ANALYSES OF THE CZECH REPUBLIC'S CURRENT ECONOMIC ALIGNMENT WITH THE EURO AREA

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A   INTRODUCTION

The Czech Republic has been participating automatically in the Economic and Monetary Union (EMU) since it joined the EU and acquired the status of a Member State with a derogation from adopting the euro. Consequently, it is not currently a member of the euro area, but has committed itself to introducing the euro and joining the euro area in the future. The balance between the benefits (mainly microeconomic) and costs associated with introducing the euro will depend on the resolution of the current problems in the euro area and subsequently on the ability of the Czech economy to operate without an independent monetary policy and without the possibility of exchange rate adjustment vis-à-vis its most important trading partners. This ability will be affected by the similarity of economic developments in the Czech economy with those in the euro area, since the degree of alignment will co-determine the appropriateness of the single monetary conditions in the euro area to the current situation in the Czech Republic. The ability to adjust rapidly to asymmetric economic shocks will be another important factor.

The analyses of the Czech economy's alignment with the euro area in 2013 have been drawn up in line with the Czech Republic's Updated Euro-area Accession Strategy of 2007 and assess the current state of economic alignment in terms of long-term economic trends, the medium-term evolution of economic activity, the structural similarity of the Czech economy to the euro area economy, and the economy's ability to absorb and adjust flexibly to asymmetric shocks.

This set of analyses is a follow-up to the documents of the same name published by the CNB in previous years. As in previous years, this year's document contains a section on the economic alignment and public finance situation of euro area countries and on the institutional changes being made in response to the problems in some parts of the monetary union. Changes in the economic and political framework of the euro area alter the view on the economic benefits and costs of adopting the single currency. Changes in the functioning of rescue mechanisms may imply new and unforeseen financial obligations for accession countries. From the perspective of future accession it is also necessary to monitor the use and impacts of the unconventional instruments applied by the European Central Bank.

The analyses of the Czech Republic's preparedness for euro adoption are divided into two basic groups according to the type of question to which they answer. The section entitled "Cyclical and Structural Alignment" deals with the assessment of different economic developments in the Czech Republic compared to the euro area and hence the risk of the single monetary policy being highly suboptimal for the Czech economy. The section entitled "Adjustment Mechanisms" answers the question of to what extent the Czech economy is capable of absorbing the impacts of potential asymmetric shocks using its own adjustment mechanisms.

These analyses are aimed at assessing the evolution of the alignment indicators over time and in comparison with selected countries. These countries either are euro area members already (Austria, Germany, Portugal, Slovakia and Slovenia) or aspire to such membership (Hungary and Poland).[1] All of the analyses attempted to make comparisons with all the selected countries. However, in some cases this was not possible owing to a lack of relevant statistical data. The values of the indicators for the euro area are defined at the EA-17 level.[2]

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[1] The selected euro area countries are countries that are comparable in terms of economic level and countries with which the Czech economy has trading links. This selection is not related to any assessment of how successfully these economies have performed in the euro area. Germany, the largest trading partner of the Czech Republic, also provides a useful benchmark as a core country of the euro area, although when making comparisons with aggregate or average economic indicators the large weight of Germany in the calculation of those indicators must be taken into account.

[2] The EA-17 comprises the euro area Member States: Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia and Spain. Only in exceptional cases, owing to data unavailability, does the analysis not cover all EA-17 countries.

B   EXECUTIVE SUMMARY

The Czech Republic's future entry into the euro area ensues from the commitments associated with EU membership. Adoption of the single European currency should lead to the elimination of exchange rate risk in relation to the euro area and to a related reduction in the costs of foreign trade and investment. This should further increase the benefits accruing to the Czech Republic from its intense involvement in international economic relations. Besides the aforementioned benefits, however, adoption of the euro will simultaneously imply costs and risks arising from the loss of independent monetary policy and exchange rate flexibility vis-à-vis major trading partners. The benefits and costs stemming from euro adoption will be affected by the situation in both the Czech economy and the euro area economy and its institutional framework. These factors will influence whether adoption of the euro by the Czech Republic will lead to an increase in the country's economic stability and performance.

Developments in the **euro area** in recent years are, on the one hand, pointing to differences between the countries of the EMU, and, on the other hand, are leading to a change in its institutional architecture, which may significantly alter the benefits and costs of euro adoption.

The **problems in the institutional architecture of the euro area** have also been the subject of an ever-growing flow of academic literature in recent years. In particular, it is apparent that the optimum currency area endogeneity hypothesis has not been confirmed. By contrast, exchange rate fixing, sharp interest rate cuts on the periphery of the euro area and the absence of a system of fiscal transfers have resulted in a systematic accumulation of major imbalances in the euro area. With no option of exchange rate depreciation, and in a situation of low inflation, the single monetary policy now seems too restrictive for the less competitive countries. Conversely, the monetary conditions may be too easy for the countries with rising competitiveness. These factors, combined with other effects, have in recent years been reflected in rising misalignment in a whole range of indicators, for example long-term interest rates, unemployment and partly also GDP growth.

The two key factors for the **Czech economy** as regards the costs and benefits of euro adoption will be (i) the economic and structural similarity between the Czech economy and the euro area, and (ii) the flexibility of the Czech economy and its ability to absorb potential asymmetric shocks. As usual, the analyses presented in this document therefore assess the similarity of the long-term economic trends, the medium-term development of economic activity and economic structure, including similarity of the functioning of monetary policy transmission, the adjustment capacity of fiscal policy and the labour and product markets, and the absorption potential of the banking sector. As in previous years, the characteristics of the Czech economy as regards its preparedness to adopt the euro can be divided into four groups.

The first group consists of **economic indicators that speak in the long run in favour of the Czech Republic adopting the euro**. These include the high degree of openness of the Czech economy and its close trade and ownership links with the euro area. These factors provide for the existence of microeconomic benefits of euro adoption, such as a reduction in transaction costs and the elimination of exchange rate risk. Strong trade links with the euro area are also reflected in a high correlation between the exchange rates of the koruna and euro against the dollar and are also fostering alignment of the business cycle with the euro area. This alignment has increased markedly in recent years, although it is not certain that the increased level will persist once the current crisis is over. Another favourable factor is the achievement of long-term convergence in the rate and persistence of inflation and in nominal interest rates, as this reduces the macrofinancial risks associated with euro adoption. The Czech banking sector is not a barrier to joining the euro area either, as it is capable of helping to absorb economic shocks.

The second group contains **areas where convergence was disrupted by the crisis but which have been returning to a trend of rising alignment in recent years**. The increased volatility of the koruna's exchange rate against the euro has been replaced by gradual stabilisation. After rising substantially, risk premia on the Czech financial market have decreased again and the standard functioning of the transmission of monetary policy rates to client rates has thus been renewed. The global financial crisis also caused a temporary interruption of the integration of Czech financial markets with markets in the euro area. This was a result of fragmentation in euro area financial markets owing to increased risk aversion. In recent years, however, market synchronisation has been renewed. This group of the features of the Czech economy also includes fiscal policy, where structural general government deficits have decreased. However, fiscal policy has so far been mostly procyclical and, in addition, is not heading towards the medium-term objective (MTO), fulfilment of which is a condition for fiscal policy to have a stabilising function following the loss of independent monetary policy.

