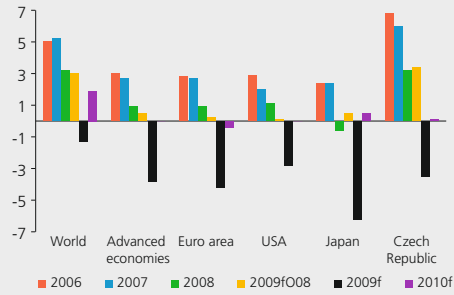


CHART II.1

Economic growth in the advanced economies

(year-on-year growth in %; outturns and October 2008 and April 2009 forecasts)



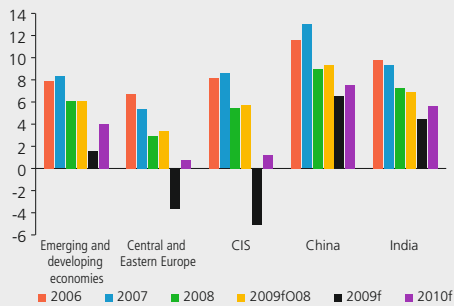
Source: IMF (World Economic Outlook, April 2009)

Note: 2009fO08 is the October 2008 forecast for 2009 and 2009f is the April 2009 forecast for 2009.

CHART II.2

Economic growth in emerging and developing countries

(year-on-year growth in %; outturns and October 2008 and April 2009 forecasts)



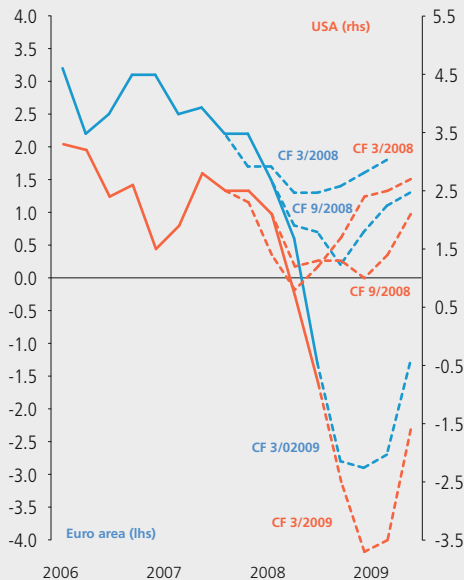
Source: IMF (World Economic Outlook, April 2009)

Note: 2009fO08 is the October 2008 forecast for 2009 and 2009f is the April 2009 forecast for 2009.

CHART II.3

Expected and actual economic growth in the USA and the euro area

(quarterly data; year-on-year growth; outturns versus expectations of Consensus Forecasts, CF)



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

2 THE REAL ECONOMY**2.1 THE MACROECONOMIC ENVIRONMENT**

The external macroeconomic environment was significantly affected in 2008 and in the first few months of 2009 by the direct and indirect effects of the financial crisis. Owing to a strong decline in demand, the world economy started to slip gradually into recession. Underlying these developments were rapid fluctuations in asset prices, interest rates and exchange rates. In the countries hit directly by the financial crisis, i.e. in the USA and Europe in particular, confidence in the stability of the financial system was not satisfactorily restored despite extensive government interventions and an easing of the financial conditions by central banks. For the same reason, the announced fiscal programmes were not yet able to stop the fall in consumer and investment demand. The gradual downward revisions to the 2009 and 2010 forecasts for economic activity continued into 2009 Q1 this year, and there was a high level of uncertainty surrounding the time frame of the end of the recession and the extent of the subsequent recovery. The next few years can be regarded as a period of exceptionally strong risks. However, a continuation and escalation of the financial crisis and a recession in the Western economies remain the main risks.

The Czech economy was not hit directly by the financial crisis in 2008. However, indirect effects of the crisis started to be observed in 2008 H2. The current outlook for the Czech economy for the next two years is fairly negative. A fall in GDP in 2009 should be replaced by only a weak recovery in 2010. One major side effect of the developments in the world economy was sharp volatility in the koruna exchange rate, which, after appreciating strongly in 2007 H2, started to depreciate significantly in 2008 H2. Although the exchange rate fluctuations can be expected to have some adverse impact on exporters, the return of the exchange rate to weaker values more in line with fundamentals should have a positive effect on the economy in the longer run.

The world economy cooled significantly during 2008. In 2007, according to IMF methodology, it grew by more than 5%, but in 2008 the growth was down to just 3.2%. In its new April 2009 forecast, the IMF expects a decline in world economic activity of 1.3% in 2009, which can be regarded as a global recession (see Chart II.1). The forecast predicts that the advanced economies will find themselves in recession in 2009 (see Chart II.1), while the emerging economies¹ as a whole will maintain positive growth (see Chart II.2). Both these charts show two forecasts for 2009 (from October 2008 and April 2009). The differences between them show just how dramatically the outlook for this year has been revised in recent months. From the point of view of the Czech economy, the unexpectedly strong recession in Germany (the IMF forecasts a decline in GDP of 5.6%) and the fall in the economies of Central and Eastern Europe (CEE) are bad news. The forecast also expects only a very modest recovery during 2010. However, this recovery will be due chiefly to the emerging economies.

¹ The April IMF forecast and Consensus Forecasts (a publication containing the average estimates of a broad representative sample of analysts and forecasters) expect first a decline in the world economy and then a gradual recovery in the next two years. The IMF's April forecast, published in the World Economic Outlook (in which the Czech Republic was ranked among the advanced countries for the first time), and Consensus Forecasts were predicting the aforementioned trend in economic activity for the Czech Republic as well.

Chart II.3 confirms that the economic growth forecasts for the advanced economies were substantially revised between September 2008 and April 2009. The magnitude of the revisions indicates that the effect of the financial crisis on the real economy was underestimated by analysts and forecasters last year. Chart II.4 shows that the uncertainty regarding future economic growth has been rising since the start of 2008, making growth very hard to predict. In this environment, businesses – including financial institutions – are faced with an exceptionally high level of uncertainty. The unusual size of the current recession is also evidenced by the rates of growth of industrial production and exports in industrial economies, with the advanced economies of this type in Asia being hardest hit. At the end of 2008, exports in many countries were down by as much as a third year on year (see Chart II.5) and industrial production in some countries recorded declines of a similar extent (see Chart II.6). The charts also show that the economic downturn is much stronger than the previous recession of 2001–2002. Rapid falls in commodity prices also testify to the strength of the economic slowdown (see section 3.1).

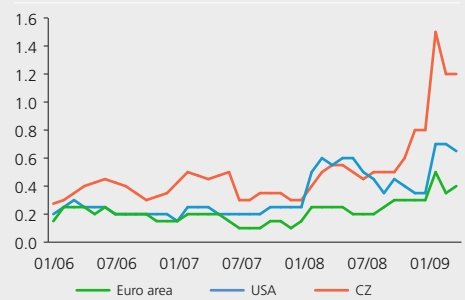
The financial crisis and the slump in economic activity have fundamentally changed the nature of central bank monetary policy (see Chart II.7). The US Fed lowered its monetary policy rate to almost zero and the Bank of England did likewise. These central banks adopted a series of measures to boost commercial banks' holdings of reserves on accounts at the central bank and to exert downward pressure on long-term interest rates. This type of policy, known as "quantitative monetary easing" has been practised by the Bank of Japan for many years. The ECB also drastically cut its monetary policy rates and took accompanying measures to provide liquidity to the financial system. However, the decline in short-term money market interest rates did not pass through symmetrically to long-term interest rates and rates on loans provided to the private sector. The monetary conditions thus were eased to a limited extent (see section 3.1).

In response to the declining demand and falling inflation pressures, the CNB also repeatedly lowered its monetary policy rate. The monetary policy easing led to a decline in money market rates, albeit to a lesser extent (see section 3.1). The phase of declining rates was interrupted by depreciation pressures on the koruna linked with falling confidence in the entire CEE region in February 2009. This resulted in revised expectations regarding the scope for lowering monetary policy rates. The CNB did not cut its monetary policy rates again until May 2009.

