3.3	2.2
Manufacturing	24.4	24.5	18.4
Electricity, gas and water supply	29.1	24.9	22.0
Construction	6.6	6.6	5.5
Trade and repair	29.6	28.9	24.8
Transport and communications	7.9	5.2	4.0
Services*	92.6	32.0	4.8
Non-financial corporations sector, total	23.4	21.9	13.8

Source: CZSO, Deutsche Bundesbank
* The high share of German companies in assets in the services sector is due to the inclusion of only large corporations (100 employees or more) from the CZSO database, whereas a large number of smaller companies are probably active in this sector.

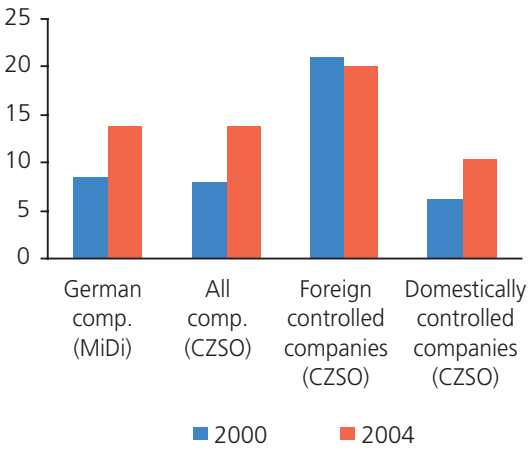
Chart 1 shows the average increase in the indicators of companies with a German investor between 2000 and 2004 by comparison with developments in Czech companies with 100 employees or more in the following categories: all companies, foreign-owned companies and domestic companies (including public enterprises). The averages of size and performance for German-owned companies generally increased after 2000 at a higher rate than those for other company categories. This may have been due to organic growth and an improving financial and economic situation of the existing enterprises with a German investor, but also to the exit of inferior companies and the entry of new, larger and better performing companies. In part this trend can also be explained by the privatisation of some large Czech companies to German corporations (e.g. Transgas) during this period.[148] Chart 2 shows that companies with a German owner raised their profitability to a similar extent as larger companies in the Czech Republic in general, but still lag behind the average profitability of foreign-owned companies. The growth of companies with a German investor and the improvement in their profitability indicate that these enterprises are still in the growth phase of their life cycle and therefore their liquidation can be assessed as not very likely (see also section 4 of this article).

Chart 1 – Annual growth in company performance indicators 2000–2004
(average annual growth in %)



Source: CZSO, Deutsche Bundesbank

Chart 2 – RoE in 2000 and 2004
(RoE = return on equity in %)



Source: CZSO, Deutsche Bundesbank

148 The increase in the average company size may also have been due to a change in the asset threshold for FDI reporting in the MiDi database, which more than doubled in 2002.

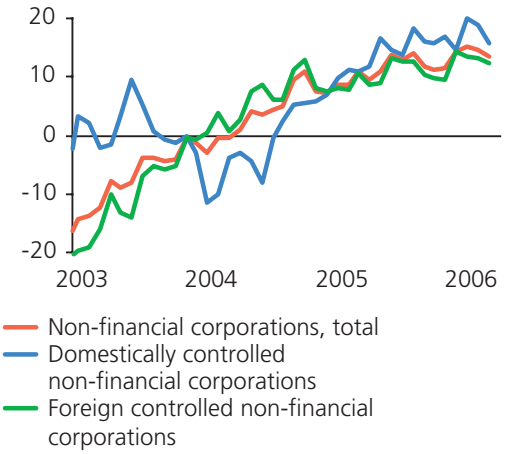
3. INTRA-GROUP FINANCING AND ITS DETERMINANTS

The indirect effect on the financial sector of the recipient of an investment is one of the concerns raised by a strong FDI inflow. If the foreign-owned company has easier access to finances for its operation and investment activities through its parent company abroad, it will effectively reduce its demand for loans from local banks, using funds provided by the foreign owner in the form of capital or loans to finance its development and investment. The effect of lower demand for bank loans is likely to be higher in the cases of privatisation or takeover of a domestic company by a foreign enterprise than in the case of new investment. In both situations, however, the dependence of demand for loans on growth in economic activity may weaken. Banks can respond to the weaker demand by shifting supply towards smaller domestic enterprises, although this may increase the credit risk of their loan portfolios.

However, higher efficiency and profitability, as well as the support provided by a stable foreign owner, put foreign-owned companies at an advantage in seeking external financing from banks, as such companies rank among the least risky debtors. Therefore, especially in the later stages of an investment when the company already has a history, is generating a profit and has sufficient assets to offer as collateral, the demand for loans and the company's total debt can increase or intra-group financing can be replaced by bank loans (see also section 4 of this article).

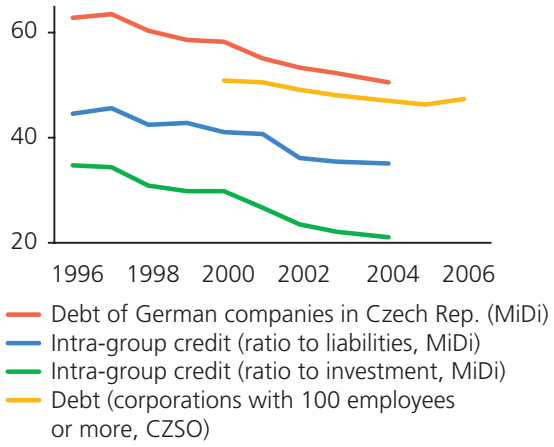
The analysis of the financing of foreign-owned companies was motivated by a decline in the growth rate of loans as compared to domestic companies during the economy's recovery around 2003–2004 (see Chart 3). Chart 4 illustrates that the average debt ratio of companies with German investors was higher than that of all companies with 100 employees or more in the Czech Republic. Intra-group loans accounted for a large share of the debt (around 40% of the total in 2004), with debt and the share of intra-group liabilities in debt both falling over time.

Chart 3 – Growth in loans to non-financial corporations
(annual growth in %)



Source: CNB

Chart 4 – Total debt and intra-group financing
(debt as ratio of liabilities to total liabilities in %)



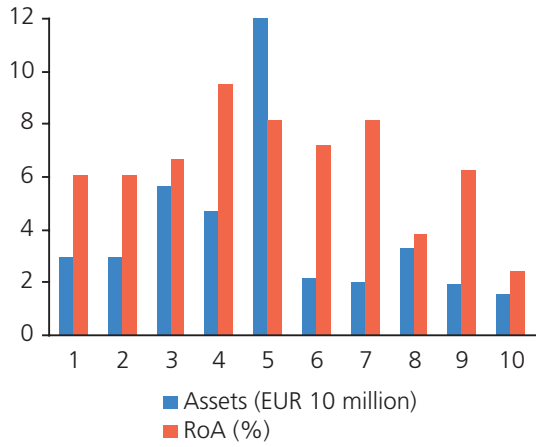
Source: CZSO, Deutsche Bundesbank

The degree of intra-group financing can depend on numerous factors. Some of the determinants can be connected with the company's characteristics and do not necessarily change over the life of the investment (financing strategy, influence of the parent company), while others are related to the life cycle of the investment and therefore the optimum degree of financing by the parent company may change over time. Factors on the external financing supply side, e.g. client interest rates and competition on the banking market, certainly also play a role.