The third group consists of **areas where positive trends were disrupted by the global crisis and a return to the convergence path has yet to occur**. The real economic convergence of the Czech Republic to the euro area observed until 2008 has halted since then. As measured by GDP per capita (converted using purchasing power parity), the Czech Republic is at a higher absolute level than the least developed euro area countries, but this is no guarantee of future smooth functioning of the economy in the EMU. The long-term price level convergence trend has also been interrupted. The previous convergence of the price level to the euro area halted in 2008. Since then, the Czech price level has been flat on average relative to that in the euro area. This is due to a halt in the trend of nominal appreciation of the koruna against the euro, and its depreciation at the time when the crisis was escalating.

The fourth group contains **areas which are showing long-term problems or misalignment and which, moreover, are not showing any significant improvement.** This group includes the still insufficient flexibility of the Czech labour market, whose weak spots include relatively low labour mobility and relatively high implicit labour taxation. On the other hand, the labour market is showing signs of greater flexibility in some recently problematic aspects, for example in the form of rising use of part-time work and some increase in the financial incentives for the unemployed to seek a job. Persisting administrative barriers to starting and closing a business have long hampered the flexibility of the Czech product market. Significant differences vis-à-vis the euro area still exist in the structure of the Czech economy, which is characterised by a high share of industry and a low share of services. Differences also persist in the financial sector and in the structure of financial assets. These factors may cause the single monetary policy to have a different effect or may be a source of asymmetric shocks.

The following text summarises developments in the individual areas analysed. Part D examines the economic convergence of euro area countries, debt problems and changes in the institutional architecture of the EMU. Detailed results of the analyses of the developments in the Czech Republic are presented in Part E.

Situation in the euro area

Economic alignment of euro area countries is a basic prerequisite for the EMU to function smoothly. However, recent developments point to shortcomings in this area. The persisting differences in year-on-year growth rates across euro area economies indicate that their business cycles are displaying no major change in alignment. These differences widened in 2008–2009 and again in 2011, as the economies were hit by recession in different quarters and to different extents. By contrast, the unemployment rate was initially converging, but

since 2009 has been rising much more strongly in some countries. The financial and economic crisis was accompanied by rising misalignment in the inflation rate. In recent years, however, this misalignment has decreased again. In 2010–2012, very large divergence can be seen for long-term interest rates, which reflect the different magnitudes of the debt problems across euro area countries. This misalignment decreased last year due to the calming of the market situation and to the measures adopted by the ECB, but the public finance situation in many euro area members is still putting the functioning of the monetary union under pressure. At present, only three countries meet the **fiscal criteria** laid down in the Treaty on the Functioning of the EU.

Major changes are being made to the **institutional framework** in response to the euro area's problems. The future form of the economic and political organisation of the EMU is changing the view of the economic benefits and costs of joining. In addition to the objective of fiscal consolidation, EU economic policies have recently been aimed more intensively at fostering a recovery in economic growth. At the same time, the euro area has accelerated its progress towards significantly stronger economic policy coordination and integration, particularly as regards the creation of the banking union. The euro area rescue facility, the ESM, has been in operation since last autumn and is to expand its remit to include direct recapitalisation of banks once the single supervisory mechanism (SSM) is established. If it adopted the euro, the Czech Republic would – according to Czech Finance Ministry calculations – have to pay about CZK 40 billion into the ESM and undertake to supply a further amount of up to around CZK 310 billion in the event of non-repayment of loans or a large decrease in the contracting parties' solvency. Owing to the ongoing changes, the present and planned future shape of the framework for the functioning of the euro area is thus moving further and further away from the situation that existed when the Czech Republic entered the EU and committed to adopt the euro.

Cyclical and structural alignment of the Czech economy with the euro area economy

If the Czech economy is aligned with the euro area economy, the costs arising from the loss of the Czech Republic's own monetary policy (assuming a stable and sustainable economic situation in the euro area) will be relatively small.

The **degree of real economic convergence** is an important indicator of the Czech economy's similarity to the euro area. A higher level of such convergence fosters greater similarity of long-run equilibrium development. Indirectly it can also foster a lower likelihood of misalignment in the shorter run. A higher degree of convergence in the economic level prior to ERM II entry and euro adoption should further increase the relative price level, which will reduce the potential future pressures for growth of the price level and equilibrium appreciation of the real exchange rate. The Czech economy had been gradually converging towards the euro area in real terms before the crisis broke out. However, this trend halted in 2009, and the Czech Republic's economic level relative to that of the euro area has been flat since then. In recent years, GDP per capita has been about three-quarters of the euro area average. Owing to the crisis, the convergence process was also interrupted in the case of the price level of GDP, which has halted at around 70% of the euro area average. The price level thus remains slightly below the level corresponding to the performance of the economy. The wage level in the Czech Republic in 2012 was roughly 40% of the average euro area level when converted using the exchange rate and about 60% when converted using purchasing power parity. The real exchange rate of the koruna (on an HICP basis) appreciated on average by 3% a year between 2003 and 2012, but is displaying significant fluctuations around its long-run trend. These fluctuations have been helping to absorb macroeconomic shocks in recent years. According to the analyses, equilibrium real appreciation of the koruna against the euro, albeit at a lower rate than in the past, can be expected over the next five years provided that real

GDP convergence is renewed. Continuing real appreciation of the exchange rate following euro area entry would mean an inflation differential vis-à-vis the euro area and related lower (or even negative) real interest rates.

Sufficient **alignment of economic activity** increases the likelihood that the single monetary policy in the monetary union will be appropriately configured from the perspective of the Czech economy. The analyses indicate increased correlation of overall economic activity between the Czech Republic and the euro area in recent years; the same goes for activity in industry and export activity. The increase in correlations can be attributed partly to a greater significance of common extraordinary shocks in the form of the global economic crisis, the subsequent temporary recovery in economic activity and later the real economic impacts of the euro area debt crisis. Owing to the above events, it is not clear whether the increased business cycle alignment will persist in conditions of normal growth in European economies.

Similarity of the **structure of economic activity** with the euro area should reduce the risk of asymmetric economic shocks. The persisting relatively high share of industry (moreover with an exceptionally significant share of the procyclical car industry) and a smaller share of services compared to the euro area may mean a higher risk of asymmetric shocks for the Czech economy, to which a potential single monetary policy is unable to respond. In addition, the differences in structure are widening further and structural misalignment thus remains one of the risks of adopting the single currency.

Fast convergence of **nominal interest rates** in connection with joining the euro area acted as an asymmetric shock in some economies in the past, generating macroeconomic imbalances and risks to financial stability. For a country planning to enter the monetary union, earlier gradual interest rate convergence is therefore an advantage. The fact that the difference between Czech and euro area interest rates was very low for a long time is favourable from this perspective. Three-month interbank market rates showed a slightly positive interest rate differential in 2009 and 2010, but this closed gradually, temporarily turning negative in 2011 H2. Government bond yield differentials against Germany grew temporarily in early 2009 and again in 2012 H1, also due to increased financial market tensions linked with the further escalation of the euro area debt crisis. However, the interest rate differential between Czech and German long-term interest rates has long been much lower than in the other non-euro area countries under review.

Another indicator of the possibility of sharing a single currency is long-term co-movement in the **exchange rates** of two currencies against a reference currency. Compared to the other currencies under review, the correlation between the rates of the Czech koruna and the euro against the dollar has been relatively high and stable. The exchange rate volatility of the koruna against the euro saw a temporary increase due to the global financial crisis and then also the European debt crisis. However, the correlation of koruna and euro rates against the dollar has remained high (the correlation coefficient is about 90%) and is still higher than that for the Polish zloty and the Hungarian forint. This indicates that the Czech currency responds to changes in the external environment similarly to the euro, suggesting a high degree of alignment.