The assets of key central banks rose significantly as a result of the actions taken by these central banks to support banking system liquidity (see Chart II.8). This raises concerns of a future surge in inflation in the relevant economies based on the assumption that the growth in central banks' assets will be accompanied by money supply growth. From the short-term point of view, the concerns about rising inflation are not justified because of the current negative output gap. From the long-term point of view, the concerns regarding the inflationary effect of the central bank measures may also be exaggerated, since they will not necessarily lead to increased money supply growth. The purchases of government and private assets by central banks and the increased liquidity provision are being reflected primarily in a rise in commercial bank assets held at central banks, i.e. in increased holdings of free reserves of commercial banks. The current situation in banking systems, however, is creating strong barriers to the pass-through of this policy to higher rates of growth of loans. Many large international banks have suffered

CHART II.4
Uncertainty regarding expected GDP growth in selected economies

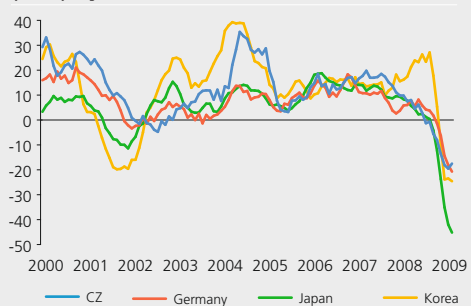
(mean standard deviation of GDP growth estimates for given and next year from Consensus Forecasts; in percentage points)



Source: Consensus Forecasts, CNB calculation

CHART II.5
Export growth in industrial economies

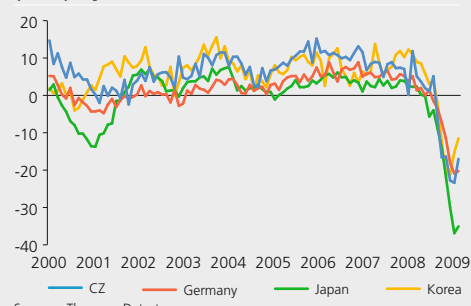
(year-on-year growth in %)



Source: Thomson Datastream

CHART II.6
Industrial production growth in industrial economies

(year-on-year growth in %)



Source: Thomson Datastream

CHART II.7
Monetary policy rates between the start of the financial turbulence and May 2009

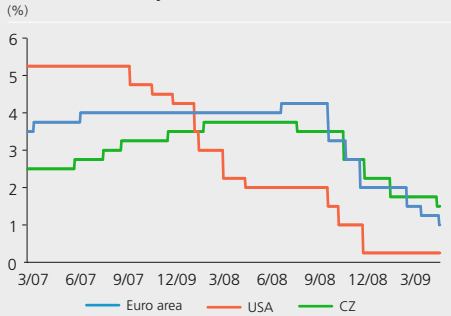


CHART II.8
Balance sheet indices of the Fed, Eurosystem and Bank of England
 (October 2008 = 100)

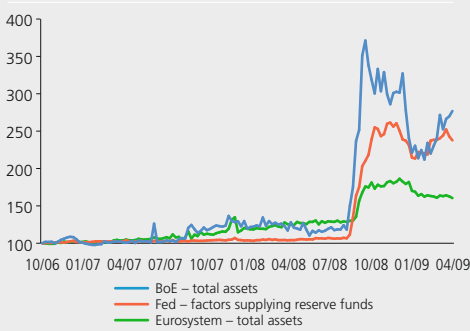
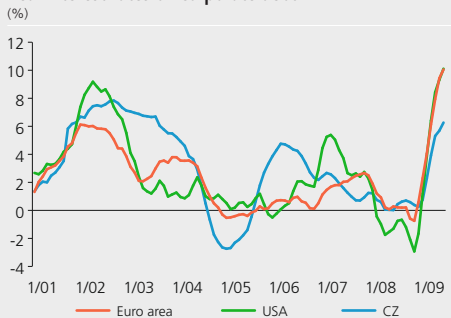


CHART II.9
Real interest rates on corporate debt



Note: Corporate bond yields in the euro area and the USA and interest rates on long-term corporate loans in the Czech Republic adjusted for current producer price inflation.

enormous losses, and this is putting pressure on regulatory capital. The newly paid capital of banks in the EU (USD 300 billion at the end of 2009 Q1, of which around USD 180 billion has been supplied by governments) exceeds the losses they have so far posted during the crisis (USD 260 billion). However, it is reasonable to expect that the losses in the coming quarters will necessitate further capital injections or exert pressure for a reduction in banking assets. In this situation, central bank measures to increase the monetary base would not necessarily lead to money supply growth, but might only cause a decline in the money multiplier.

The potential impacts of the financial crisis on banks' capital and indirectly on their ability to lend are revealed by the still rising estimates of financial institutions' total losses on loans and related assets. The need to recapitalise and restructure banks, combined with the limited functioning of other credit market segments, is causing at the very least a rapid slowdown in growth in lending to the private sector, and in some countries even a credit contraction (see section 4.1). A decline in political support for fiscally costly measures poses a risk to banking sector stabilisation in the USA and other countries. The stabilisation of the situation in the financial systems of some European countries is being jeopardised by political pressures for an immediate and fundamental Europe-wide change in financial market regulation in an effort to prevent future crises in a situation where the authorities have still not succeeded in eliminating the risks of the current crisis. Similarly risky are the efforts to change the accounting standards so as to optically improve financial institutions' balance sheets instead of taking effective action to clean them up.

Besides the obstacles on the credit supply side, demand for loans among households and corporations is falling sharply. This is due in part to the real interest rate level (see Chart II.9), which may be proving too high particularly for the corporate sector in relation to its investment returns. The first reason is that despite the fall in monetary policy and short-term market interest rates, corporate bond and long-term loan interest rates have not dropped below their pre-crisis levels in many countries. In contrast, the increase in credit risk has led to a rise in corporate bond yields in the euro area and the USA (see Chart II.9).² This factor testifies to reduced monetary policy effectiveness, or impaired monetary policy transmission, at a time of financial stress (see section 3.1). The second reason is declining prices at which corporations sell their output. These two factors together are increasing real debt servicing costs. As a result, the corporations using external financing may be facing a significant tightening of the financial conditions.³ Households in many countries may be in a similar situation. This increases the risk that large numbers of economic agents will not be able to repay loans taken out in previous years. This factor may be a significant contributor to slower emergence of the world economy from the recession and a more distant recovery. A rise in the private sector saving rate, however desirable it may be from the long-term point of view, will then foster a slower and weaker recovery in Western economies (see section 3.1).

² Corporate loans interest rates in the Czech Republic, in contrast to the euro area and the USA, have so far followed the decline in short-term market rates to some extent (see section 4.1). Nevertheless, owing to growth in industrial producer prices, real rates have been increasing here as well.

³ The tightening of the credit conditions ensues to a certain extent from the zero lower limit for monetary policy rates. In its 27 April 2009 issue, the Financial Times reported that the Fed analyses presented at the April monetary policy meeting stated that if the monetary policy rate was set according to the Taylor rule (a rate recommendation tool based on the difference between target and forecast inflation and the output gap), it would have to fall to -5%.

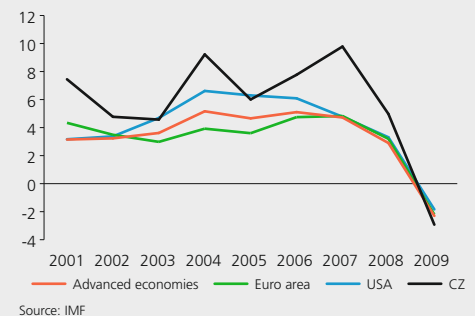
Overall, therefore, one can identify many reasons why the cyclical decline in Western economies might be deeper and longer than currently forecasted. The stress potential of the change in corporate and household nominal income growth is indicated by a comparison of nominal GDP growth in previous years in selected economies with the 2009 forecast (see Chart II.10). In terms of expected nominal income growth, economic agents are in an environment which not only is hard to predict, but also has very different features than the previous decade. The very low inflation will on the one hand mitigate the fall in the rate of growth of real income and thereby prevent a decline in demand. Debt deflation, on the other hand, would have a significant adverse effect on debtors, especially if it were protracted. The same goes for governments, which will substantially increase their indebtedness as a result of the financial crisis and economic decline. Nevertheless, we consider concerns that the resulting increase in the debt financing need will lead to a global rise in world real interest rates to be premature (see section 3.1).