Chart 5 shows that companies with a higher share of intra-group financing are, on average, smaller (have lower assets) and less profitable (as measured by return on assets), even though the influence of profitability is not completely non-linear. Smaller companies may rely more on finance from their parent company, as their size can work to their disadvantage on the loan market (due to a lack of fixed assets as potential collateral). On the other hand, Chart 5 may capture companies at different stages of the investment life cycle. Companies in the initial stage, i.e. smaller and less profitable ones, use credit from the parent company, whereas companies in the later

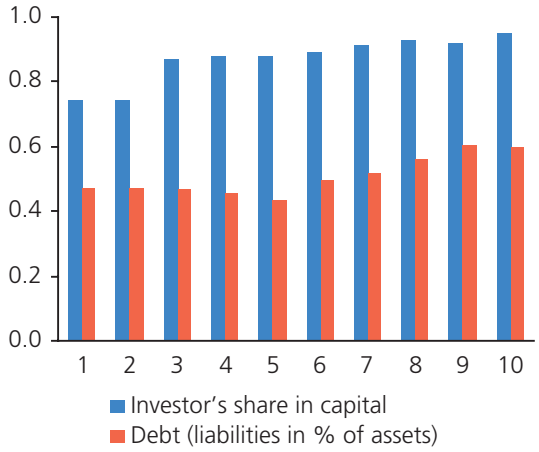
stage are larger, generate profit and tend to obtain finance for their operation from local banks. Chart 6 shows two other possible determinants of the degree of intra-group financing, namely the investor's share in the company's capital and the company's total debt. On average, companies where the investor has a larger share of capital use intra-group financing to a greater extent. This confirms the hypothesis that funds from the parent company are used as a financing instrument mainly where the parent company has a high degree of control of its investment. The company's total debt is another important determinant: companies with higher debt use funds from the parent company to a greater extent. Again, this may be related to the investment life cycle, as a company in the initial stages of its development has higher debt and secures funds for its development from the foreign direct investor rather than local banks. The life cycle of an investment is discussed in detail in the following part of this article.

Chart 5 – Determinants of degree of intra-group financing
(average values in deciles of distribution of degree of intra-group financing, 2004)



Source: Deutsche Bundesbank

Chart 6 – Determinants of degree of intra-group financing II
(average values in deciles of distribution of degree of intra-group financing, 2004)



Source: Deutsche Bundesbank

4. THE LIFE CYCLE OF A FOREIGN DIRECT INVESTMENT

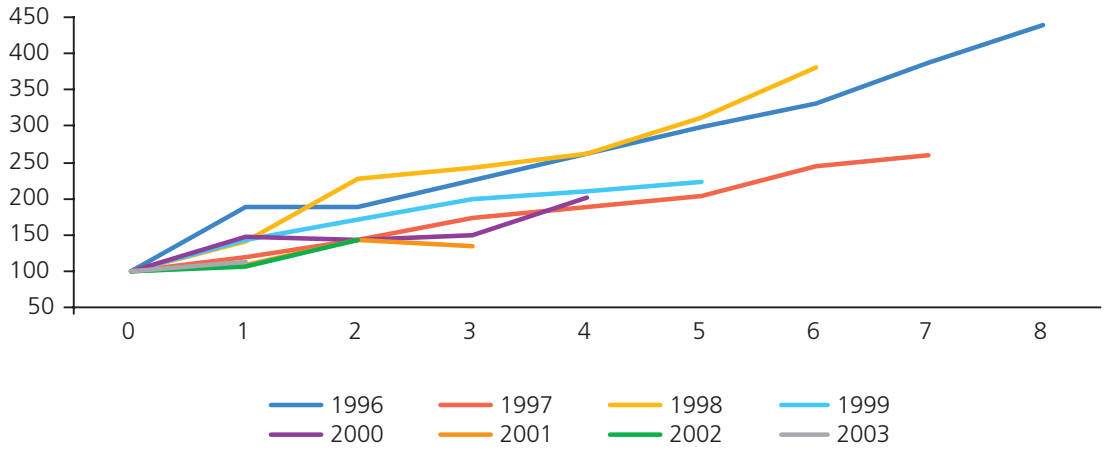
The evolution of the financial indicators of FDI for foreign-owned companies described in sections 2 and 3 was analysed by comparing the averages for the companies existing in the individual years. The changes in profitability or financing may thus have been due to the entry or exit of investors and therefore do not capture the typical evolution of an average foreign direct investment. Neither is the comparison of the profitability and other financial ratios for German investments with ratios for corporations under domestic control entirely conclusive, as the higher profitability of German enterprises may be due to the fact that foreign investors acquired more profitable companies ("cherry picking").

In this section, the average financial ratios always represent the same sample of companies over several years. Companies for which records are available for the whole time span of the investment were selected from the MiDi database. Companies with a complicated ownership structure (i.e. those where the subsidiary has more than one owner or one foreign company owns more than one Czech company) were excluded.[149] Companies were sorted by the year the German owner made the investment in the Czech Republic.[150] This breakdown enables us to assess the evolution of the characteristics of an investment over its life cycle.

149 Especially in the case of companies where one parent company owns more than one subsidiary, individual data may be affected by potential transfers of production and profit between subsidiaries.

150 The first year of the firm's existence in the database is regarded as the year when the foreign owner made the investment. Data for companies entering in 1996 are an exception, as they also include all German companies that invested before 1996 (1996 is the first year of the database).

Chart 7 – Evolution of assets after investment
(year zero of investment = 100, %)



Source: Deutsche Bundesbank, own calculations

Following the commencement of an investment, companies with a German owner typically record further growth in assets (see Chart 7). Six to nine years following the commencement of a foreign investment, assets had risen roughly two to four times. The increase in assets occurs with varying intensity for investments from all years. The additional investment in assets is generally distributed quite evenly over time. Current assets usually dominate the structure of the asset growth, followed by tangible and intangible fixed assets, whose rate of growth is also above average. Growth in financial assets is the lowest.

So far, the data on asset growth do not indicate any turning point in the FDI life cycle, as assets are continuing to grow even for relatively old investments (8 years and older). Thus a significant outflow of assets from foreign-owned companies and FDI in general probably cannot be expected in the short to medium term.[151]

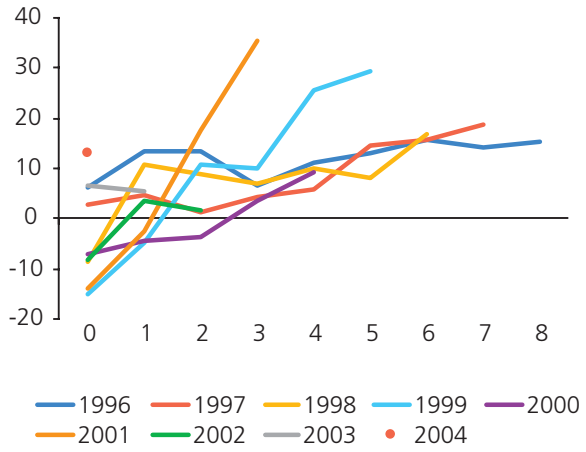
The evolution of return on equity (RoE) in the individual groups of companies according to the year the investment was made (see Chart 8) suggests that the profitability of a foreign direct investment usually goes through a cycle. In the case of acquisitions of domestic companies by a German investor, this would confirm the hypothesis that the entry of a foreign owner has led to a rise in the profitability of the subsidiaries in the Czech Republic.[152] Many investments of this type were designed as restructuring investments where investors picked loss-making companies having potential for growth. In the case of green-field investments, the evolution of RoE reflects high start-up costs, connected with higher depreciation of fixed assets and still low turnover due to the gradual launching of production. Chart 8 also shows that the increase in profitability was sharper in companies which had recorded relatively high losses at the beginning of the investment (investments of 1999 and 2001).[153]

151 This conclusion applies if a relatively long time remains until the end of the period under review. It is also conditional on the sector structure of FDI. It can be assumed that investment motivated primarily by lower wages of employees with a lower standard of human capital can move quite quickly (see also the discussion in section 2 and Table 1). More detailed evidence on the sector structure of investment in manufacturing indicates that German FDI in the Czech Republic has tended to go into facilities with a higher share of value added.

152 Unfortunately, the MiDi database does not indicate whether the investment was made by acquiring an existing Czech company or in the form of a green-field investment. Anecdotal evidence suggests that both types of FDI were made in the past.

153 The high increase in RoE in these companies is to some extent due to their low initial equity, which is the denominator in the RoE ratio. An improvement in the absolute level of profit is thus reflected in a rise in RoE which is much more significant owing to high leverage.