The Czech economy's strong **trade and ownership links** with the euro area increase the benefits arising from the elimination of potential fluctuations in the exchange rate and the reduction in transaction costs. The euro area is the partner for 63% of Czech exports and 61% of Czech imports, a level comparable to, or even higher than, that in the other non-euro area countries under review. The share of intra-industry trade is relatively high as well. Despite declining modestly in 2011, the degree of ownership links in the Czech economy, as measured by direct investment from the euro area, is still the highest of all the countries under review.

The **financial sector** in the Czech Republic is still much smaller in size than that in the euro area. The depth of financial intermediation, as measured by the ratio of financial institutions' assets to GDP, is roughly one-quarter of the value for the euro area. In 2012, the share of bank loans to the private sector to GDP was 57% in the Czech Republic, less than half that in the euro area. However, the current level of the aforementioned indicators in the euro area is not necessarily optimal. On the contrary, in many countries it may reflect private and public sector overleveraging.

The **structure of the financial assets and liabilities of Czech non-financial corporations and households** is gradually converging to that of euro area entities, but still shows differences. For corporations, the difference is particularly visible in a lower weight of loans (at the expense of shares) in their net debtor position. Corporations in the Czech Republic are showing higher liquidity, although liquidity growth has also been visible in the core euro area countries under review in recent years. The share of Czech corporations' short-term liabilities in the total debt is much lower than that in the euro area. The Czech corporate debt to equity ratio has been rising since 2007. In 2012, this indicator was higher than the euro area average and comparable with Germany. Czech households have a lower debt ratio than euro area households and also a lower value of financial assets, which, moreover, have a different structure. Compared to euro area households, Czech households hold a larger proportion of their financial assets as currency and deposits. Overall, the household sector's net creditor position is about half that in the euro area.

In the past, the **effect of monetary policy rates on client rates** in the Czech Republic was roughly the same as in the euro area. Rate transmission is fast, taking place within one month for most types of loans. The global financial and economic crisis led to a temporary slowdown and weakening of the transmission of monetary policy interest rates in the Czech economy as a result of rising client risk premia. However, this increase was comparable to that in the euro area core countries. The structure of initial interest rate fixations on new loans to non-financial corporations is similar to that in the euro area. Mortgages in the Czech Republic are dominated by loans with shorter fixations (mostly of up to five years) than in the euro area, where longer fixations are more common.

Differences in **inflation persistence** in the monetary union countries could lead to the single monetary policy having different impacts. However, inflation persistence in the Czech Republic is average among the countries under comparison. The difference is not significant even compared to the euro area core countries. Inflation persistence thus does not pose a significant risk to the symmetric effect of the single monetary policy in the Czech Republic.

The analysis of **integration of financial markets** (the money, foreign exchange, bond and stock markets) with the euro area reveals that synchronisation in the individual segments of the Czech financial market has long been mostly high and comparable with the euro area countries. A natural exception is still the money market, which was already showing a lower degree and speed of integration in the pre-crisis period, mainly due to different monetary policy in the Czech Republic compared to other countries. The global crisis and its impacts resulted in an increase in financial market misalignment in all the countries compared. The situation on the Czech financial market started to improve in 2009 H2, and 2010 saw a return to the pre-crisis degree of integration on all markets under review.

The degree of **euroisation** in the Czech Republic has long been low and is due to economic agents' high trust in the domestic currency and to sustained low and stable inflation, a floating exchange rate and low interest rates. The use of foreign currency is concentrated primarily in the sector of corporations involved in foreign trade.

Adjustment mechanisms in the Czech economy

If set appropriately, **fiscal policy** can have a countercyclical effect and be a stabilising element for the economy. Otherwise it may itself be a source of economic shocks. The closer the structural part of the public budget deficit is to zero and the lower is the accumulated public finance debt, the more room there will be at a time of economic downturn for automatic stabilisers to function and countercyclical discretionary measures to be implemented. Czech budget policy was characterised by chronic deficits and a procyclical effect for most of the period under review. Windfall tax revenues in 2006–2008 were not employed to reduce the fiscal deficit, but instead tended to be used to generate new public expenditures. Similarly, tax cuts affecting the revenue side were not accompanied by corresponding austerity measures on the public expenditure side, even during years of rapid economic growth. Fiscal policy had the desirable countercyclical nature particularly in 2009, when government anti-crisis and other measures were adopted. In 2010, fiscal consolidation was commenced, albeit at the cost of a strongly procyclical restrictive effect of fiscal policy in 2010–2013. In addition, the fall of the economy into recession made the government abandon its originally declared intention to comply with the medium-term objective (MTO) in 2015. Meeting this objective is a precondition for fiscal policy to be ready to fulfil its macroeconomic stabilisation role effectively after the loss of independent monetary policy. By contrast, the structural component of the public finance deficit is expected to increase again and is thus moving away from the MTO. Although the Czech Republic's total general government debt is lower than that of many EU countries, it has been showing very fast growth in recent years. The high and rising share of mandatory expenditure combined with the expected effect of demographic changes on pension system expenditures (this effect is mitigated by an increase in the retirement age adopted within the "small" pension reform) and health care system expenditures also poses a risk to public finance sustainability. However, the related risks are smaller than in the other countries under review.

The **labour market** is another important mechanism through which the economy can cope with asymmetric shocks in the absence of an independent monetary policy. Although labour market flexibility is average overall compared to the other European economies, the situation cannot be assessed as sufficient from the perspective of adjustment capacity following euro adoption. The weak points still include persisting relatively high implicit labour taxation and relatively low labour mobility. Internal mobility in the Czech Republic is among the lowest in the countries under review. The total share of foreign nationals in the population was increasing until 2008 but then halted at lower levels than those typical of the advanced euro area countries owing to lower demand for foreign labour at a time of subdued economic activity. The Czech Republic still has large differences in unemployment across regions. On the other hand, the labour market is showing signs of greater flexibility, with part-time work recently being used to a larger extent instead of dismissals and wage cuts in response to the economic contraction. Both long-term unemployment and structural unemployment have thus increased slightly in the Czech Republic, but are still among the lowest in the countries under comparison.

The **institutional rules on the labour market** have a strong effect on its flexibility. The effect of collective bargaining on wage setting in the Czech Republic is not much higher than in the current euro area members. The ratio of the minimum wage to the average wage has been falling since 2006. This is important above all in low-skilled jobs, for which the negative impact of a high minimum wage on wage flexibility can be greater. By contrast, overall labour taxation in the Czech Republic is relatively high, and has increased slightly further in recent years. The implicit taxation rate, expressing the average effective tax burden, remains one of the highest among the countries under comparison. The financial incentives to seek and accept a job increased somewhat in 2012 due to parametric changes made to taxes and benefits. However,

this increase was from a relatively low base, particularly in the case of the short-term unemployed.

The **response of wages to the business cycle** can enhance the economy's ability to absorb shocks to which the single monetary policy cannot respond. From the longer-term perspective, the Czech Republic shows a relatively strong response of unemployment to the phase of the business cycle and a weak or lagged response of real wages to unemployment. This suggests that economic shocks were in the past reflected in unemployment instead of being absorbed by real wages, since the latter are not sufficiently flexible. Recently, however, the Czech Republic has seen labour market adjustment through the aforementioned use of part-time work and a concurrent decline in real wages.