The macroeconomic situation in the economies of the Central European region (the Czech Republic, Slovakia, Poland and Hungary) remained relatively successful in 2008, with the exception of Hungary (see Table II.1). The Czech Republic, Slovakia and Poland are now, together with Slovenia, viewed as the most stable economies in the entire CEE region. Nevertheless, they too were hit by the fall in confidence related to concerns about the sustainability of some countries' external positions and about the stability of banking systems in which a substantial proportion of loans are denominated in foreign currencies and provided by foreign parent companies. These concerns manifested themselves chiefly in depreciating currencies, rising government debt financing costs (see section 3.1) and falling stock markets. The national authorities responded to the negative and often incorrect information about the situation in the region with active communication aimed at explaining that the situation differs from country to country and that some of the negative information is moreover based on misinterpreted statistics (see section 4.1). Thanks to this communication, international investors and supranational institutions started gradually differentiating between the individual countries of the region. The different economic situations of these countries are confirmed by their ratings (see Chart II.11). Last year, Fitch Ratings upgraded the Czech Republic's rating to A+. This means the Czech Republic, together with Slovakia, has the highest rating in the region.

However, the CEE economies will undergo a tough test in the next two years. Even those whose situation can be regarded as stable will face flat or falling economic activity and rising public finance deficits. In the more vulnerable countries of the region, difficulties with banking system stability, problems with balance of payments financing and the acceptance of assistance programmes from supranational institutions cannot be ruled out. These factors could trigger further waves of depreciation pressure on the currencies of countries with floating exchange rates or devaluation pressure on countries with hard pegs. Countries with floating exchange rates seem to be in a better position, since a slight depreciation of their currencies should foster a faster recovery of their economies. However, panic sales of regional assets, which could lead to excessive and fundamentally unjustified currency depreciations, pose a risk. The chances that the Czech economy will be exposed to these potential pressures are relatively low thanks to its stronger external position (see Box 1). Investors' growing ability to differentiate between the individual economies in the region also reduces this risk.

For the Czech economy in the last few years, sharp fluctuations in the koruna's

CHART II.10
Nominal GDP and its forecast
(year-on-year growth in %)



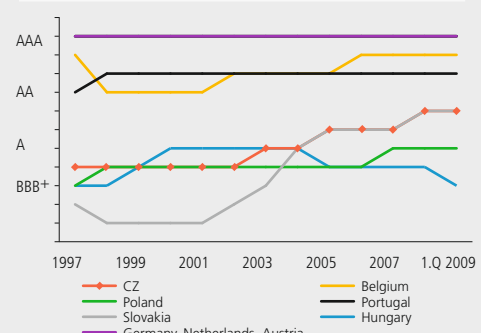
Source: IMF

TABLE II.1
Macroeconomic indicators for Central European economies
(2009 and 2010 – EC forecasts)

Indicator	Country	2007	2008	2009	2010
Real GDP growth (%)	CZ	6.0	3.2	-2.7	0.3
	SK	10.4	6.4	-2.6	0.7
	HU	1.1	0.5	-6.3	-0.3
	PL	6.6	4.8	-1.4	0.8
Inflation – HICP (%)	CZ	3.0	6.3	1.1	1.6
	SK	1.9	3.9	2.0	2.4
	HU	7.9	6.0	4.4	4.1
	PL	2.6	4.2	2.6	1.9
Government debt (% of GDP)	CZ	28.9	29.8	33.7	37.9
	SK	29.4	27.6	32.2	36.3
	HU	65.8	73.0	80.8	82.3
	PL	44.9	47.1	53.6	59.7
Government balance (% of GDP)	CZ	-0.6	-1.5	-4.3	-4.9
	SK	-1.9	-2.2	-4.7	-5.4
	HU	-4.9	-3.4	-3.4	-3.9
	PL	-1.9	-3.9	-6.6	-7.3
Current account balance (% of GDP)	CZ	-1.5	-3.1	-3.2	-3.3
	SK	-5.1	-6.8	-7.5	-7.1
	HU	-6.2	-8.4	-5.0	-4.8
	PL	-5.1	-5.3	-4.7	-3.7

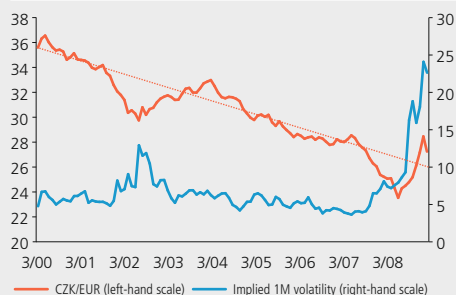
Source: EC (Economic Forecast, Spring 2009)

CHART II.11
Sovereign ratings of selected countries
(long-term ratings in foreign currency, Fitch)



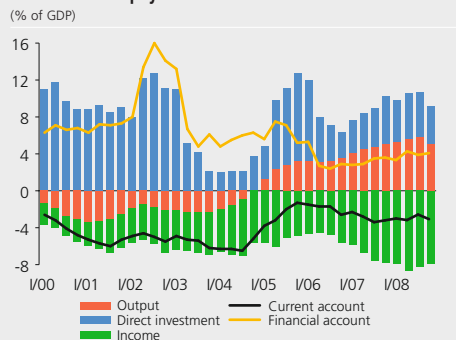
Source: Fitch

CHART II.12
The koruna exchange rate and its volatility



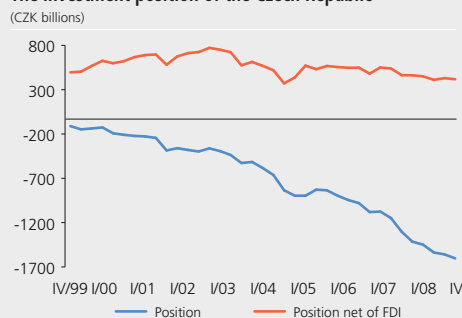
Source: CNB calculation based on CNB data
Note: The dotted line shows the long-term trend.

CHART II.13
The balance of payments



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

CHART II.14
The investment position of the Czech Republic



Source: CNB

exchange rate have been a major side effect of developments in the world economy and specifically in the CEE region. Between summer 2007, when the financial market turbulence started abroad, and summer 2008, the koruna appreciated strongly in nominal terms. However, in the second phase of the financial crisis, which started with the failure of US investment bank Lehman Brothers, the lack of confidence spilled over to the emerging economies and their currencies started to weaken. Exchange rate volatility increased considerably at the same time (see Chart II.12). These pressures increased in intensity in February 2009, owing among other things to incorrect information on some features of the domestic economy published in major foreign periodicals.⁴ Successful communication by the CNB with the financial markets led relatively quickly to stabilisation of the koruna at levels that can be regarded as consistent with the fundamentals of the Czech economy. Although the sharp exchange rate fluctuations and increased volatility can be expected to have an adverse effect on exporters (see section 2.2), the depreciation of the exchange rate should have a positive effect on economic activity and firms' profitability in the longer run. Chart II.12 also illustrates the important fact that even though the depreciation of the koruna in 2008 H2 may seem strong, the exchange rate to a large extent returned to its long-term modest appreciation trend.

The Czech Republic's external balance (see Chart II.13) continued to record positive trends. As in 2008, the current account deficit was roughly 3% of GDP. The robustness of the external position is evidenced by the goods and services balance surplus, which – despite decreasing at the close of the year – stood at 5% of GDP and covered practically the entire income deficit net of reinvested earnings. The direct investment surplus was 4% of GDP, although two-thirds of this was due directly to reinvested earnings. Chart II.14 shows that the Czech Republic's deepening investment position deficit is linked exclusively with net FDI inflow. Net of this deficit, the balance remains at the positive levels usually seen in previous years. The Czech Republic's external balance should further improve in the next two years (see Box 1).

Box 1: The Czech Republic's external debt and its sustainability

In response to the increased perceived risk of the situation in the CEE region, investors and analysts started to address the issue of the external sustainability of these economies. As some of these economies maintain fixed exchange rates and in many of them firms the government sector and households have significant foreign currency debts, the analyses focus mainly on the future balance of foreign exchange funds for financing the current account deficit and for covering external debt service payments and any external financing needs. This type of analysis is motivated by the experience from the Asian crisis in the second half of the 1990s, when rapid currency depreciations had a harsh impact on economic agents whose balance sheet assets and liabilities were not balanced in currency terms.