Chart 8 – Evolution of profitability (RoE) after foreign investment
(broken down according to year one of investment, %)



Source: Deutsche Bundesbank, own calculations

TABLE 2 – Distribution of change in RoE into three years after investment

	Contributions in percentage points				
	Total change in RoE	Return on sales	Financial leverage	Assets turnover ratio	Residual - combined effect
1996	0.1	1.1	1.3	-1.5	-0.7
1997	1.6	2.6	-0.6	0.1	-0.4
1998	15.6	16.3	-0.1	-1.9	1.3
1999	25.0	41.5	-11.3	67.6	-72.8
2000	10.9	8.4	0.6	3.7	-1.8
2001	49.1	22.5	3.5	0.9	22.4

Source: Deutsche Bundesbank, own calculations

The comparison also reveals that profitability decreases in some companies after the second or third year. This may be due to additional development of the company and ensuing higher investment costs. Such a decrease occurs more often in companies with higher initial profitability. The chart also shows that the potential for further growth in profitability is somewhat exhausted at a longer time horizon after the commencement of the investment (6 to 8 years), even though profitability remains relatively high. Overall, it can be expected that the impulse to corporate profitability from foreign direct investment will continue into the future, but it will be somewhat weaker than in the past.

In the case of investments taking the form of the acquisition of a Czech company by a German investor, the changes in profitability resulting from the entry of the foreign partner can be analysed by breaking down RoE into three basic components.[154] The first component is the change in return on sales, which indicates the company's ability to generate profit from a given volume of sales. Thus the role of the foreign investor consists in introducing new technology, streamlining production and improving overall labour productivity. Another component is the effect of debt. If debt rises, leverage is strengthened, which leads to an increase in RoE amid an unchanged return on assets. The foreign owner can thus contribute to an increase in RoE by providing funds, by providing an implicit or explicit guarantee for a loan to the subsidiary or by generally enhancing the credibility of the subsidiary in the eyes of creditors. The third channel for increasing profitability is a reduction in the assets turnover ratio, which leads to more efficient use of the company's assets to generate sales. The foreign owner can contribute to an increase in profitability by penetrating into new markets and thereby boosting sales, or by more efficient use of existing assets (e.g. modern inventory management methods, sale of unusable assets, etc.).

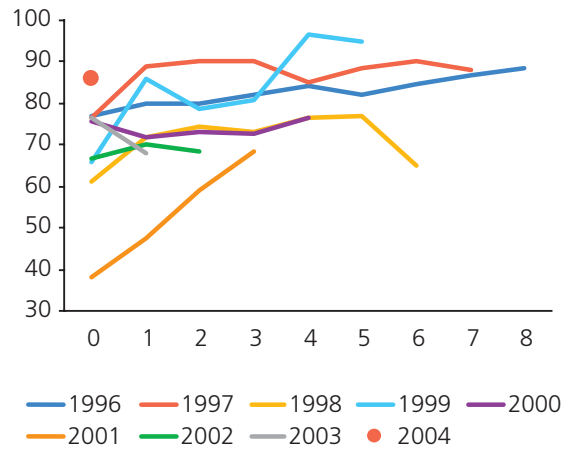
As shown in Table 2, growth in RoE has mostly been driven by increases in return on sales. The influence of debt has been relatively low (perhaps with the exception of investments made in 1996). In some years, however, the positive effect of a decrease in the assets turnover ratio was fairly significant (investments of 1999 and 2000). This was probably linked chiefly with an increase in the companies' sales. The rise in the assets turnover ratio for investments of 1996 and 1998, which made a negative contribution to overall profitability, can be explained by additional investment of these companies, which had yet to generate sufficient sales.

154 The following relationship holds: $RoE = \frac{profit}{equity} = \frac{profit}{sales} = \frac{sales}{assets} = \frac{assets}{equity} = (Return\ on\ Sales) \cdot \frac{360}{assets\ turnover} \cdot \frac{1}{1 - debt}$

The change in RoE can be thus approximated by the change in return on sales, the change in the inverse of the assets turnover ratio and the percentage change in the inverse of the ratio of equity to assets. This approximation is not entirely accurate, with the "residual" in Table 2 reflecting the error of this estimate.

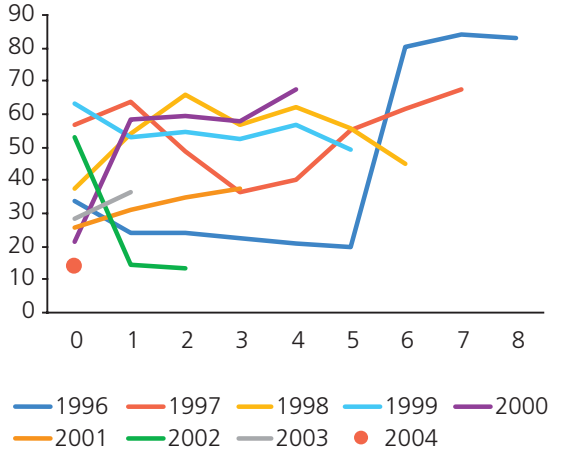
In addition to growth in assets and profitability over the investment life cycle, the structure of balance-sheet liabilities of the subsidiaries of German investors in the Czech Republic was also analysed. In most cases, the share of the foreign company in the equity of the subsidiary[155] showed an upward tendency within three years of the investment as foreign companies expanded their influence over their subsidiaries (see Chart 9).[156] Five to seven years following the commencement of the investment, the German owner's share in equity in some companies had declined slightly, maybe reflecting the start of an outflow of profits to Germany.

Chart 9 – Share of parent company in equity of subsidiary
(%)



Source: Deutsche Bundesbank, own calculations

Chart 10 – Share of debt to parent company in total debt
(%)



Source: Deutsche Bundesbank, own calculations

In most cases, the debt of the subsidiary declined over the time span of the German investments. However, loans from the parent company (which are also included in the FDI statistics) also appear within the subsidiaries' external funds. As shown in Chart 10, the share of loans from the parent company in total external funds increased in many companies. Where the investment was made in the form of an acquisition, loans from the foreign parent company may have crowded out bank loans (see also section 3 of this article).[157]

The causes of this may have been, for example, that the parent company was looking for a way of allocating its free funds or that it borrowed at home and transferred a part of the loan to the Czech Republic. Lower interest on the loan granted to the parent company, which had higher creditworthiness and a longer credit history, or economies of scale in the case of a relatively large loan, may have played a role here. In some cases, however, the share of loans from the parent company has decreased recently, while the debt ratio has remained unchanged, which might indicate an improvement in the efficiency of the Czech credit market or a situation where subsidiaries no longer need direct financial aid from their parent companies. Macroeconomic stability in the Czech Republic and very low interest rates, which are currently even lower than in the euro area and are motivating the subsidiaries of foreign companies to draw loans from local banks to a greater extent, are also having a positive effect.

155 i.e. the share of the parent company in capital plus its shares in retained earnings, profit for the current financial year and capital funds.

156 This growth in the investor's share was partly voluntary, but may also have been due partly to mandatory purchase offers for listed companies. The efficiency of the capital market with regard to takeover bids is analysed in the article *Takeover bids and capital market efficiency* in the thematic part of this report.

157 However, it is difficult to determine whether the higher share of loans from the parent company is due to difficult access of the subsidiaries to loans ("credit crunch") or whether loans from the parent company crowd out bank loans in a situation where banks would be willing to lend. It can be assumed that the former reason prevailed in the initial stages of foreign investments, when FDI contributed significantly to the removal of market imperfections and offered a valuable alternative to bank financing. This motivation is probably somewhat weaker now.

5. CONCLUSIONS

The results of the analysis confirm the hypothesis that where FDI took the form of an acquisition of a Czech company, the entry of the foreign owner resulted in an increase in the profitability of the domestic company, primarily by increasing its ability to generate profit on a given volume of sales. Some companies also benefited from a decline in the assets turnover ratio, probably reflecting growth in orders thanks to the foreign investor.

Foreign-owned companies generally do not face a lack of funds to finance further development and growth in assets. Intra-group financing, i.e. loans provided by the parent company to its Czech subsidiary, played an important role in the financing of corporate growth. Thus the hypothesis that loans from domestic banks were partly crowded out by loans from foreign owners was confirmed to some extent. However, the direction of the causality is not necessarily clear, as the loan from the foreign owner may have been requested by the subsidiary in response to an insufficient supply of financing from local banks.