In the area of **product market flexibility** the situation has showed some positive changes since 2010, as the administrative burden of closing a business has decreased compared to the other countries. However, the domestic business environment remains in some respects (starting a business in particular) more burdened with administrative obstacles than in the countries under comparison. Although the Czech corporate tax rate, as measured by the statutory tax rate, is one of the lowest among the countries monitored, the implicit taxation of corporations in the Czech Republic is one of the highest.

Stability and effectiveness of the **banking sector** is a necessary condition for the sector to be able to absorb shocks. By contrast, an unsound banking sector (or financial sector in general) can create shocks and propagate them to the real economy. It can also cause problems in the fiscal area, as the recent experience of some euro area countries shows. The Czech banking sector displays very good macroprudential indicators such as profitability, capital adequacy, balance-sheet liquidity, a stable and still relatively low NPL ratio and limited dependence on other countries. It is therefore not a source of shocks and should be able to absorb fluctuations emanating from the domestic economy or from abroad.

C   THEORETICAL FOUNDATIONS OF THE ANALYSES

The basic theoretical starting point for the analyses contained in this document is the **theory of optimum currency areas**.[3] This theory examines whether individual countries are good candidates for introducing a single currency. In the context of the creation of the single European currency, knowledge of this theory is often used to assess the appropriateness of adoption of the single currency by the existing euro area countries and the suitability of the same step for the new EU Member States.

Although economists agree on the general set of fundamental **benefits and costs of the single currency**, the significance of the individual arguments may change over time or depending on the specific features of the respective economies. The main benefits are improved functionality of money and reduced trade costs (including, for example, lower transaction costs, easier-to-compare prices and the elimination of exchange rate risk and the costs of hedging against it) and potentially also increased macroeconomic and financial stability, reflected in a more favourable investment environment (thanks to the elimination of excessive exchange rate fluctuations, financial market integration and potentially an overall increase in the credibility of the monetary authority).[4]

The costs are broken down into non-recurring ones, associated with the change of legal tender,[5] and long-term ones. The latter include a reduction in the effectiveness of domestic macroeconomic policies and the risk of greater volatility in economic activity and consumption due to the loss of independent interest rate policy (and potentially also exchange rate policy) upon transition to the single currency. The reason is that the single monetary policy cannot respond to a sufficient extent to shocks which affect only a small part of the currency area's economy. The costs of the loss of an independent currency will depend on the extent to which the exchange rate absorbs real shocks or, on the contrary, generates real and/or financial shocks, on the degree of alignment of the domestic business cycle with the cycle of the currency area, and on the ability of the economy to employ other adjustment channels.[6] Additional costs may then arise from the build-up of imbalances in the monetary union as a result of suboptimal economic policy settings for individual economies or in connection with resolving the economic problems of monetary union members.

The potential costs and benefits differ depending on the specific situation, and the decision to introduce the single currency is – in addition to economic arguments – motivated by political

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[3] Mundell (1961), McKinnon (1963) and Kenen (1969) are regarded as the cornerstones of this theory. A survey of literature can be found, for example, in Mongelli (2002), De Grauwe (2003) or Horváth (2003). A recent paper worth mentioning is Dellas and Tavlas (2009), who describe the history of the optimum currency area theory over the last fifty years. In a summary of the modern empirical literature they show, among other things, that pegged exchange rates tend to be associated with higher GDP volatility.

[4] The enhanced macroeconomic stability should facilitate a low and relatively stable interest rate level and higher investment growth. An increase in foreign trade and competition, productivity growth and subsequent GDP growth per capita can also be expected. However, financial market integration can be a drawback at times of financial crises, which can spill over to other countries as the recent situation has shown. Similarly, the latest developments show that a fall in interest rates and the elimination of exchange rate volatility can reduce the pressure for macroeconomic discipline in individual countries, with negative consequences.

[5] The non-recurring costs include the physical exchange of money, the conversion of all contracts to the new accounting unit, and similar costs. In the context of transition to another currency, there is also a risk of setting the conversion ratio incorrectly, as an excessively appreciated exchange rate may damage the competitiveness of the economy in the long term, while an excessively depreciated exchange rate will generate inflationary pressures.

[6] For new EU members planning to join the euro area, another possible cost is fulfilment of the Maastricht criteria prior to entry, especially the price stability criterion. A potential cost for converging countries is a persisting inflation differential, which may be reflected in a rise in nominal client rates and a fall in real client rates and may adversely affect the economy (the welfare cost of inflation theory – Hampl and Skořepa, 2011; Ahrend et al., 2008; Taylor, 2009; Martin, 2010).

and social demand (Eichengreen, 2008). However, knowledge of the theory of optimum currency areas can, *inter alia*, be applied to identify possible sources of macroeconomic imbalances associated with entering the monetary union and to assess the economy's ability to benefit from membership. Factors that contribute to the benefits of the single currency (compared to a free nominal exchange rate) make up the set of **optimum currency area properties** (Mongelli, 2002).

One of the key properties determining the appropriateness of joining a currency area is the degree of the **openness of the economy** and its economic links with the other countries of the currency area. The greater the integration, the higher the potential benefits of the single currency against which the costs are gauged. These benefits reflect above all the elimination of exchange rate risk in economic relations, which reduces the costs of foreign trade and foreign investment and may lead to a strengthening of such relations.[7]

Other properties tend to reduce the negative aspects of the loss of certain macroeconomic adjustment instruments at country level, and can be summarised under the headings of **symmetry and flexibility** (De Grauwe and Mongelli, 2005). The traditional optimum currency area criteria therefore also include similar economic structure and economic shocks, output and consumption diversification, a similar inflation rate, stable terms of trade, mobility of labour and other production factors, price and wage flexibility, and fiscal and political integration.[8]

An important role in the theory of optimum currency areas was played by the **endogeneity hypothesis** (Frankel and Rose, 1998), which holds that changes leading to an optimum currency area will be an automatic result of the very introduction of the single currency.[9] The endogeneity paradigm was opposed by the view that greater openness of the economy leads to a greater degree of specialisation, a decrease in structural similarity and thus a higher probability of asymmetric shocks, which increase the costs of currency area participation (the "**specialisation hypothesis**", Krugman, 1993). Kalemli-Ozcan, Sorensen and Yosha (2003) find that high financial integration (including outside a monetary union) can have a similar impact thanks to risk sharing, which fosters greater specialisation. Agenor and Aizenman (2011) find that the benefits from joining a currency area depend on the efficiency of the domestic financial sector, and in particular on its ability to expand into other countries of the currency area. In recent years, the opinion has been gaining ground that the theory of endogeneity of currency areas has not been confirmed, particularly in the case of the EMU. On the contrary, it has been observed that less competitive economies are diverging from the core of the euro area (Caporale, Santis and Girardi, 2013).

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[7] Micco, Stein and Ordonez (2003) found this effect to be economically significant for the euro area countries. Baldwin (2006), on the other hand, points out that euro area accession cannot be expected to have such an upward impact on foreign trade as implied by the results set out in the earlier literature. A meta-analysis of this literature (Havránek, 2009) in fact demonstrates that the effect of euro adoption on trade between euro area countries is not statistically significant and with high probability is less than 5%. The first article, Rose (2000), finds effects of hundreds of per cent, while Micco, Stein and Ordonez (2003) measure just a few per cent for the euro area.

[8] In the event of an asymmetric shock, fiscal policy can assist by means of either automatic stabilisers or discretionary measures. However, discretionary measures can give rise to further fluctuations (Feldstein, 2002). What is more, research has shown that a fiscal expansion can have a much lower impact on demand than expected (Blanchard and Perotti, 2002). This is particularly true for small open economies. Nevertheless, discretionary fiscal measures regained importance during the recent financial and economic crisis.