⁴ The Financial Times incorrectly reported the size of the banking sector's external debt, and the Economist mistakenly stated that Czech households were in difficulties due to foreign currency loans. The CNB responded to this misleading information by issuing a press release (see http://www.cnb.cz/en/public/media_service/press_releases_cnb/2009/090224_statement_FT.html) and sending letters to the editors of both periodicals. These letters were subsequently published.

One measure of external sustainability is the financing gap, which compares the annual need for foreign exchange with the inflow of foreign direct investment, the range of permissible reductions in the country's foreign exchange reserves and with other available market sources of financing of foreign exchange needs. Financing gap estimates are dependent on numerous assumptions regarding inflows and outflows of external funds in the economy and on the specification of the critical level of forex reserves. A typical example of external sustainability analysis is the IMF's Debt Sustainability Framework, in which the gross external financing need is calculated as the sum of the current account deficit, repayments of long-term external debt principal and existing short-term external debt. Although this approach is better suited to assessing debt sustainability in developing countries with fixed exchange rates, it is routinely applied to advanced countries as well. According to the IMF, the Czech Republic will need around USD 40 billion per year to cover its external financing needs this year and the next.⁵

The CNB's estimates regarding the external financing need, based on the balance of payments forecast for this year and the next (see Table II.1 Box), suggest that the IMF's aforementioned estimates of around USD 40 billion per year are exaggerated. As regards the current account deficit, it creates virtually no external financing need in the coming years. The CNB's latest forecast (May 2009) predicts certain current account deficits, but these include reinvested earnings, which by their very nature are self-financing. Including reinvested earnings, the external financing need arising from the current account should in fact be negative. Given the decline in economic activity, it cannot be ruled out that foreign-owned firms' profits will be lower and hence reinvested earnings will also be lower. In such case, however, the outflow of funds via the income balance, which is part of the current account, will also be lower. Taking into consideration the short-term external debt and projected debt service, the financing need will be just above USD 30 billion per year.

If, moreover, we start working with the specifics of the Czech economy, we can easily conclude that the calculation method above says little about the external financing risks for a Czech-type economy. As regards short-term external debt, for example, the method does not take into account the fact that domestic entities have short-term assets at their disposal which could be used to finance the liabilities at least partly. The short-term external debt is linked to a large extent with the business activities of firms and can thus be refinanced relatively easily. Chart II.1 (Box) shows that even at present the banking sector has assets equivalent to roughly 80% of the total gross foreign debt.⁶

TABLE II.1 (Box)

Financing of the external position of the Czech economy

CZK billions	2009	2010
<i>Financing of current account</i>	-10	-35
- current account (deficit)	75	60
- reinvested earnings	-85	-95
Amortisation of external debt	135	135
- <i>debt service</i>	174	170
- interest paid	-39	-35
Short-term debt as of 31 December 2008	499	499
Financing need in CZK billions	624	599
Financing need in USD billions	31	30
FX reserves (as of 31 December 2008)	716	716
FX reserves/financing need (in %)	115 %	120 %

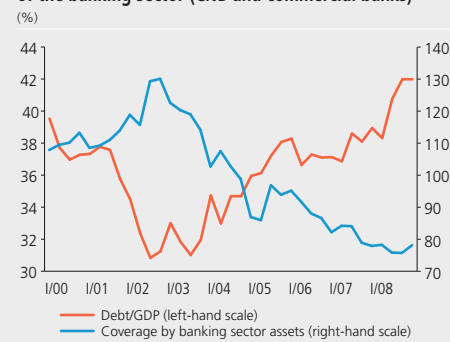
Source: CNB

Note: Current account and reinvested earnings – CNB May 2009 forecast.

Data on debt amortisation – CNB estimate based on an analysis of the Czech Republic's investment position. The financing need is made up of the items in italics (interest paid is already included in the current account).

CHART II.1 (Box)

Ratio of the gross external debt of the Czech Republic to GDP and its coverage by the external assets of the banking sector (CNB and commercial banks)



Source: CNB

5 See the IMF Staff Report for the 2008 Article IV Consultation with the Czech Republic, p. 27, <http://www.imf.org/external/pubs/ft/scr/2009/cr09122.pdf>

6 Banks and corporations have sufficient assets at the aggregate level to finance their external debt, even if that is not necessarily the case at the individual level.

CHART II.15
Actual and projected economic growth in the Czech Republic

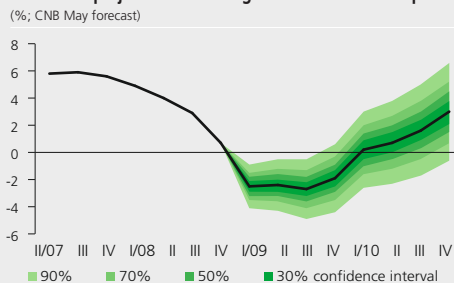
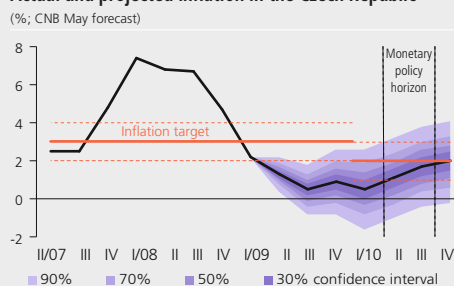


CHART II.16
Actual and projected inflation in the Czech Republic



To sum up, we can say that the external financing need does not far exceed the current short-term debt, which can be financed to a large extent from short-term external assets without any need to use foreign exchange reserves. Even in the absence of FDI inflows, the remainder of the financing need would be covered by the existing forex reserves. The Czech Republic is thus not exposed to the risk of a financing gap and its current external sustainability position can be regarded as very stable.

In 2008 H1 the domestic economy recorded relatively dynamic – albeit gradually decreasing – growth, whereas in H2 it showed a marked slowdown. The CNB's May 2009 macroeconomic forecast assumes that GDP will fall by a total of 2.4% in 2009 owing to low external demand, further impacts of the global economic and financial crisis, a fall in investment and slackening household consumption (see Chart II.15). The recovery is expected to start in 2010, but this date is associated to a large extent with uncertainty regarding external demand growth. CPI inflation dropped from levels between 6% and 7% in 2008 Q1–Q3 to about 2% in 2009 Q1. According to the CNB's May forecast, headline inflation will fall quickly below the inflation target in the course of 2009. In 2010 it will rise again and reach the 2% inflation target at the year-end (see Chart II.16). Consistent with the forecast is a decline in 3M PRIBOR market interest rates this year and a modest rise in 2010.

The gloomier picture of economic activity painted in the CNB's May macroeconomic forecast formed the basis for the first of the three alternative scenarios used in section 4 to test the resilience of the Czech financial sector. This scenario is called "Europe in recession".

Alternative scenario A: "Europe in recession"

Scenario A, which is based on the CNB's May 2009 macroeconomic forecast, assumes a relatively marked fall in domestic economic activity, due mainly to a strong recession in the euro area. Annual GDP growth would fluctuate around -2.5% on average in the individual quarters of 2009 then switch in 2010 Q1 to slightly positive figures, which would gradually increase. The exchange rate would gradually appreciate during 2009 and then stabilise at levels around CZK 26/EUR. Interest rates would remain relatively low given the low inflation pressures. The fall in domestic economic activity would result in rising default rates in the non-financial corporation and household sectors. Overall credit growth would slow to relatively low levels, and share and property prices would show further – albeit comparatively modest – declines. We also assume that the financial sector would generate net income 10% lower than the average for the last two years.

Owing to the falling economic growth, the public finance deficit started rising in 2008. The CNB's May 2009 forecast implies that the 3% Maastricht budget deficit threshold will be exceeded in both 2009 (4.3% of GDP) and 2010 (5.4% of GDP). By the CNB's estimation, the ratio of public debt to GDP rose by 0.9 percentage point to 29.8% in 2008 because of slower nominal GDP growth (see Chart II.17). Owing to a significant increase in public finance deficits, the public debt-to-GDP ratio will rise to 39% at the end of 2010 (CZK 1,440 billion in absolute terms). Of course, this will be accompanied by increased issuance of government bonds on the financial markets. Whereas the government's total gross borrowing need was CZK 145 billion in 2007 and CZK 190 billion in 2008, it could rise to CZK 250 billion in 2009 and as much as CZK 300 billion in 2010 given the projected growth in public finance deficits.