Although there are some indications that the life cycle of German investment in the Czech Republic might have entered its later stages, these effects are not sufficiently conclusive as yet. The risk of liquidation of foreign direct investments thus seems relatively low.

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TAKEOVER BIDS AND CAPITAL MARKET EFFICIENCY

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This article deals with the structure and evolution of tender offers, takeover prices and the effects of tender offer announcements in the Czech Republic in 2001–2005. Semi-strong form efficiency is examined by means of the traditional event study methodology. Based on the results it is impossible to prove either semi-strong form efficiency of the Czech stock market or trading based on private information.

1. INTRODUCTION

Market efficiency can be understood as an important implicit assumption in financial stability analysis. If stock markets are informationally efficient and new information is immediately reflected in share prices, they can provide a timely warning signal for the assessment of financial stability. Capital market efficiency is also a necessary precondition for share prices to provide accurate information to economic agents. Although Czech capital market and share price stability is not right now a primary issue in financial stability assessment, their influence on this segment can be expected to increase owing to the gradual development of the capital market in the future and as a result of the integration of capital market supervision into the Czech National Bank.

The efficient market hypothesis (EMH) asserts that market prices on a semi-strong form efficient market[158] accurately reflect all obviously publicly available information (i.e. the hypothesis concerns informational efficiency). Information should be reflected in prices on the day it is published or the following day at the latest. If, then, it is possible to achieve abnormal returns (i.e. unusually high returns from the economic point of view) based on new public information, the market is considered as semi-strong form inefficient. Semi-strong form efficiency is usually tested by analysing the market's responses to new information as compared to the expected behaviour based on a selected model (the event study approach). In this article semi-strong form efficiency is tested on the Czech stock market using the Capital Asset Pricing Model (CAPM), a simple index model and a control market portfolio. The effects of announcements of tender offers for shares of minority shareholders are examined on the Prague Stock Exchange and RM-System.

This article is structured as follows. Section 2 briefly describes the basic statistics of takeover bids, their structure and changes over time. In section 3 the relationship between average prices and tender prices and its development over time is analysed. In section 4 semi-strong form efficiency is tested on the Czech capital market using the event study methodology.

2. STRUCTURE OF TENDER OFFERS

Despite the various reasons for takeover bids, a common feature of them is that a market regulator tries to guarantee minority shareholders' right to an equitable price for their share in the company's assets.[159] Depending on the characteristics under discussion, the analysis concerns (a) all types of tender offers, (b) individual types separately, or (c) mandatory takeover bids only.

A total number of 443 offers to purchase minority shareholders' shares were recorded between 2001 and 2005. Three-quarters of them involved mandatory takeover bids resulting from gaining control of a company or exceeding thresholds establishing a tender offer obligation.[160] Delisting-related offers accounted for 20% and voluntary offers for 3% of cases. The rest consisted of other offers, i.e. voluntary ones having the character of

158 For the traditional classification of efficiency with respect to information sets that prices should reflect (weak form, semi-strong form and strong form), see Roberts (1967).

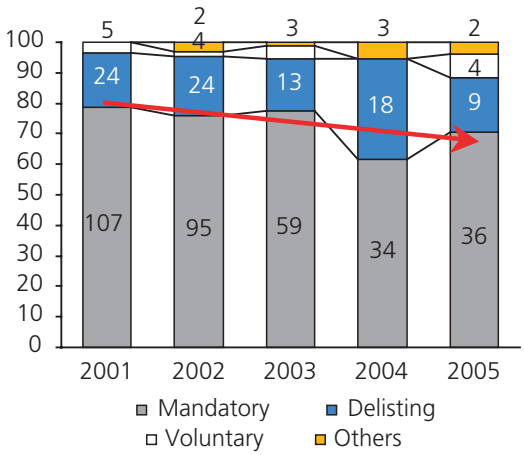
159 The possible reasons for tender offers include a new majority shareholder (or controlling shareholder) gaining control of a company or increasing its share above a particular threshold; an AGM (de facto a controlling shareholder) deciding to delist shares, usually with a major impact on their liquidity; or a controlling shareholder trying to further strengthen its stake (influence) in a company by making a voluntary offer and buying up minority shareholders' shares. "Tender offer" and "takeover bid" are regarded as synonyms in this text.

160 Two-thirds or three-quarters of the voting rights (Article 183b of the Commercial Code).

mandatory ones, or purchase offers.[161] Chart 1 illustrates the structure of takeover bids over time. The chart shows that the share of mandatory offers has declined slightly over time.[162]

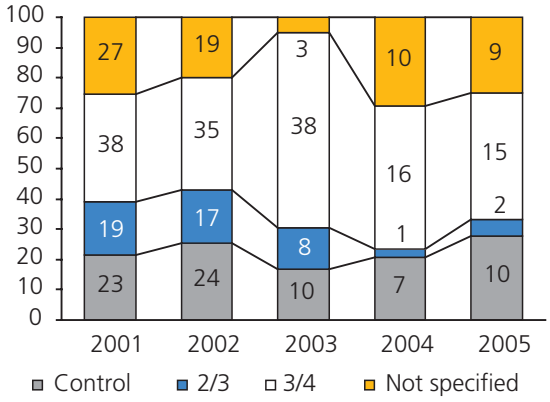
Chart 2 illustrates the breakdown of mandatory offers by the reason for their initiation (a total of 331 cases). The prevailing reason was the exceeding of a three-quarter threshold. Gaining control of a company[163] was significant as well. Chart 2 also shows that while acquisitions of smaller stakes occurred more often in the first two years of the period under review, exceeding the three-quarter threshold has recently prevailed as the main reason for the establishment of an obligation to make a takeover bid. This may be a result of a growing concentration of ownership in publicly traded companies.

Chart 1 – Evolution of takeover bid types over time
(figures denote number of bids, %)



Source: CNB

Chart 2 – Mandatory takeover bids by reasons of initiation
(figures denote number of bids, %)



Source: CNB
Note: The idividual categories denote the reaching or exceeding of a share of the voting rights in the company, i.e. the gaining of a controlling (40% or more), two-thirds or three-quarters stake. Bids for which no figure was available are included under "Not specified". For more details, see the Commercial Code (Article183b).

3. PRICES IN TAKEOVER BIDS – RELATIONSHIP BETWEEN TENDER PRICE AND AVERAGE PRICE[164]

In this section the relationship between the tender price and the average price is analysed.[165] On an efficient market, the ratio of the tender price offered to minority shareholders to the average price at which a share has recently been traded expresses the willingness or unwillingness of a takeover company to pay a premium to acquire additional shares or to share the majority premium with minority shareholders. It can also indicate the level

161 "Purchase offer" means the right of a minority shareholder to call on a supervisory authority (the CNB) to impose on a shareholder of a company or shareholders acting in concert having 95% of the voting rights the obligation to repurchase the remaining securities (Article 183f of the Commercial Code).

162 This may be caused, inter alia, by growing stabilisation of ownership relations in companies listed on regulated markets in the Czech Republic following the turbulent period of structural and ownership changes in the 1990s. In section 2, offers are assigned to individual years according to the date of establishment of the obligation or announcement of the offer intention, or alternatively according to the date when an offer is received by the regulator.

163 Exceeding a 40% share of the voting rights is regarded as gaining control of the company, unless the company has another shareholder with a larger share.

164 The tender price is the price per share which is offered to minority shareholders in tender offers. In the case of mandatory takeover bids, the average price expresses the weighted average of prices at which transactions were executed in the six-month period prior to the establishment of the obligation to make a takeover bid which were registered by the Czech Securities Centre (i.e. including the transactions initiating the takeover bid). Average prices are based on figures stated in tender offer announcements. The accuracy of the calculation of the average prices given by the Securities Centre and, in particular, the input data used for averaging could not be verified.