[9] According to this hypothesis, the adoption of the single currency should lead to a strengthening of the free market (Engel and Rogers, 2004) and growth in trade with partners in the monetary union. Increased competition will then strengthen diversification and specialisation, which will further increase the intensity of trade and underline the benefits of the single currency. Greater trade integration can lead to greater business cycle correlation (Frankel and Rose, 1997). However, Kenen (2000) finds that although trade intensity can increase the correlation between cycles, asymmetric shocks are not necessarily fully eliminated. Hughes-Hallett and Piscitelli (2002) show that this causality between monetary union participation and cycle alignment exists provided that the convergence in institutional structures and the symmetry of shocks are sufficient.

The conclusions of **empirical analyses for the euro area** have evolved over time. On the basis of pre-crisis data, the review article by De Grauwe and Mongelli (2005) finds support primarily for the endogeneity hypothesis, i.e. that the similarity of economic shocks probably increases with greater economic integration. Babetskii (2005) shows an increase in the correlation of demand shocks in new EU member countries with the euro area and Germany amid rising trade integration. By contrast, Giannone, Lenza and Reichlin (2009) state that euro adoption has not significantly changed the characteristics of member countries' business cycles, as countries with lower long-run volatility retain this characteristic after euro area entry. Likewise, the characteristics of countries with historically higher volatility in economic activity and lower business cycle correlation with the euro area average persist. According to Lane (2006), the introduction of the euro had a clear impact in terms of increasing the integration of the euro area financial markets; however, there was growth in foreign trade with both members and non-members of the euro area. Similarly, Frankel (2008), despite supporting the endogeneity hypothesis in the euro area, considers the risks of asymmetric shocks in the transitory phase to be substantial; on the other hand, alignment increases over time even without euro adoption. Frankel therefore recommends that the new EU Member States should wait. The experience of the recent global financial and economic crisis also suggests that increasing financial market integration is not unequivocally favourable for the healthy functioning of an economy in a monetary union. An analysis of the causes of non-fulfilment of the endogeneity hypothesis is provided, for example, by De Grauwe (2010a). EEAG (2011) emphasises the significance of structural differences across economies in the monetary union and the resulting economic and financial divergence. On the other hand, Crespo-Cuaresma and Amador (2013) find that the euro area has shifted to a new equilibrium with smaller misalignment of business cycles compared to both historical data and other OECD countries. Ferreira-Lopes (2013) simulates the costs of euro adoption in Central European countries using a DSGE model. He concludes that the costs of the loss of independent monetary policy are relatively high for the Czech Republic and Poland because of the large significance of domestic demand shocks (e.g. government consumption).

The empirical literature analysing the **symmetry of economic shocks** hitting the euro area countries is divided. Giannone and Reichlin (2006), Eickmeier (2007) and Stavrev (2008) find the significance of common shocks to be decisive in explaining the variability of economic output. The increase in the significance of common shocks is attributed to financial market integration (Kalemli-Ozcan et al., 2012) and the effect of the single monetary policy on the synchronisation of cycles. However, different transmission of common shocks can also have an asymmetric effect. The impact of this channel, however, is found to be rather small. Eickmeier and Ng (2011) show that global financial and demand shocks have a very similar effect in euro area countries and European non-euro area countries, indicating a high degree of alignment of European financial markets regardless of euro area membership.

Different transmission of the single monetary policy in different currency area countries can also be a significant source of asymmetric shocks: whereas Havránek and Rusnák (2012) show that monetary transmission is faster in countries with more developed financial markets, Jarocinski (2010) concludes that monetary policy transmission is similar in new and old euro area countries. Matějů (2013) asserts that euro area countries show stronger responses to non-systematic monetary policy shocks than inflation targeting countries.

European Commission (2006) emphasises the importance of **idiosyncratic shocks for euro adoption**, including a fall in the risk premium, an easing of the monetary conditions, and the development of productivity in the tradable and non-tradable sectors. As a result of the monetary policy response, these shocks can also have secondary impacts on other countries. Ahrend et al. (2008) and Taylor (2009) point out that an excessive decrease (compared to that implied by the Taylor rule under independent monetary policy) in long-term interest rates after

the adoption of the single currency in some economies gave rise to bubbles in asset markets, property markets in particular.

Recent literature (e.g. De Grauwe, 2010b; Gros and Alcidi, 2010; Wyplosz, 2010 a,b) critically examines the **experience of the euro area during the crisis** and the efforts to strengthen fiscal policy coordination. Eichengreen (2009) considers the global crisis of 2008–2009 to be a textbook example of an asymmetric shock, but he also claims that small converging countries are better off inside the euro area during a crisis. Razin and Rosefielde (2012) point out that the main problem in the euro area is weak political integration. Mongelli (2013) argues that the euro area may be functional and beneficial to all members even without a fiscal union provided that rescue mechanisms are introduced within the banking union. Brunnermeier (2010) points out the implications of differences in inflation rates for different monetary policy effects in the individual countries of the monetary union. He suggests that the centralised monetary policy should be supplemented with region-specific macroprudential instruments, e.g. regulation of the loan-to-collateral and loan-to-income ratios. These arguments thus go against the centralised concept of the banking union which is currently being created (see section D.2).

Based on an assessment of experience of the functioning of the euro area, a number of papers point to **real benefits** (see, for example, Mackowiak et al. (eds.), 2009). The undoubted benefits include the achievement of price stability. In other areas, however, the assessment is less clear-cut. European Commission (2008) arrived at a generally positive assessment, while admitting that the growth potential of the euro area remained low and significant differences persisted in inflation and unit labour costs across the individual countries. Hurník et al. (2010) point to an absence of the expected benefits for the real economy (2010). Giannone et al. (2009) found that the growth of the euro area since 1999 had been lower than what could have been predicted on the basis of historical experience and US observed developments. At the same time, the cross-correlations of member countries' business cycles had not changed, hence the endogeneity theory has not been confirmed in this respect.

D   ECONOMIC ALIGNMENT OF EURO AREA COUNTRIES

The global financial and economic crisis revealed structural weaknesses in some economies and low institutional readiness of the euro area to resolve such situations. To address this situation, rescue and later reform measures were commenced which are having large impacts on the functioning of the monetary union. It is thus important for countries that have undertaken to adopt the euro, such as the Czech Republic, to monitor institutional and economic developments in the euro area countries and in the euro area as a whole in addition to their domestic parameters of economic alignment with the euro area.

1   ANALYSIS OF EURO AREA ECONOMIC COHESION

The protracted economic downturn in the euro area (especially in the southern periphery) raises the question of whether it is optimal for the monetary union to exist in its current composition of differently performing economies. Despite having met the Maastricht criteria prior to euro adoption (thanks only to inaccurate statistics in the case of Greece), the euro area countries are heterogeneous and some of the differences between them have widened in the wake of the debt crisis. Last year there was even speculation that the monetary union might be unsustainable. The situation has calmed recently, but many problems persist. This section analyses the evolution of the alignment of key macroeconomic variables of euro area countries over the last ten years on the basis of simple descriptive statistics.

1.1   CONVERGENCE OF REAL AND NOMINAL VARIABLES

A prerequisite for an optimal currency area is a high degree of economic integration. In addition, the pursuit of a single monetary policy requires economies to be aligned in terms of their business cycles. Cycle alignment can be measured using GDP growth and unemployment.