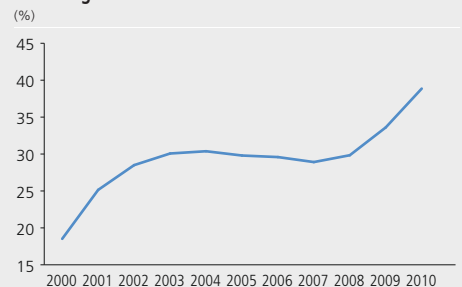
The widening fiscal deficit and rising government debt are increasing the risks to financial stability in the long run. For this reason, fiscal policy should pursue medium-term objectives and rely primarily on automatic stabilisers in the present recession. Given the declining growth rates of GDP, wages, profits, etc., the operation of these stabilisers leads to worsening public budget revenues and potentially to increasing public expenditure. This generates a growth impulse slowing the fall of the economy. Further budget-intensive demand-oriented fiscal expansion would probably be of limited effectiveness and could endanger fiscal discipline and ultimately also internal and external economic stability.

2.2 NON-FINANCIAL CORPORATIONS

The favourable situation in the corporate sector observed in previous years gradually deteriorated during 2008 and in early 2009. Declining external demand for exports of the Czech corporate sector as from mid-2008 caused problems with firms' sales and led to a decline in their income. In addition, corporations had to cope with a sharp appreciation of the exchange rate during 2008. They were probably unable to benefit fully from the subsequent depreciation in 2008 H2 because of a fall in projected exports and therefore in foreign currency income and hedging accepted in the past. This trend continued into 2009 Q1. As a result, there was a marked increase in the NPL ratio in the corporate sector compared to the previous two years. The risks to financial stability in the period ahead include falling external demand for Czech firms' products and a further increase in their insolvency. A subsequent decline in lenders' willingness to lend to non-financial corporations would further contribute to the decrease in overall economic activity.

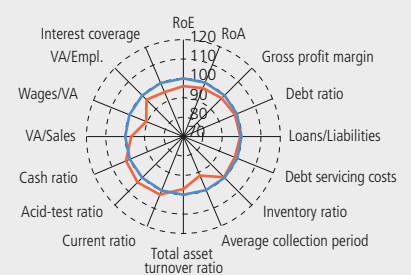
The financial results of corporations for 2008 indicate a modest decline in return on equity and return on assets. This, however, was offset by still favourable results for the first half of the year. The corporate debt ratio showed only very modest growth, but value added decreased and wage costs rose significantly, resulting in a decrease in labour productivity in some industries. The asset turnover ratio and the inventory ratio increased owing to the reduced domestic and external demand. Problems with repaying corporate loans gave rise to an increase in the average collection period of corporations. At the same time, given the increased uncertainty surrounding their future revenues, firms cut back on investment activity and invested their free funds mainly in bonds. This fostered a rise in their balance-sheet liquidity indicators (see Chart II.18).

CHART II.17
Ratio of government debt to GDP



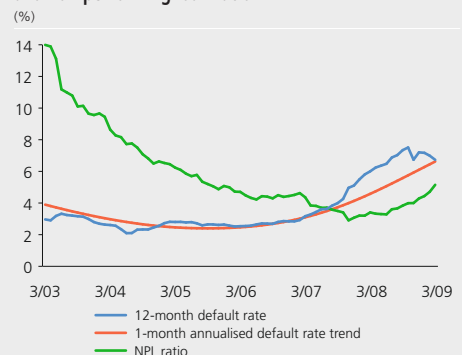
Source: CZSO, CNB
Note: The figures for 2009 and 2010 are CNB estimates

CHART II.18
Key financial indicators for non-financial corporations
(2007 = 100; index > 100 = improvement; index < 100 = deterioration)



Source: CZSO, CNB calculation

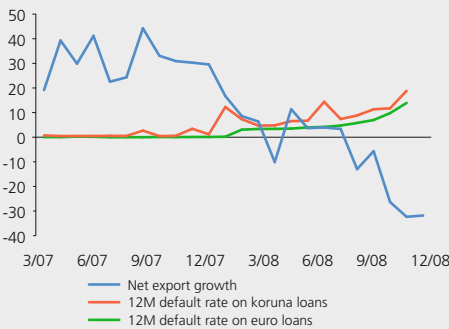
CHART II.19
12-month default rate on bank loans to corporations and non-performing loan ratio



Source: CNB (CCR)

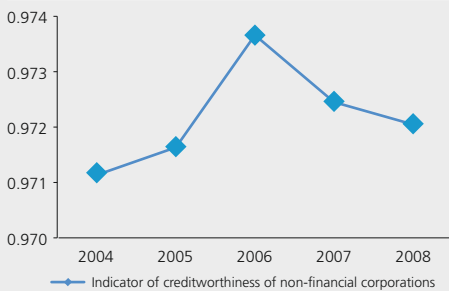
CHART II.20
Fall in net exports and rise in 12M default rate of export-oriented corporations

(%; data for 1,000 largest exporters)



Source: CNB, CZSO, CNB calculation

CHART II.21
Indicator of creditworthiness of non-financial corporations



Source: CZSO, CNB calculation

CHART II.22
Number of bankruptcy petitions filed

(annual data)



Source: Czech Ministry of Justice

CHART II.23
Credit growth

(monthly data; year-on-year growth in credit to corporations by number of employees in %)



Source: CNB (CCR)

2008 H2 saw a marked increase in the corporate sector's credit risk as measured by the 12-month default rate on bank loans to corporates, as a consequence of the falling external demand (see Chart II.19). At the start of 2007 this indicator had been moving around 3%, but at the end of 2008 it exceeded 7% and in 2009 Q1 it reached about 7.5%.⁷ According to an internal CNB model, it should rise further in 2009 to 11% or even to 13% in the event of significantly adverse developments (see alternative scenario C in section 4.1.1).⁸ The increase in the NPL ratio is reflected in deteriorating loan portfolios of banks.⁹ The ratio of NPLs to total loans has been increasing since 2008 H2 (see section 4.1).

The decline in external demand had particularly a negative effect on export-oriented firms, which form the backbone of the Czech economy (see Box 2). This is illustrated by pronounced growth in the 12-month bank loan default rate among the largest exporters (see Chart II.20). Unlike in previous years¹⁰, however, the default rate is also deteriorating among exporters with euro-denominated debts. This may also be partly due to the exchange rate depreciation in 2008 Q4.

The rising corporate sector risk is confirmed by the creditworthiness indicator, one of the forward-looking indicators of corporate sector stability.¹¹ Based on the aggregated financial results of non-financial corporations, this indicator assesses the corporate sector's overall financial condition, or the resilience of firms to default in the next year. It is calculated using seven financial indicators covering firms' profitability, liquidity, indebtedness and activity. The figures obtained show that the corporate sector's creditworthiness deteriorated further in 2008, although it was still better than in 2005 (see Chart II.21). The risk level of corporations was adversely affected by worsening profitability, a modest rise in debt and deteriorating activity. By contrast, the decline in creditworthiness was moderated by a rise in firms' balance-sheet liquidity.

The increased risk of default is confirmed by the number of insolvency petitions filed,¹² which increased by 6% year on year. Compared to 2007, however, the rate of growth of insolvency petitions increased by only 0.5 percentage point

7 The 12-month default rate is calculated as the ratio between the volume of bank loans 30–89 days past due and average total outstanding loans in the 12-month period after the reference period. The calculation method implies that this indicator can only be accurate if one has information about the developments in the 12-month period after the reference period. As such information was not available in full when the calculations for the last year were made, an estimate is made for the last 11 months assuming a trend based on the average for the data already available. The calculations are based on data from the CNB-administered Central Credit Register, which contains data on the bank loans of legal entities.

8 A detailed description of the model applied can be found in Jakubík, P., Schmieder, C. (2008): Stress Testing Credit Risk: Is the Czech Republic Different from Germany? CNB WP 9/2008.

9 The forward-looking nature of the default rate means that loan portfolios would deteriorate substantially in 2010.

10 See Box 2 *Analysis of export-oriented corporations* in Financial Stability Report 2007, pp. 25–26, or Geršl, A.: Co ničí české exportéry? [What is Destroying Czech Exporters?] Euro, No. 35, 25 August 2008.