165 Absolute outliers are excluded from the sample so that they do not significantly distort the results of the analysis. Some ratios relate to mandatory takeover bids only. Unlike in section 2, tender offers are arranged along the time axis according to the time of their announcement, hence numbers of bids may differ in individual years.

of market efficiency; if a market is inefficient, the difference can, besides the aforementioned, indicate that shares are incorrectly priced on the capital market.[166]

The relationship between the tender price and the average price is shown in Table 1. The table reveals that the average premium offered to minority shareholders in mandatory tender offers amounted to 25% of the six-month weighted average price, irrespective of the bidder's domicile (domestic or foreign).[167] In roughly 80% of cases the tender price exceeded the average price; outliers occur more frequently with a positive sign. Bidders are therefore either willing (or forced) to share the majority premium (or part thereof) with minority shareholders, or the Czech market is inefficient and prices do not reflect the fundamental value of shares. In the case of voluntary offers, the median is higher than in the case of mandatory and public offers, although given the low number of observations this difference should not be overestimated.

Table 1 – Ratio of tender price to average price by entity and offer type

	Total	Domestic	Foreign	Mandatory	Voluntary	Public
No. of offers	219	169	50	153	16	50
Mean	1.25	1.26	1.22	1.24	1.29	1.27
Median	1.07	1.07	1.07	1.06	1.22	1.06
Max	5.56	5.56	5.17	5.56	2.80	5.08
Min	0.22	0.22	0.49	0.22	0.64	0.45
Std. deviation	0.65	0.64	0.66	0.63	0.47	0.75

Source: CNB

The first part of Table 2 shows the ratio of the tender price to the average price, i.e. the premium, for mandatory takeover bids in relation to the reason establishing the tender obligation.[168] A premium offered in a tender after gaining control of a company can be justified, for example, by the effort of the shareholder(s) holding a significant stake in the company to reach the majority. From comparing with the average premiums offered when the higher thresholds are exceeded one cannot say that the majority premium depends on a growing share in a company and that bidders are more motivated by successful realisation of tenders.[169]

The second part of Table 2 shows the average ratio of the tender price to the average price over a five-year period. As can be seen, after two years of relatively low premiums the mean and, in particular, median increased markedly in 2005. This is inconsistent with the assumption of standardisation of the Czech capital market and an improving information content of prices.

Table 2 – Ratio of tender price to average price by reason for establishment of obligation and its evolution over time

	Control	2/3	3/4	Not distinguished	2001	2002	2003	2004	2005
No. of offers	29	20	73	97	61	57	35	34	32
Mean	1.20	1.23	1.19	-	1.18	1.32	1.24	1.20	1.31
Median	1.06	1.16	1.02	-	1.09	1.06	1.03	1.05	1.16
Max	2.50	2.29	5.17	-	2.50	5.56	5.17	4.00	3.21
Min	0.49	0.57	0.31	-	0.80	0.22	0.57	0.45	0.39
Std. deviation	0.38	0.34	0.58	-	0.29	0.87	0.75	0.58	0.59

Source: CNB

166 However, one also needs to take into account a usual time span between the period from which the average is calculated and the period of validity of a takeover bid, which is 5–6 months. Given the stock investor's usual required return, the time span represents roughly a 5% difference in value.

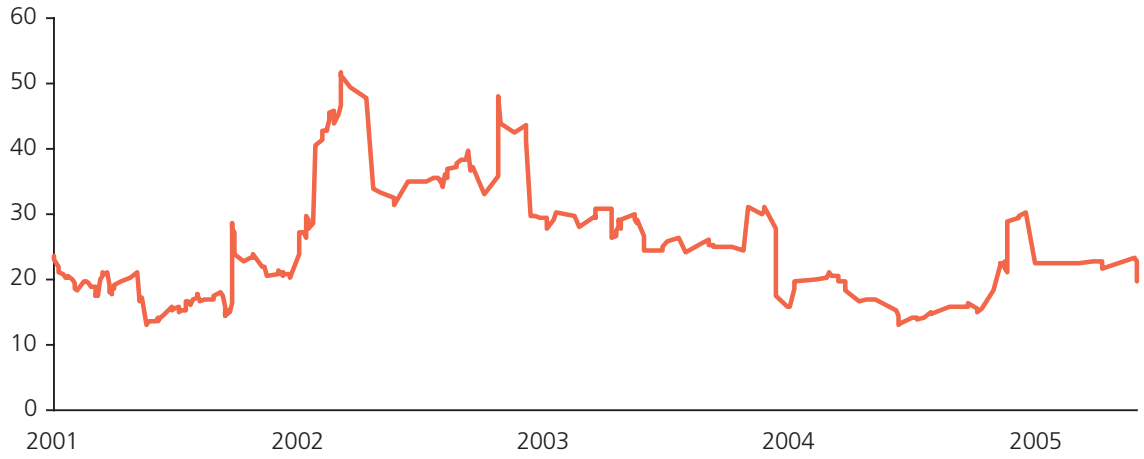
167 The criterion for dividing entities into domestic and foreign companies is their legal form, i.e. whether they were established under Czech or foreign law.

168 The category "Not distinguished" includes mandatory takeover bids for which one of the prices is unknown, and other types of tender offers.

169 Actions could be motivated by an effort to minimise the share of minority shareholders and to exceed a threshold allowing a bidder to make a purchase offer with subsequent delisting of shares or dissolution of the company with the majority shareholder taking over the equity (or to squeeze out minority shareholders). Under the Commercial Code, three-quarters of the votes present are needed for the approval of a change of type or form of shares or delisting of shares. A 90% share of the company's capital is needed for transferring the equity to shareholders and squeezing out minority shareholders.

Chart 3 shows the average premium over time using the moving average of premiums/discounts of tender prices (where available) for the last 60 offers prior to the given date relative to the six-month average price. Despite the significant volatility of the values, a declining trend in recent years, except for 2005, is obvious.[170]

Chart 3 – Moving average of premiums/discounts of tender price relative to average price
(in %)



Source: CNB

4. TAKEOVER BIDS AND SEMI-STRONG FORM MARKET EFFICIENCY

A variety of approaches are applied for testing market efficiency. The choice usually depends on the nature of the information being analysed. As mentioned in the introduction, market prices on a semi-strong form efficient market accurately reflect all publicly available information, which is absorbed on the day it is published or the following day at the latest (depending on the time at which it is published during the day). Semi-strong form efficiency is thus tested on the basis of newly published fundamental information on traded instruments (e.g. the announcement of share splits, financial results, acquisitions, etc.), generally using the event study approach, where the behaviour of potential excess returns on days around the aforementioned event is examined. In this article the reaction time of share prices to announcements of takeover bids (in the form of newspaper advertisements) is analysed for individual shares traded on the Czech stock exchange and the OTC market.

The publication of the tender offer terms provides a minority shareholder with two fundamental pieces of information. If an offer is considered as a shareholder's put option acquired at zero cost, the announcement contains information on the exercise price of the option and thus determines its value. If this information is new and unexpected, it should be reflected in the price. According to the EMH, market prices should adjust very fast, in a single move, mostly during the day on which it is published.[171] The second fundamental piece of information arising from the offer, and particularly from the tender price, concerns the future liquidity of the shares. The higher the price, the higher the probability of a decline in the free float and thus also of a decrease in the liquidity of the shares.[172]

170 Starting in 2002, the average premium gradually declined, reaching a minimum of 15% at the beginning of 2005. The increase in the average premium in April 2005 is due to a few tenders in the mining and energy sectors; after adjustment of the series a continuing slight downward trend to 9% at the end of 2005 would be visible.

171 Note that bids are announced in the national press, so participants have a whole trading day to assess the information and react accordingly.

172 It can be also expected – specifically on the Czech stock market – that a new owner intending to delist shares or squeeze out minority shareholders will offer a higher price in order to acquire the necessary qualifying stake at the General Meeting.

The tender price can also be viewed as the bidder's estimate of the share value. Since takeover companies usually have more detailed information on the firm being taken over than ordinary minority shareholders, the relationship between the tender price and the market price determines the response of the market price to the tender announcement. Realised offers are therefore divided into two subsets: cases where the market price exceeds the tender price and cases where the opposite applies.