Chart 1 illustrates the weighted and simple average of **real GDP per capita** in euro area countries and its standard deviation over the last ten years. The chart shows that the differences in economic level between member countries had been widening before the onset of the financial crisis and then decreased. The decrease in the standard deviation was mostly due to a larger fall in real GDP in better performing countries in 2009. The standard deviation increased again slightly in 2010 and 2011 as some countries recovered faster from the crisis-related contraction while the performance of other countries (notably those hit hardest by the debt crisis) decreased further. In 2012, however, the standard deviation of GDP per capita fell again, mainly due to similar impacts of the debt crisis on most euro area economies.

Chart 2 shows that some countries saw a degree of (beta-)convergence, with poorer countries – primarily those which do not rank among the original euro area countries – growing faster than wealthier ones on average. On the other hand, economic activity per capita fell in Greece, Italy and Portugal over the past ten years and these countries thus diverged from the best performing economies.

The **standard deviation of quarterly year-on-year growth rates** in the economies under review shows no significant trend (see Chart 3). This indicates that their business cycles are displaying no major change in alignment. However, the differences in the countries' growth rates widened in 2008–2009, as the economies were hit by recession in different periods and to different extents. A similar increase was recorded in 2010 H2, reflecting the differences in the post-crisis evolution of the economies. Last year, by contrast, the standard deviation of the growth rates of euro area countries fell slightly, again reflecting the similar extent of the negative impacts of the debt crisis on most euro area countries.

Chart 1: Real GDP per capita in euro area countries (EUR thousands)
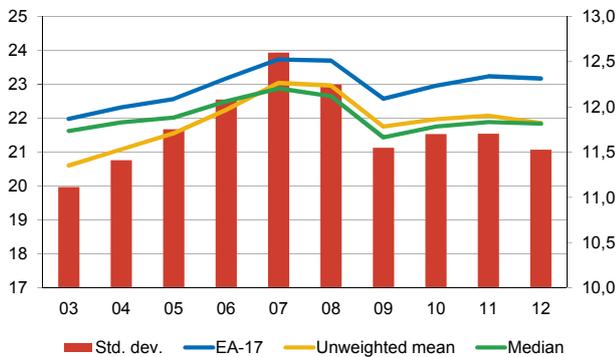
Note: GDP at 2000 prices. Right-hand scale – standard deviation. The EA aggregate is created by dividing the real GDP of the euro area countries by the population. The average is unweighted.

Source: Eurostat, CNB calculations.

Chart 2: Beta-convergence of real GDP in euro area countries
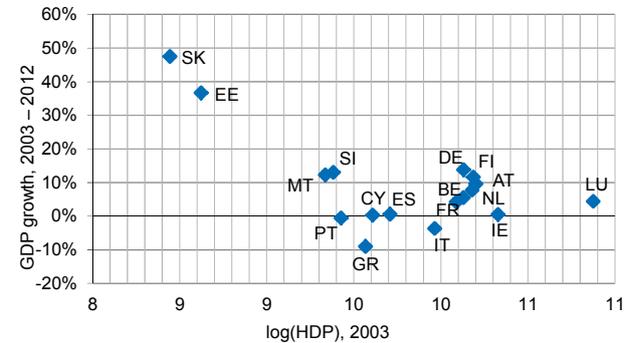
Source: Eurostat, CNB calculations.

By contrast, the **unemployment rate** is following a trend (see Chart 4). The differences in the unemployment rate were on a downward trend as from 2003, mainly because of falling unemployment in the countries with the highest rates (Slovakia and Spain). During the financial crisis, conversely, unemployment rose in almost all countries and the rates in the hardest hit countries (Spain, Estonia, Slovakia, Ireland and Greece) started to diverge from the other countries, resulting in a substantial increase of the mean above the median and widening misalignment between countries. This misalignment increased further in 2011 and 2012, when unemployment rose mainly in the countries hit hardest by the debt crisis. In early 2013, however, the growth in unemployment rate misalignment moderated, as did the growth in the average unemployment rate.

Chart 3: GDP growth in euro area countries (y-o-y, %)
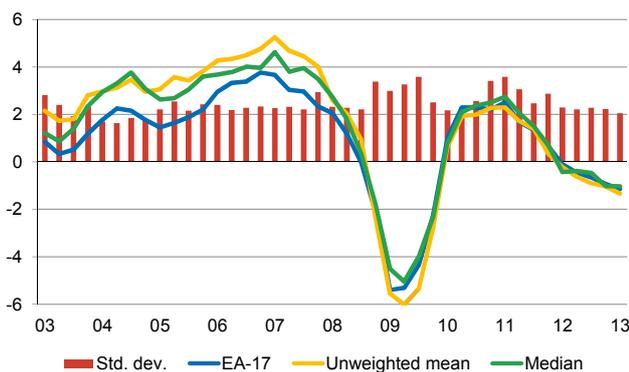
Note: The EA-17 aggregate represents GDP growth in the euro area as a whole. The source series are seasonally adjusted.

Source: Eurostat, CNB calculations.

Chart 4: Unemployment in euro area countries (%)
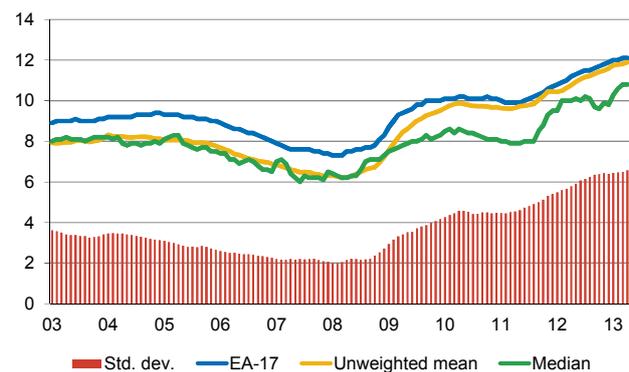
Note: The EA-17 aggregate represents unemployment in the euro area as a whole. The source series are seasonally adjusted.

Source: Eurostat, CNB calculations.

In addition to convergence of real variables, nominal convergence is important for the successful functioning of the monetary union. Differences in long-term interest and inflation rates signal structural differences and differences in competitiveness and lead to differing real interest rates with different impacts on the real economy.

Chart 5 shows that **inflation** recorded relative alignment after euro adoption, but the crisis years saw a temporary increase in misalignment. At present, inflation is below the ECB's definition of price stability, as the higher inflation levels in some countries (Estonia, the Netherlands, Slovenia and Spain) are being outweighed by very low levels in some other countries (Ireland, Cyprus, Malta and Greece, where the disinflation process has even resulted in a decline in the price level).

Long-term interest rates also recorded a modest convergence in the pre-crisis years (see Chart 6). However, the growth in their misalignment surged in 2010 and fell significantly only last year thanks to ECB measures and a calming of the situation on government bond markets.

Chart 5: The inflation rate in euro area countries (y-o-y, %)
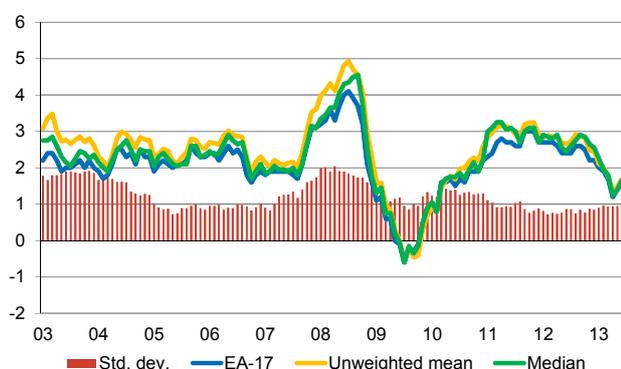
Note: The EA-17 series is a weighted average of the inflation rates of the euro area countries, where the weights are the shares of household expenditure of the given countries in households expenditure in the euro area. The source series are seasonally adjusted.