11 For more details about this indicator, see Jakubík, P. (2008): Scoring as an Indicator of Financial Stability, Financial Stability Report 2007, Czech National Bank, pp. 76–85.

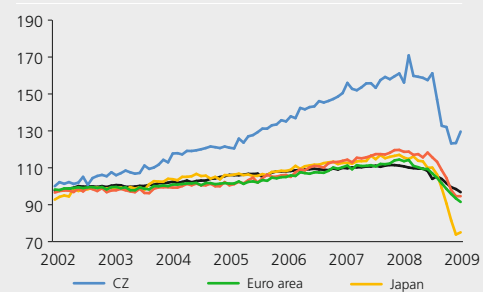
12 All data on the number of insolvencies are from Creditreform statistics. For "insolvency petition" we will henceforth use the shortened term "insolvency".

(see Chart II.22). The impacts of the recession had by now started to be felt in full in Western European countries, where the number of corporate insolvencies increased by 11%. Among the economies hit hardest in this regard was Spain, where corporate bankruptcies rose by 139%, followed by Ireland (121%) and Denmark (55%). By contrast, Germany recorded a rise of only 2%.¹³ Besides the modest growth in the number of bankruptcies, the absolute number of bankruptcies in the Czech Republic is also relatively low by international comparison. In 2008, there were 50 insolvencies per 10,000 corporations in the Czech Republic. The insolvency rate defined in this way is below average compared to both CEE countries and Western European countries.¹⁴ However, some branches were hit much harder by the global economic decline. In 2008, the highest insolvency rates were recorded in the paper industry (233) and the textile and leather industry (220). They were followed by travel agencies (172), manufacture of glass, ceramics and construction materials (140), the food industry (123), manufacture of chemicals and plastics (122) and mining and quarrying (99).

The fall in domestic and external demand for corporate products was reflected in a modest decline in the annual rate of growth of corporate loans, from 17% at the end of 2007 to 14% at the end of 2008 and on to 10% at the end of 2009 Q1 (see Chart II.23). During 2009, in connection with the expected economic downturn, the annual growth rate of loans should see a further marked decrease to levels around zero. The economic decline is also indicated by a fall in industrial production in the Czech Republic in late 2008 and early 2009, in line with all other world economies. Given its small size and high degree of openness, the Czech economy is more sensitive to global developments than the large countries (see Chart II.24). The biggest falls in production occurred in transport equipment, machinery and equipment manufacture and in the textile and clothing industry. A decline in economic activity with modest signs of a recovery is also being signalled by new orders and direct export sales in industry and by domestic energy consumption (see Chart II.25). This trend is also consistent with a slowing decrease in toll collection, which, after year-on-year falls of 20% in January and 19% in February 2009, declined by only 9% in March. Although it is clear that Czech corporates will have to cope with a global fall in demand in 2009, they have a significant advantage in that they are less in debt at an aggregate level than euro area corporations (see Chart II.26). This should help them deal better with the new situation.

CHART II.24**Industrial production indices (seasonally adjusted)**

(%; May 2001 = 100)



Source: Datastream

CHART II.25**New orders from abroad, direct export sales and domestic energy consumption**

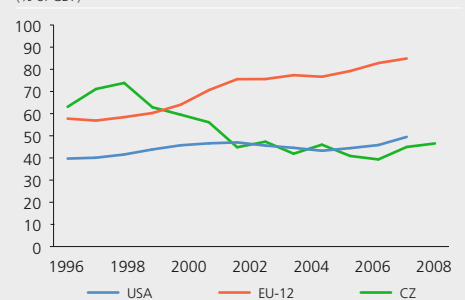
(monthly data; year-on-year indices in %)



Source: CZSO

CHART II.26**Debt ratios of non-financial corporations**

(% of GDP)



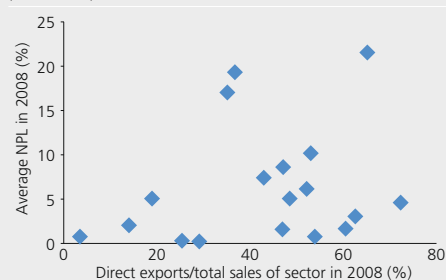
Source: Eurostat, US Bureau of Economic Statistics
 Note: The debt ratio is calculated as the ratio of loans received and bonds issued from financial accounts to GDP

¹³ Some Western European countries even saw declines in corporate insolvencies (-17% in the Netherlands, -13% in Luxembourg, -2% in Switzerland).

¹⁴ The average for Western European countries is around 83 insolvencies per 10,000 corporations.

CHART II.2 (Box)
Relationship between export orientation of sector and NPL ratio

(data for 2008)



Source: CNB, CZSO

Box 2: Exporters, exchange rate volatility and hedging

The volatility of the Czech koruna exchange rate increased significantly in 2008. The strong appreciation trend in the first three quarters was replaced by depreciation (see section 2.1). In 2008 H2, this was accompanied by an emerging global economic recession, which led to a decline in external demand for Czech-made products. This combination had adverse effects on the financial condition of exporters. Many strongly export-oriented branches of industry recorded relatively high NPL ratios in 2008 (see Chart II.2 Box).

The depreciation in 2008 Q4 had only a limited positive effect on exporters because of the sharp fall in external demand. Corporations that had hedged against foreign exchange risk by means of derivatives contracts with domestic banks in the earlier period of koruna appreciation were unable to take advantage of the weaker exchange rate either.

The domestic currency volatility is increasing exporters' uncertainty regarding koruna export revenues. Exporters record lost revenues if the koruna appreciates and windfall revenues if it depreciates. However, most exporters use natural hedging (i.e. they cover currency risk by importing in foreign currency as well), so that the lost/windfall revenues relate only to net exports. Given the trend appreciation of the koruna, exporters hedge further by borrowing in foreign currency (the euro in particular) and by means of derivatives (futures, forwards, swaps and options).

Hedging with FX loans and derivatives also generates lost/windfall revenues. In the case of euro loans, these lost/windfall revenues always move in the opposite direction than in the case of exports. As for derivatives, it depends on the difference between the agreed and subsequent market exchange rates. Banks obtain hedging intermediation fees usually by offering exporters a future exchange rate 2%–4% stronger than the current forward exchange rate level.¹⁵ It should be added, however, that the difference between the earlier agreed stronger exchange rate and the current (weaker) market rate represents a "virtual" hedging loss (i.e. lost revenues), not an actual loss. Derivatives hedging yields additional positive and quantifiable windfall revenues in a phase of fast and unexpected appreciation of the koruna, when the market exchange rate may be stronger than the rate stipulated in the derivatives. Hedging with derivatives thus protects corporations mainly against a sharp appreciation, not against a modest and expected gradual strengthening. However, foreign exchange risk hedging with derivatives also generates major benefits in the form of simpler planning of investment, production and demand for supplies of goods. Unlike lost/windfall revenues, these positive effects are relatively difficult to quantify reliably.

¹⁵ Banks then close out the position at the market forward exchange rate and thus receive (in the future) only the fee realised in this way (see section 4.1).

The available information suggests that many firms had problems with overhedging in late 2008 and early 2009 due to falling export revenues. Owing to the koruna's weak exchange rate in this period, the virtual lost revenues from hedging became actual losses equal to the difference between the agreed derivatives volume and the actual (lower) export volume, as some firms had to buy the shortfall in foreign currency at a higher price in the market and sell more cheaply to the bank.¹⁶ Although this is not a problem for the corporate sector as a whole, some firms could be strongly affected by these additional costs.¹⁷

2.3 HOUSEHOLDS

At the end of 2008, the economic slowdown started to affect the household sector as well. Last year saw a correction of the high growth rate of household debt seen in previous years, but also growing problems with repayment of household liabilities. A further worsening of households' solvency owing to a deteriorating labour market situation and a decline in their disposable incomes still poses a risk. The CNB's preventive action in the area of financial education should help mitigate negative economic effects on the household sector.