Data

The EMH is tested using CNB data on tender offers for publicly traded companies on the Prague Stock Exchange (also referred to as the "PSE" or "stock exchange") between December 2000 and November 2005 and in the RM-System (also referred to as "RM-S") between June 2000 and September 2005. Daily returns were calculated based on time series of market prices of shares running from January 1998 to December 2005 in the case of the stock exchange and from December 1998 to December 2005 in the case of the RM-S. The set under analysis contains 145 and 351 takeover bids for shares listed on the PSE and RM-S respectively. Adjusted for non-traded shares, 92 and 249 cases on the PSE and RM-S respectively remained for the purposes of analysing price responses to takeover bid announcements.[173]

Methodology

The standard event study methodology is applied to test price responses to new and unexpected information.[174]

After calculating the actual returns on a given share around an announcement date, the "equilibrium returns" are determined and compared with the actual returns on the share.[175] Three approaches to determining the equilibrium (daily) returns are applied:

1) CAPM: $\tilde{r}_{it} = r_{ft} + \hat{\beta}_i (r_{mt} - r_{ft})$,

2) simple index model (IM): $\tilde{r}_{it} = \hat{\alpha}_i + \beta_i r_{mt}$,

3) control portfolio (CP):[176] $\tilde{r}_{it} = r_{PX\text{-}Glob}$.

In the case of the CAPM and the index model, the market return r_{mt} is represented by the PX-Glob index. The three-month PRIBID is substituted for the risk-free interest rate. The CAPM and IM parameters are estimated by regressing for each share separately using the least squares method, although only in cases where the time series is sufficiently long. The difference between the actual return and the equilibrium return represents the abnormal return achieved for the share.[177] The cumulative abnormal returns on individual shares are then obtained by adding the subsequent abnormal returns as from the announcement date. The average cumulative abnormal return (CAR) is determined by averaging these values for all the shares. The final steps consist in verifying the statistical and economic significance of the results.

173 The set was adjusted for cases where trading data were unavailable for a sufficiently long period prior to the takeover bid announcement (data were usually required at least 50 trading days prior to the announcement).

174 The event studies literature includes Ball and Brown (1968), Ball (1978), Fama, Fisher, Jensen and Roll (1969) and Scholes (1972); in the Czech Republic, for example, Filip (1999), Filip (2000) and Jindřichovská and Rhys (2000) have applied the approach.

175 The actual returns r_{it} on a given stock i at time t were calculated using the equation $r_{it} = (P_{it} - P_{it\text{-}L}) / P_{it\text{-}L}$, where P_{it} stands for the market price. L denotes the "event window", which should be sufficiently long, usually four or six weeks.

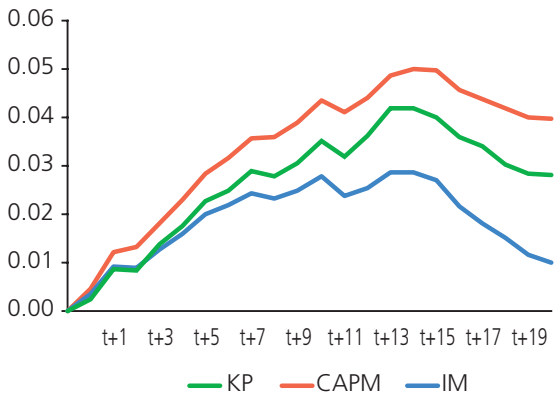
176 See Sharpe (1964) for more details on the CAPM and Sharpe (1963) for more details on the index model. In the case of the control portfolio, the expected estimated return is assumed to equal the return on the control market portfolio, i.e. the return on the PX-Glob index. If the selection is sufficiently representative, the results obtained when using this model and the CAPM are very similar (deviations are created, inter alia, by different weights of shares in the index and by other factors).

177 Formally, the excess return on stock i at time t can be written as $\tilde{u}_{it} = r_{it} - \tilde{r}_{it}$

Results of testing the reaction to the tender offer announcements

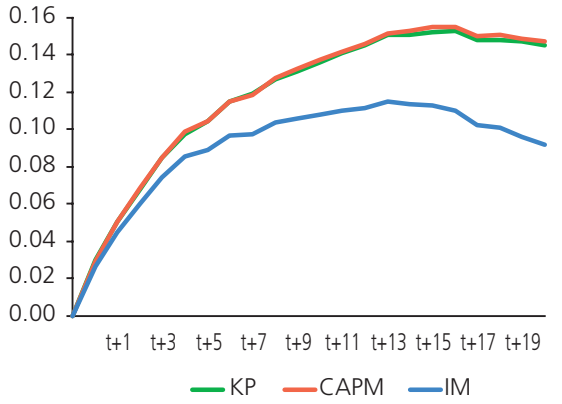
In the following section, conclusions of the analysis are presented. Chart 4 shows the average cumulative abnormal returns in the 20 days after the announcement of 92 tender offers to purchase shares listed on the Prague Stock Exchange. Market responses are most evident when the CAPM is used to calculate the expected return.[178] When the other two approaches are applied, the shape of the cumulative abnormal return curves is similar, but the absolute values are lower. Share prices on the Prague Stock Exchange therefore adjust gradually to new information on tender offers for minority shareholders' shares. Chart 5 analogously shows the reactions to 249 offers in respect of companies listed on the RM-S market. Here, too, a slow and gradual response to tender price announcements is evident.

Chart 4 – Reaction of share prices to tender offer announcements (PSE)



Source: CNB

Chart 5 – Reaction of share prices to tender offer announcements (RM-S)



Source: CNB

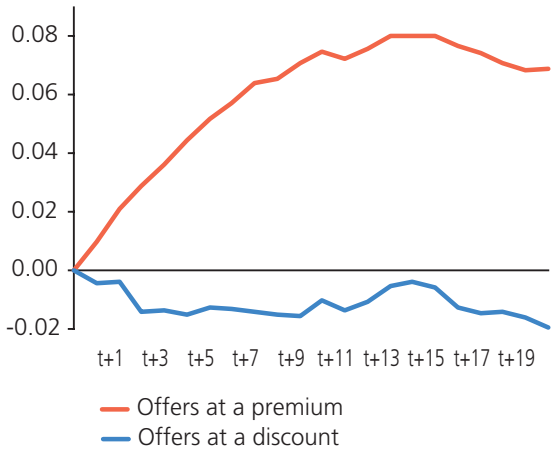
To get a clear idea of the nature of price behaviour, the set of tender offers was divided into three subsets according to whether: (1) the tender price on the announcement date exceeded the market price (offer at a premium), (2) the market price on the announcement date exceeded the tender price (offer at a discount), or (3) neither of the above options was true.[179] On the PSE, the tender price was higher than the market price in 59 cases and lower than the market price in 33 cases. Likewise on the RM-S, the tender price exceeded the market price in 170 cases, and in 76 cases the opposite applied. The next two charts show the results after these adjustments. The red curve shows the behaviour of shares demanded at a premium in tender offers (the tender price exceeded the market price on the announcement date), whereas the blue curve depicts the tender prices of shares demanded at a discount compared to the market price.

178 The values are statistically significant already on the announcement date and rise continually for ten trading days to 4.3% (99% on an annual basis). The cumulative abnormal return reaches its maximum of 5.0% on the fourteenth trading day after the announcement date (84% p.a.).

179 The market price is equal to the tender price or the tender price is unknown. This concerned only a minimum of cases. These cases are then excluded from the analysis.