Source: Eurostat, CNB calculations.

Chart 6: Long-term interest rates in euro area countries (%)
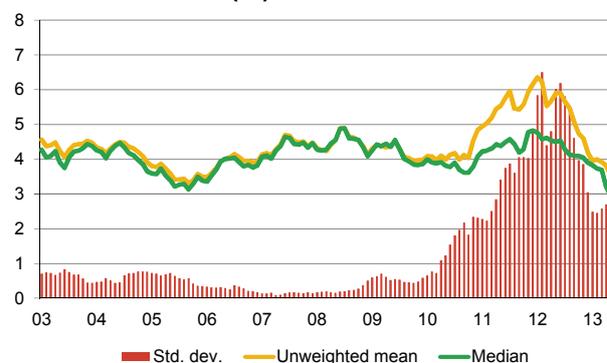
Note: Bond yields for the convergence criteria.[10] March 2002 data (rates for Slovenia are not available before this date). The bond maturity is about ten years. Estonia is not included in the chart because a sufficiently long time series is not available. The source series are seasonally adjusted.

Source: ECB, CNB calculations.

To sum up, the evolution of the alignment of euro area economies can be illustrated using **normalised standard deviations** of key macroeconomic variables (GDP growth, the unemployment rate, the inflation rate and interest rates). Negative values in Chart 7 indicate that the standard deviation of a variable is below the long-term average for that variable in the given period; positive values mean higher-than-usual (average) misalignment. Most variables – except for GDP growth – were indicating relative alignment of economies until the financial crisis broke out. After 2008, there was a clear upward trend in misalignment, except for the inflation rate, whose standard deviation – after rising temporarily in 2008 – fell back below its long-term average, where it remains. Until last year, the biggest and fastest-growing misalignment could be seen for long-term interest rates, reflecting the differing magnitudes of the debt problems across euro area countries. However, the debt problems seen in some countries are still being reflected in high levels of, and misalignment in, the unemployment rate. Given the lower GDP growth across the euro area, the standard deviation of GDP remains below its long-term average.

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[10] The yield series are published by the ECB and also include countries without access to primary bond markets. Yields on bonds traded on the secondary bond market were used for the calculation for the three countries without access to the primary bond market (Greece, Ireland and Portugal). In the case of Cyprus, yields on the primary bond market that are reported to the ECB for convergence purposes were used for the calculation.

Chart 7: Evolution of the alignment of the variables under review
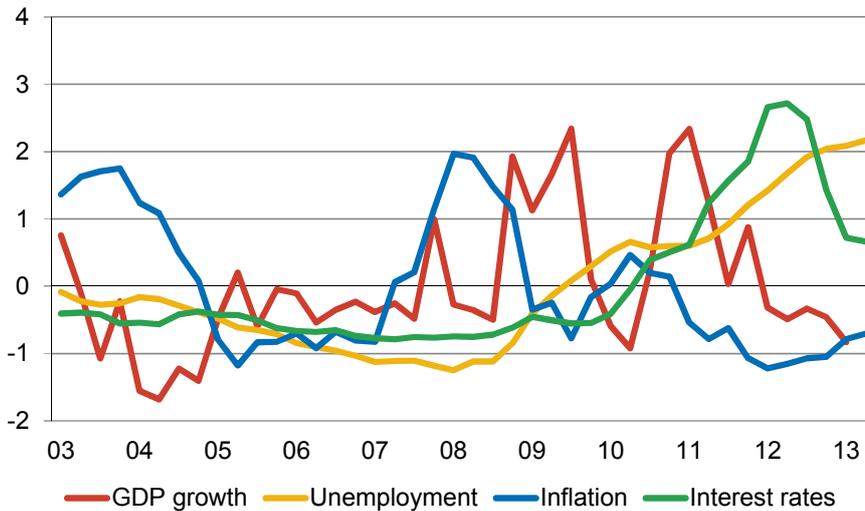
Note: The individual series in the chart depict the normalised standard deviations of the variables under review.
Source: ECB, Eurostat, CNB calculations.

1.2 FISCAL POSITIONS IN THE EURO AREA

The evolution of the euro area countries' fiscal positions also illustrates the degree of alignment and points to insufficient fiscal discipline of individual EMU members. Chart 8 clearly shows the current sizeable differences in compliance with the Stability and Growth Pact (deficit and debt criteria). At present, only three euro area countries (Estonia, Luxembourg and Finland) meet both criteria. Five others are at least compliant with one criterion. At the opposite end of the spectrum are Greece, Portugal and Ireland, which are nowhere near compliant with either criterion. Italy's debt exceeds 120%, but the excessive deficit procedure against it was discontinued in May 2013.

Chart 8: Fiscal situation of euro area countries
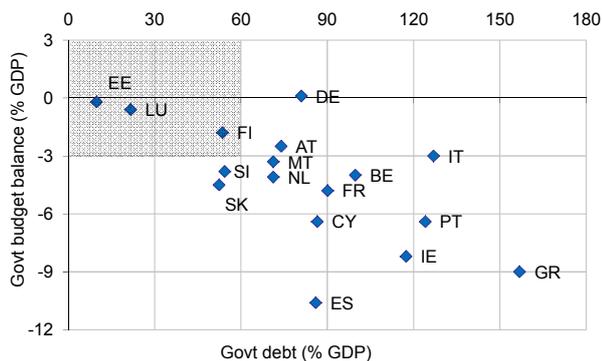
Note: 2012 data. Countries compliant with the Stability and Growth Pact lie in the grey area (see Chart 9).
Source: Eurostat.

Chart 9: Non-compliance with the fiscal criteria
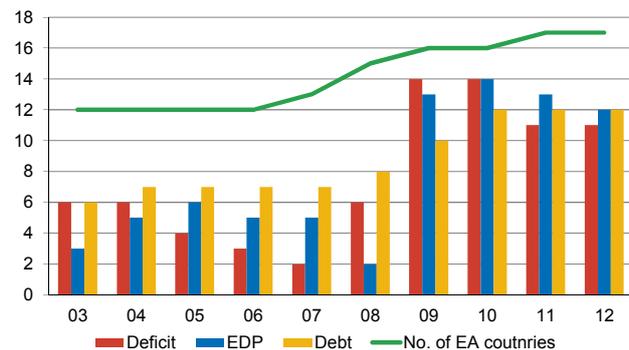
Note: The number of countries not compliant with the Stability and Growth Pact, which sets limits on government deficits (3% of GDP) and debt (60% of GDP). The EDP series shows the number of countries in an excessive deficit procedure. The number of countries in an EDP can be higher than the number of countries with an excessive deficit, as EDPs usually last several years.
Source: ECB, Eurostat, CNB calculations.

Fulfilment of the fiscal criteria, however, has been a weak point of the euro area since its creation. Chart 9 shows the number of countries in breach of the Stability and Growth Pact and the number of countries in an excessive deficit procedure (EDP). It can be seen that the fiscal imbalance is persistent, but has grown significantly since the crisis broke out and is the main source of the euro area's current problems. It is mainly the countries on the southern periphery of the euro area that are afflicted by fiscal problems, and their budget imbalances are additionally linked with general macroeconomic and financial instability.