The increased uncertainty regarding future household incomes fostered a gradual slowdown in the high rate of growth of lending to households that had prevailed in the previous few years (see Chart II.27 and section 4.1).¹⁸ In the case of consumer credit, the slowdown pertained mostly to loans from non-bank institutions, which rose by only 1% year on year in 2008 compared to almost 30% in 2007. Despite the slowing credit growth and a moderately falling ratio of interest paid to gross disposable income¹⁹, total household debt increased to about CZK 950 billion at the end of last year (see Chart II.28). This amount is still due mostly to house purchase loans (about 65%), with bank consumer credit (about 20%) and non-bank loans (about 15%) accounting for the rest. The aggregate household debt ratios kept rising: the ratio of debt to gross disposable income was almost 50%, the ratio of debt to financial assets exceeded 30% and the debt-to-GDP ratio was roughly 25% (see Chart II.29). The debt-to-disposable income ratio of Czech households is about half that in the euro area countries, and the debt-to-GDP ratio is even lower.

16 According to banks that are most active in this segment of hedging, the market value of exporters' hedging positions was in a loss of about USD 2–3 billion (at exchange rates of around CZK 29/EUR).

17 The situation was much worse in Poland in the same period. There, large exporters hedged using option strategies with high leveraging (see the Morgan Stanley Global Economic Forum of 23 February 2009). These option strategies protected exporters very cheaply at times of appreciation, but create substantial losses at times of depreciation and falling revenues.

18 New loans to households decreased in absolute terms (see section 4.1).

19 Although interest rates on new loans increased slightly (by about 1.5 percentage points), the ratio of interest paid to gross disposable income decreased. This was a result of a decrease in credit growth and a rise of about 8% in disposable income in the course of 2008. The ratio of interest received to disposable income fell slightly as well. Overall, however, the decline in interest paid exceeded that in interest received and the household sector's net interest income increased as a percentage of disposable income.

CHART II.27

Annual growth in bank loans to households by purpose (%)

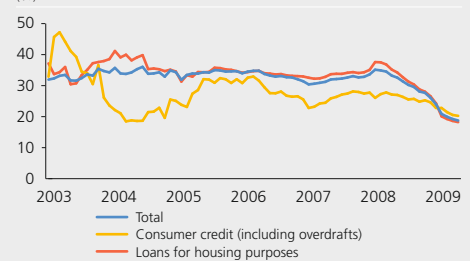


CHART II.28

Bank and non-bank credit to households (CZK billions)

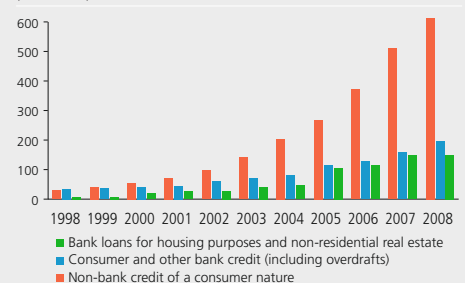


CHART II.29

Ratio of household debt to gross disposable income, financial assets and GDP; ratio of interest paid and net interest received to households' gross disposable income (%)

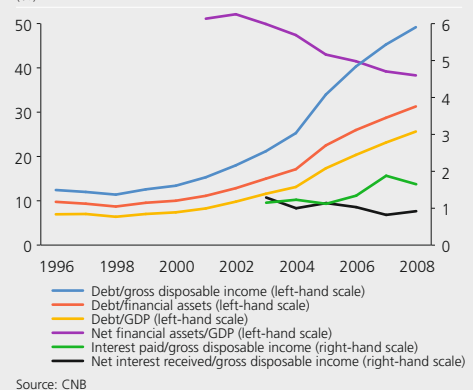
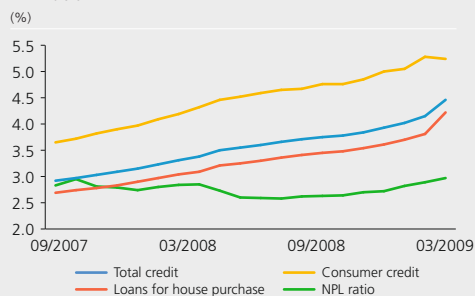


CHART II.30
12-month default rate on bank loans to households and NPL ratio



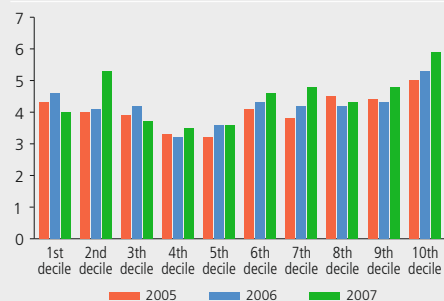
Source: Czech Credit Bureau, ČNB

At the aggregate level, households still have more financial assets than liabilities and are net recipients of interest payments, although their net assets-to-GDP ratio is falling steadily over time as the debt rises. Given the expected decrease in growth, the aggregate household debt ratios should record only a very slight rise or even no change in 2009. The debt-to-gross disposable income ratio should increase by only about 1 percentage point in 2009. Unlike some other CEE countries, Czech households have virtually no foreign currency loans and are thus not exposed to foreign exchange risk (see section 4.1 and Chart IV.7).

The decline in economic activity is starting to be reflected in rising household sector credit risk. The 12-month default rate on bank loans to households is edging upwards (see Chart II.30). This indicator can be expected to increase from just above 4% at the start of 2009 to 7% at the end of 2009. A greater increase can be expected from 2009 H2 onwards, when the corporate sector's difficulties will start to manifest themselves fully in the household sector. In a highly unfavourable scenario (see alternative scenario C in section 4.1), this indicator could reach 10% by the end of 2009. The future trend will be correlated with expected unemployment growth and its knock-on effect on households' disposable income (see Box 3). The higher default rate will gradually also lead to a growing share of NPLs to households in bank portfolios.

CHART II.3 (Box)
Households' debt burden

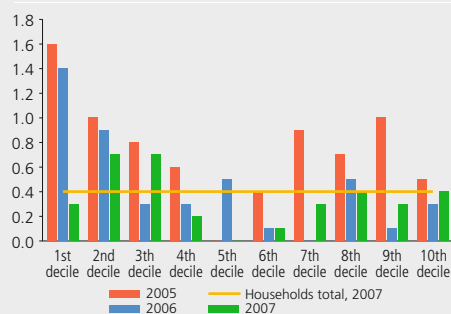
(percentages of net money income; %)



Source: CZSO

CHART II.4 (Box)
Problems making housing loan repayments in individual income groups

(%)



Source: CZSO

Box 3: Households' debt burden and loan repayments

An analysis was conducted of households' debt burden and loan repayments using CZSO statistics.²⁰ A natural disadvantage of the data used is that they are for 2007, which was characterised by peaking economic growth, albeit in a situation of rising interest rates, so they do not cover the sharp deterioration in the economic situation in the Czech Republic due to the global financial and economic crisis in late 2008.

The survey reveals that consumer credit and loans for house purchase are used by 21% and 10% of households respectively. The volume of loans of high-income households is traditionally several times higher than that of low-income households and it increased significantly further in 2007.²¹ The debt burden, as measured by the ratio of repayments to net money income, increased by 0.3 percentage point to 4.6% in 2007.²² Compared to the previous period it increased in the five highest-income deciles and in the second and fourth deciles. Over the last three years it has been highest in the tenth decile (see Chart II.3 Box). This income group also

²⁰ These statistics come from the recently published results of the EU-SILC survey "Household Income and Living Conditions 2007" and the results of the household budget survey "Expenditures and Consumption of Households Included in Household Budget Survey in 2007".

²¹ In 2007, the average volume of loans received per person was CZK 2,371 in the first income decile and CZK 21,980 in the tenth income decile.

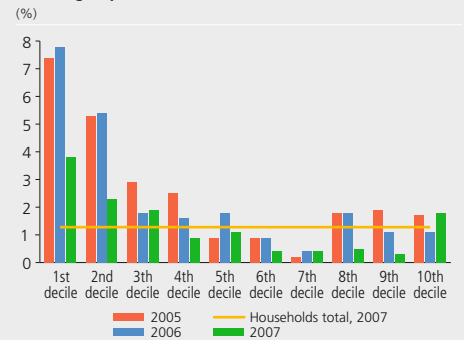
²² According to the household budget statistics, which are available for 2008 Q4 for total households only, the debt burden was also 4.6%.

had the highest saving rate (10.6%, compared with -3.4% in the first income decile). However, the strong economic growth and favourable labour market situation in 2007 also meant that despite a rising debt burden the share of households having problems making loan repayments decreased to about 2% in 2007 in most income groups (see Charts II.4 and II.5 Box). Consumer credit was a burden for almost all households in 2007 – a heavy burden for 26% of households and some burden for 66%, which suggests that repayment of this type of credit could deteriorate significantly in the future. The survey also revealed that 63% of households had difficulty making ends meet with their income. This was a problem particularly in the three lowest-income groups.