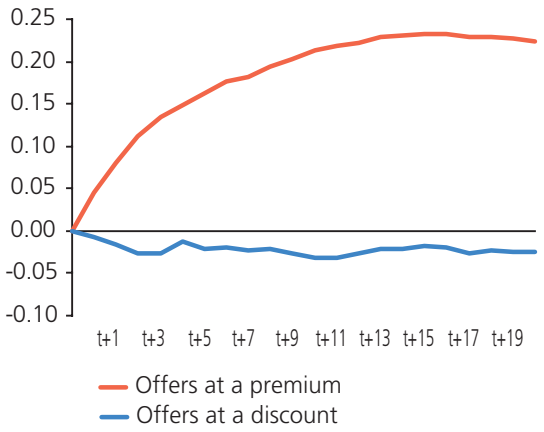
Chart 6 shows the average cumulative abnormal return following takeover bid announcements in the case of shares traded on the stock exchange. It clearly reveals a slow response to new information in the case of companies whose shares are demanded at a premium.[180] Shares traded at a discount show asymmetrical behaviour; no response to announcements is evident.[181] Chart 7 shows the reaction on the OTC market. As on the stock exchange, a slow gradual response to new information is evident in the case of offers at a premium.[182]

Chart 6 – Reaction to announcements of offers at premium and discount, CAPM (PSE)



Source: CNB

Chart 7 – Reaction to announcements of offers at premium and discount, CAPM (RM-S)



Source: CNB

So far, abnormal returns have been analysed from the announcement dates onwards. However, market efficiency can also be approached by studying the market behaviour prior to offer announcements, in this case in terms of strong-form efficiency. After widening the event window backwards by ten trading days, it is possible on the basis of abnormal returns to analyse trading based on private information. To highlight the reactions, a separate chart is displayed for the CAPM only. However, using the other two approaches has no effect on the interpretation of results. The red curves represent the behaviour of shares whose tender price exceeded the market price, while the blue curves represent offers at a discount.

Chart 8 shows that prior to announcements the abnormal returns of companies from both subsets behaved broadly similarly on the PSE; only after announcements does the aforementioned differentiation emerge. Such price behaviour indicates that the extent of insider trading related to tender offers is very low or zero. Interpretation of the results for shares traded on the RM-S, which are illustrated in Chart 9, is rather more complex. In this chart, the development of the cumulative abnormal returns estimated using the CAPM is shown. Prior to offer announcements, the cumulative abnormal returns develop more or less identically, regardless of the

180 The abnormal returns are statistically different from zero in seven days following announcements. The cumulative abnormal return rises to over 8.0% on the fifteenth trading day after the announcement (126% p.a.) and then declines slightly to 7% on the twentieth trading day after the announcement, where it stabilises.

181 The cumulative abnormal loss reaches 1.6% on the twentieth day after announcements as compared to the behaviour expected on the basis of the CAPM; the loss is not statistically significant.

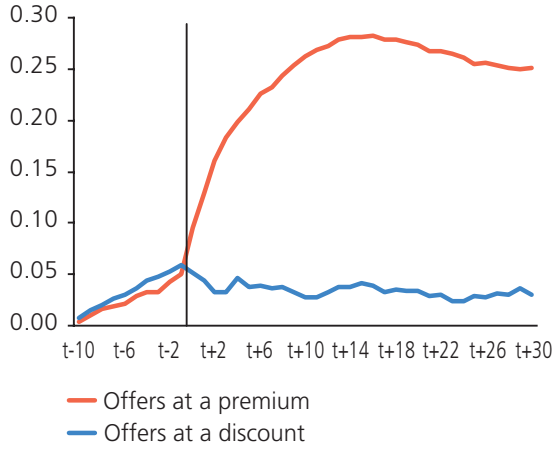
182 In the case of a premium, the cumulative abnormal return measured on the basis of both the CAPM and control portfolio climbed to around 23% (385% p.a.) on the fifteenth trading day after the announcement. In the case of the index model the figure was 19% (318% p.a.). The cumulative abnormal returns following announcements are statistically significant over the entire reference period, regardless of the approach choice. In the set of offers at a discount, the cumulative abnormal loss on the twentieth trading day after announcements reaches 8.3% (-104% p.a.) using the index model, which represents a statistically significant value, whereas with the CAPM and control portfolio it amounts to 2.5% (-314% p.a.) and is statistically insignificant.

relationship between the tender price and the market price. Unlike on the stock exchange, however, they are rising slightly. Nevertheless, as in the previous case, it is impossible to conclude, based on the aforementioned results, that trading on private information exists on the Czech OTC market. The behaviour of returns on shares demanded in tender offers at a premium and at a discount deviate insignificantly from one another, and the abnormal cumulative return is even higher for shares demanded at a discount. Moreover, as soon as the first day after the announcement, the abnormal cumulative return on offers at a premium exceeds that on offers at a discount by around 9 percentage points, and on the fifteenth day the difference exceeds 24 percentage points.

Chart 8 – Behaviour before and after offer announcements, CAPM (PSE)

Source: CNB

Chart 9 – Behaviour before and after offer announcements, CAPM (RM-S)



Source: CNB

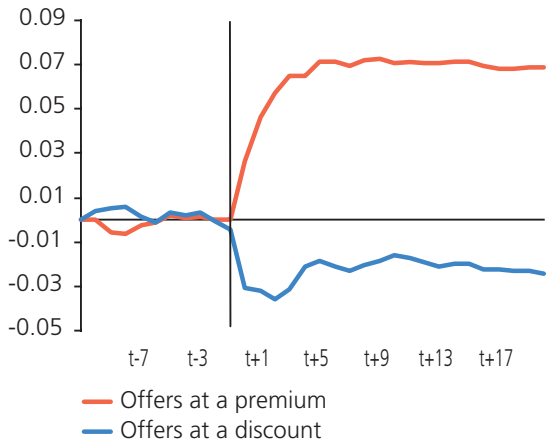
The low liquidity of many analysed shares and the non-trading factor represent challenges to correct interpretation of the results. Assuming that information which is reflected in prices with a time lag due to illiquidity would otherwise be reflected in prices on the first possible trading day, the non-trading factor can be taken into consideration by leaving out those days on which a share was not traded during the first 20 days after the offer announcement date and on which the information could not be reflected in prices.[183] Such adjusted responses can be observed in Charts 10 and 11 for the PSE and RM-S respectively.

Even after such adjustment, however, market prices react with a delay and gradually to tender announcements, and the market can be described as inefficient in terms of semi-strong form efficiency. It turns out that market prices on the stock exchange react to information on offers at a premium within four days. In the case of offers at a discount, prices respond within three days, while the abnormal returns are statistically insignificant except for the announcement date. These charts also show that in the case of the RM-S, by contrast with the PSE, there is an insignificant difference in market behaviour before and after the adjustment (compare Charts 9 and 10). This

183 This approach implicitly and very optimistically assumes that information which is reflected in prices with a time lag due to illiquidity would under normal circumstances be reflected in prices on the first possible trading day.

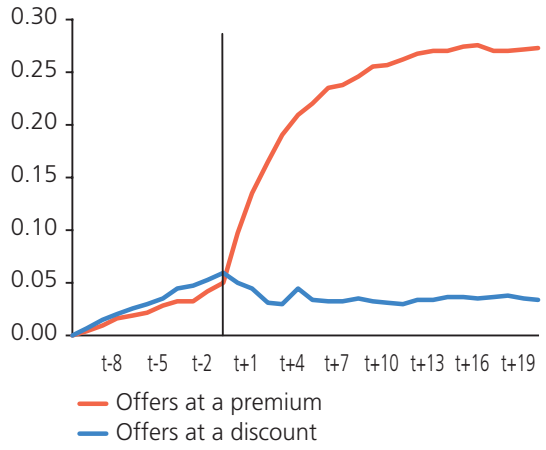
could be interpreted so that the generally lower liquidity in the RM-S leads to slower reflection of information in prices and lower market efficiency compared to the PSE.

Chart 10 – Reaction to offer announcements, adjusted for nonsynchronous trading, CAPM (PSE)



Source: CNB

Chart 11 – Reaction to offer announcements, adjusted for nonsynchronous trading, CAPM (RM-S)



Source: CNB

5. CONCLUSIONS

This study aimed to test the semi-strong form of the EMH on the Czech stock market – the Prague Stock Exchange and the RM-System. After providing an introductory general description of tender offers, including the relationship between tender prices and average prices, the speed and strength of market reactions to tender price announcements were analysed.

To sum up, it is impossible to confirm semi-strong form efficiency on the Czech stock market. Since prices respond gradually to tender offer announcements, significant responses occur primarily for offers where the tender price exceeds the market price. Prices respond gradually even after adjustment for the factor of irregular trading due to low liquidity. Moreover, in 2004 and 2005 tender prices exceeded average prices more significantly than in previous years, which is inconsistent with the assumption of standardisation of the Czech capital market and improving information content of prices. The explanation can be found primarily in insufficient (or only partial) fulfilment of the axioms on which the efficient market hypothesis is based. In particular, factors such as the short history of the market, method and course of privatisation, trading system used or the extent of foreign investor participation affect the market transparency and liquidity, the proportion of illiquid shares, direct and indirect trading costs and thus also efficiency. These conclusions are in line with previous studies testing semi-strong form efficiency on the Czech stock market[184] and on Central European markets,[185] which, with few exceptions, suggest semi-strong form inefficiency.

The results of the analysis of (potential) trading based on private information concerning tender offers turn out positively, as the reactions of prices of shares demanded at a premium and at a discount in tender offers show only insignificant differences until the offers are announced. The growth in cumulative abnormal returns identified on the RM-System prior to announcements can be viewed rather as a result of rational expectations of investors rather than as evidence of insider trading.

184 E.g. Filip (1999) and Filip (2000).

185 E.g. Gryglewicz (2004) and Jermakowicz and Gornik-Tomaszewski (1998).

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GLOSSARY

Capital adequacy ratio The ratio of regulatory capital to total risk-weighted assets.

Carry trade A speculative strategy on the financial markets where an investor borrows money in a currency with a lower interest rate and invests it in a currency with a higher interest rate in order to realise the profit arising from the interest rate differential. However, this profit can only be realised on the assumption that any movement of the exchange rate between the financing currency and the investment currency does not eliminate the gain from the interest rate differential.

Default The failure of a debtor to pay principal and/or interest when 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.

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.

Global excess liquidity Global excess liquidity is a name for the sharp rise in credit and the money stock in many countries in recent years. The deviations of the money stock and credit to the private sector as a proportion of GDP from their long-term trends are viewed as the most significant indicators of this phenomenon. The global liquidity excess is put into context with central banks' low monetary policy rates since 2001 and with the persisting historically low level of long-term nominal interest rates. See also Global savings surplus.

Global savings surplus A situation seen over the past few years primarily in emerging economies, where there has been large growth in savings which cannot be invested in credible assets in those economies. This has resulted in huge capital flows from emerging economies to advanced countries. The effect has been compounded by growth in corporate sector savings in advanced countries as a result of relatively low investment. This is usually linked with an earlier investment wave, which, amid belief in the effects of the "new economy", generated excess capacity. One of the overall effects is a fall in global real interest rates, manifesting itself also in a historically low level of long-term nominal interest rates in key economies.

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.

Interest rate spread Also interest rate differential; the spread between the interest rate on a contract (deposit, security) and a reference interest rate.

Loan-to-value (LTV) ratio The ratio of a loan to the value of pledged property

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.

Over the counter (OTC) operations
Operations not conducted on an organised market.

Present value of a basis point (PVBP)
The change in the real value of an instrument given a parallel shift in the interest rate curve of 1 basis point, i.e. 0.01%.

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, which are published by the Institute for Regional Information, together with data on market rent supply prices. Supply prices should be higher than transfer prices. See also Property transfer prices.

Property transfer 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 of roughly one year. See also Property supply prices.

Search for yield The effort made by international investors to compensate for the historically low level of yields on low-risk assets from advanced countries by investing in higher-yield assets from emerging economies, for which nominal exchange rate appreciation can often be expected.

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.

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.

Tier 1 capital adequacy ratio
The ratio of Tier 1 capital to total risk-weighted assets. See also Tier 1.

Total population increase The sum of the natural population increase and net migration in the same period of time in a given area. Net migration is the difference between immigration into and emigration from a given area in the same period of time. See also Natural population increase.

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.

ABBREVIATIONS

AFAM ČR	Association of Funds and Asset Management of the Czech Republic
AKAT	Czech Capital Market Association
APF ČR	Association of Pension Funds of the Czech Republic
ATM	automated teller machine
BIS	Bank for International Settlements
b.p.	basis point
BRIBOR	Bratislava InterBank Offered Rate
BUBOR	Budapest InterBank Offered Rate
Bund	German government bond
BUX	Hungarian stock market index
ČAP	Czech Insurance Association
CAR	capital adequacy ratio
CEA	Comité Européen des Assurances (European Insurance and Reinsurance Federation)
CEBS	Committee of European Banking Supervisors
CEC5	Central and Eastern European Countries (Czech Republic, Hungary, Poland, Slovakia and Slovenia)
CEIOPS	Committee of European Insurance and Occupational Pensions Supervisors
CERTIS	Czech Express Real Time Interbank Gross Settlement System
CESR	Committee of European Securities Regulators
ČLFA	Czech Leasing and Finance Association
CNB	Czech National Bank
CRC	Central Register of Credits
CSD	Central Securities Depository
CVCA	Czech Venture Capital Association
CZEONIA	Czech OverNight Index Average
CZK	Czech koruna
CZSO	Czech Statistical Office
DJ EuroStoxx	Dow Jones EuroStoxx (European stock market index)
DJ Stoxx 50	Dow Jones Stoxx 50 (European stock market index)
DJIA	Dow Jones Industrial Average (US stock market index)
EBRD	European Bank for Reconstruction and Development
EC	European Commission
ECB	European Central Bank
EEA	European Economic Area
EIB	European Investment Bank
EMBI	Emerging Market Bond Index
EONIA	Euro OverNight Index Average
ESCB	European System of Central Banks
EU	European Union
EU-12	euro area countries
EU-25	EU countries
EUR	euro
EURIBOR	Euro InterBank Offered Rate
EVCA	European Private Equity & Venture Capital Association
FDI	foreign direct investment
Fed	Federal Reserve System (the US central bank)
FRA	Forward Rate Agreement
FSAP	Financial Sector Assessment Program
FVO	fair value option
GDP	gross domestic product
HI	Herfindahl index
HUF	Hungarian forint

IAS/IFRS	International Accounting Standards/International Financial Reporting Standards
IBRD	International Bank for Reconstruction and Development
IF	investment firm
IMF	International Monetary Fund
IRI	Institute for Regional Information
JPY	Japanese yen
LGD	Loss Given Default
LIBOR	London InterBank Offered Rate
LTV	loan-to-value ratio
MF ČR	Ministry of Finance of the Czech Republic
MiFID	Markets in Financial Instruments Directive
MNB	Magyar Nemzeti Bank (the Hungarian central bank)
NMS-8	New Member States (excluding Malta and Cyprus)
O/N	overnight
OECD	Organisation for Economic Co-operation and Development
OMF	open-ended mutual fund
OR	operational risk
OTC	over-the-counter
p.p.	percentage point
P/E ratio	price to earnings ratio
PD	probability of default
PLN	Polish zloty
PRIBOR	Prague InterBank Offered Rate
PVBP	present value of a basis point
PX (PX-Glob)	Czech stock market index
QIS	quantitative impact study
RoA	return on assets
RoE	return on equity
S&P 500	Standard & Poor's 500 (US stock market index)
SITC	Standard International Trade Classification
SKD	Short-Term Bond System
SKK	Slovak koruna
SKONIA	Slovak OverNight Index Average
SMEs	small and medium-sized enterprises
SSS	securities settlement system
UCITS	Undertakings for the Collective Investment of Transferable Securities
USD	US dollar
VA	value added
VAT	value added tax
WB	World Bank
WIBOR	Warsaw InterBank Offered Rate
WIG	Polish stock market index

Abbreviations of city names (section 3.2 The Property Market):

BRN	Brno
CB	České Budějovice
HK	Hradec Králové
JIH	Jihlava
KV	Karlovy Vary
LIB	Liberec
OLC	Olomouc
OST	Ostrava
PAR	Pardubice
PHA	Prague
PLZ	Plzeň
UnL	Ústí nad Labem
ZLN	Zlín

Country abbreviations:

AT	Austria
AU	Australia
BE	Belgium
BG	Bulgaria
CH	Switzerland
CY	Cyprus
CZ	Czech Republic
CR	Croatia
DE	Germany
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
FR	France
GR	Greece
HU	Hungary
IE	Ireland
IT	Italy
JP	Japan
LT	Latvia
LU	Luxembourg
LV	Lithuania
MT	Malta
ME	Mexico
NL	Netherlands
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia
TR	Turkey
UK	United Kingdom
USA	United States

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