Although the above indicators in 2007 were not yet indicating increased loan repayments problem, it is reasonable to assume that the downswing in economic activity and rising unemployment has increased the pressure on the financial situation of households in 2008 and 2009. This is already evident from a sharp deterioration in the consumer confidence indicator.

CHART II.5 (Box)

Problems making consumer credit repayments in individual income groups

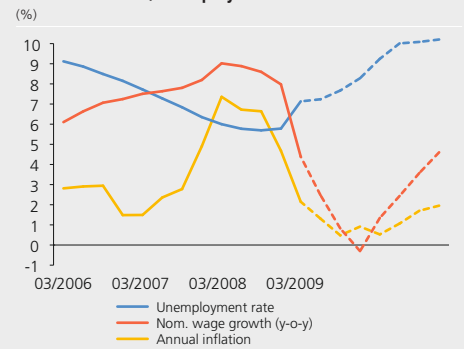


Besides the risk of a considerable worsening of the labour market situation, a decline in nominal wages in some employee segments may also pose a risk in 2009 (see Chart II.31). The budgets of about 40%–60% of households with debt burdens would probably get into deficit were their nominal incomes to decrease by more than 10% (see Box 4). This could happen as a result of a shorter working week or cutbacks in variable wage components. In such a situation, the number of insolvencies would rise sharply and the quality of banks' loan portfolios would fall. This would lead to a decline in residential property prices due to the sale of collateral. A decrease in the value of collateral (or a fall in the LTV ratio) would increase the risk to which banks are exposed (see the sensitivity stress test of house purchase loans in section 4.2).

The adverse economic situation should foster a rise in the total saving rate of households, which will have an adverse effect on consumption. By contrast with the USA, the UK and some euro area countries, however, consumption in the Czech Republic is not linked too closely to asset prices, since households hold only a small proportion of their assets in the form of securities (see section 4.1) and make minimal use of consumer credit secured by property. This means that the unfavourable evolution of asset prices will have only a limited effect on household consumption.

CHART II.31

Nominal incomes, unemployment and inflation



Box 4: The impact of falling nominal wages and rising interest rates

Given the sharp fall in economic activity, the potential decrease in nominal wages in the Czech economy during 2009 can be regarded as a relatively high risk to financial stability. The aim of the analysis below is to identify the decrease in households' nominal income that would cause a massive rise in loan defaults by households at the aggregate level and prompt a collapse of the mortgage market. The level of interest rate growth with similar effects is identified analogously. A CZSO survey (see Box 3) reveals that about 10% of households are repaying mortgage loans and 21% are repaying consumer credit. This means that the analysis covers a significant part of the sector.²³

To quantify the effects of wage and interest rate shocks we consider two variants of a typical indebted household. In the first case, the household is only repaying a mortgage loan and in the second case it is repaying both a mortgage loan and a consumer loan. Both are being repaid in regular monthly instalments and have typical characteristics.²⁴ In both cases we assume a three-member family with one child and monthly essential living costs of CZK 15,000.²⁵ Another assumption is that both parents work. One works only part time and has a nominal monthly income amounting to two-thirds of the income of the other parent.²⁶

In both cases we assume that the household is repaying a mortgage loan of CZK 1.5 million, which roughly corresponds to the average outstanding amount per mortgage in the Czech Republic. In the second variant we additionally consider the repayment of a consumer loan of CZK 100,000 / CZK 300,000.

For both variants we tested the impacts of a wage or interest rate shock on hypothetical family budgets in relation to initial nominal incomes assuming constant essential living costs. The results show that if households with a mortgage had no other loan, the budgets of about 40% of them would get into deficit if nominal wages declined by more than 10% or if interest rates increased by more than 3 percentage points. If this group of households also had a consumer loan of CZK 100,000 (CZK 300,000), around 50% (60%)

23 Statistics on the intersection of these two groups are not available. Based on knowledge of the income distribution of households with mortgages according to the household budget statistics, we estimated the total proportion of households unable to repay their monthly liabilities.

24 We assumed a 20-year maturity for the mortgage loan and an interest rate corresponding to the average rate on mortgages with fixations of over 5 years at the start of 2009. For the consumer loan, we assumed a 5-year maturity and an interest rate corresponding to the average rate on such credit at the start of 2009.

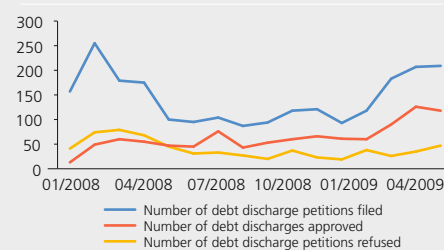
25 In reality, however, one should take into account that households may also have extraordinary expenses, so it is not possible to cover essential costs only.

26 For both variants we assume a family corresponding to the typical mortgage recipient in the Czech Republic. According to CZSO data, this is most often a household with two economically active members and one child. The main breadwinner is a 39-year-old man with secondary education. His partner is a 33-year-old employee or housewife with secondary or basic education. Essential living costs can be estimated on the basis of the household budget statistics from expenditure on food, clothing, housing, health, transport and restaurants. This expenditure can alternatively be estimated as the sum of the minimum subsistence amount and normative housing expenses as stipulated in a government order of 16 December 2008. In both cases, the estimated amount is about CZK 15,000.

of them would be hit. These estimates of the proportion of households having difficulty making loan repayments are extreme, however. In reality, the percentage of households in difficulty would be much lower. For example, the assumption of constant living costs is very conservative, since households can in reality cut their living costs to some extent if needed. A large proportion of households, moreover, can cope with a potential bad situation by selling their assets (bank deposits, life insurance, private pension schemes, building saving schemes) or are insured against the inability to repay debts.

A new Insolvency Act, introducing the option of debt discharge for private individuals (personal bankruptcy), took effect on 1 January 2008. Overindebted individuals gradually started to make use of this option last year. After a surge in interest in the initial months after the Act took effect, the number of discharge petitions filed fluctuated around 100 a month between May and December 2008. The start of 2009 saw a gradual increase, with more than 200 petitions being filed in April (see Chart II.32). The petitions are assessed by the courts, which then rule on whether to allow discharge. The number of such cases can be expected to increase as this instrument becomes increasingly used by overindebted households during the economic recession, which will have a negative effect on disposable income. An international comparison suggests that the number of personal insolvencies could run to 8,000–9,000 a year in the Czech economy.²⁷ Should the rate of growth of the number of petitions filed in 2009 Q1 be maintained, this level would be reached in 2010 H1. Numerous non-profit advisory centres specialising in providing assistance to overindebted individuals and helping people to complete the petition form are playing a positive role.²⁸ Most of their clients are aged between 30 and 40 and have secondary education, an average monthly income of around CZK 25,000 and an average debt of less than CZK 300,000.²⁹ The commonest causes of insolvency include taking on too many liabilities, loss of employment, business liabilities, sickness and divorce/separation. Prevention in the field of financial education area is also important from this perspective. The CNB is active in this field as well. In particular, it supports the teaching of financial literacy in schools. In August 2008, the CNB distributed a new textbook on financial and economic literacy to primary schools and academic secondary schools (M. Skořepa, E. Skořepová (2008): *Finanční a ekonomická gramotnost* [Financial and Economic Literacy], Prague, Scientia).³⁰

CHART II.32
Discharge of debts of private individuals
(monthly data)



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

²⁷ In Western European countries, there are 14 personal insolvencies per 10,000 people a year on average. However, the situation is very mixed across individual countries, depending on legislation and traditions.

A high number of personal insolvencies is especially typical of the UK and Germany, while the Nordic countries of Western Europe have a very low number.

²⁸ The situation of individuals who have accepted a loan, the potential impacts of repayment problems, and the solutions available are described in the Annex: *Options and solutions for overindebted households*.

²⁹ These data were obtained from the Financial Difficulties Advisory Centre, but they correspond with information from other non-profit institutions that provide assistance to overindebted households.

³⁰ The CNB, together with centres for the further education of teaching staff, subsequently started organising seminars on financial literacy for teachers in various regions of the Czech Republic led by the textbook's authors.