2   CHANGES IN THE ECONOMIC POLICY COORDINATION FRAMEWORK AND STEPS TAKEN IN CONNECTION WITH THE ESCALATION OF THE EURO AREA DEBT CRISIS

The economic policies of EU countries last year were focused even more than in previous years on combining the ongoing fiscal consolidation with efforts to restore economic growth, improve labour market situation, strengthen the social dimension of reforms and maintain overall macroeconomic and financial stability. All this was going on in a situation of significantly lower financial market tension, which had intensified in previous years due to the escalating debt problems of some euro area countries. At the same time, the euro area progressed towards significantly stronger coordination and integration in the economic policy area, particularly as regards the creation of the banking union. Owing to the ongoing changes, the present and planned future form of the framework for the functioning of the euro area is moving further and further away from the situation that existed when the Czech Republic entered the EU and committed to adopt the euro.[11]

In the field of **economic and fiscal policy coordination**, the third European semester started in November 2012. During the semester, the European Commission is continuing to emphasise public finance stabilisation, although it admits the possibility of slower consolidation in some countries. At the end of this year's European semester, the EU Council in the composition of the ministers of economy and finance (the Ecofin Council) issued specific recommendations addressed also to the Eurogroup.[12] These include a recommendation to proceed with work on deepening economic and monetary union. At the same time, measures are to be adopted against financial market fragmentation, which endangers lending, and to improve access to external finance, particularly for small and medium-sized enterprises, and steps are to be taken to improve the situation in the banking sector.

In the **economic governance** area, the package of two legislative measures known as the Two Pack was definitively approved. These measures should facilitate implementation of economic policy changes at the European level and strengthen the powers of EU institutions in the conduct of budgetary and macroeconomic surveillance. The Commission then proposed an implementing package for the Two Pack prescribing detailed new requirements for further disclosure duties (more frequent and more detailed reports) to be met by the Member States as part of the strengthened economic supervision of euro area countries.

The **Treaty on Stability, Coordination and Governance in the Economic and Monetary Union** (TSCG) entered into force at the start of this year. It imposes an obligation to transpose binding budgetary rules, including balanced or surplus budgets and a "debt brake", into national legislation. The TSCG also changes the rules of the Stability and Growth Pact,

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[11] This section follows on from the relevant section of last year's Alignment Analyses and describes the situation as of 6 August 2013.
[12] The Eurogroup (which acquired legal personality upon the adoption of the Lisbon Treaty) consists of euro area finance ministers. Preparatory meetings are held at lower working levels in the same format.

including its voting mechanisms, and assumes much closer coordination of economic policies by the signatories, including coordinated government bond issuance.

In December 2012, the European Council approved a blueprint for a **"deep and genuine Economic and Monetary Union (EMU)"**. The approval of the Two Pack is to be followed by the introduction of a Single Supervisory Mechanism (SSM), a Single Resolution Mechanism (SRM) and rules for a single deposit insurance system. These steps are leading to the establishment of a "banking union", which the Council has identified as its key priority. The Council considers the establishment of the banking union to be a crucial prerequisite for safeguarding financial stability, reducing financial fragmentation and restoring normal lending to the economy. The Council has also emphasised the need to enhance the social dimension of the EMU and resolve the problems on the labour market, particularly the high rates of unemployment among young people.[13]

Of particular importance from the perspective of **financial sector regulation and supervision** will be the implementation of the Capital Requirements Directive (CRD IV) and the relevant EC regulation (Capital Requirements Regulation, CRR) at national level in EU countries. This legislation creates the legal framework governing banking activities, the supervisory framework and the prudential rules for credit institutions and investment firms (Single Rule Book). One of its main objectives is the implementation of Basel III into European law (it introduces, for example, regulation of the leverage ratio, a refined definition of capital, monitoring of liquidity indicators and countercyclical capital buffers) Similarly, a regulation on the establishment of the Single Supervisory Mechanism (SSM) will be adopted this year. This is a basis for further steps towards a **banking union**. Under the SSM, made up of the ECB and the national authorities of participating countries, the ECB will have powers in the area of prudential supervision of euro area banks and banks of participating countries. The declared goal of the SSM is to enable a better supervision of (initially only the largest) banking groups of euro area countries on a consolidated basis from one location, which will be equipped with all necessary information and facilities. Full operation should start by September 2014. Banks and their balance sheets are being subjected to an asset quality review coordinated by the European Banking Authority (EBA), a balance sheet assessment by the ECB and stress tests. The aim is to determine the likely need for capital injections in banks with problem assets, assuming various future scenarios. Closely related to this is the process of building appropriate and effective **backstops** at the European and/or national level, which should subsequently be a source of necessary recapitalisation from public funds (amassed specifically for this purpose) after private sector possibilities have been exhausted. In June, the Ecofin Council approved an agreement on the general approach to the Banking Resolution and Recovery Directive (BRRD). This directive lays down EU rules for **crisis management in the banking sector**, i.e. the bailout, recapitalisation and restructuring of problem banks and the renewal of their activities. Under the BRRD, the losses of problem banks will be resolved primarily by the private sector (shareholders, creditors and uninsured depositors via a bail-in). Euro area countries also agreed to hold a priority discussion on the draft Single Resolution Mechanism (SRM) for Member States participating in the Single Supervisory Mechanism, which the Commission had submitted in the summer. At the same time, the Commission implemented its plan to revise the rules for state aid provision in the banking sector. The process of deepening the EMU and completing the banking union should continue at the October and December meetings of the European Council.

The **rescue mechanisms for safeguarding the financial stability of the euro area** were further developed last year. A standing euro area rescue facility (the European Stability

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[13] The Council also noted that it is imperative to break the vicious circle between the debt problems of sovereigns and those of banks and stressed the importance of some specific steps in this area.

Mechanism, ESM)[14] has been in place since last autumn. In June 2013, the Eurogroup agreed on the main principles for direct bank recapitalisation via the ESM. Once and effective SSM has been created in the euro area (see above), the ESM is to be allowed – at the decision of the competent authorities – to recapitalise banks directly. Clear eligibility criteria will be stipulated. The overall ceiling on direct recapitalisation is to be EUR 60 billion, although the Board of Governors of the ESM may change this amount if necessary. A burden sharing scheme has also been agreed stipulating the level of recapitalisation of the problem bank that is to be covered by the Member State and when the ESM comes into play. Retroactivity of direct recapitalisation from the ESM is not ruled out and will be addressed on an case-by-case at the request of a Member State.

As regards the **debt crisis in the euro area and its impact on financial markets**, the situation has calmed. A further EU/IMF review mission to **Greece** took place. Its results show that the macroeconomic situation in Greece is currently in line with the assumptions of the rescue programme and price competitiveness has improved thanks to disinflation. However, better implementation of the programme is needed in the areas of tax administration (an increase in tax collection and fair burden-sharing across society) and public sector reform. In **Cyprus**, a rescue programme aimed at resolving the problems in the local banking sector was agreed. The implementation of the programme in **Ireland** has been problem-free so far and Ireland's return to the government bond market (i.e. the possibility to start raising funds by issuing paper in the primary market) is planned for the end of this year. Ireland and **Portugal** both negotiated extensions on the financial assistance obtained. In **Spain**, too, the implementation of the rescue programme is proceeding as scheduled. **Slovenia** is meant to take remedial measures under the excessive deficit procedure (EDP) by this October, including full implementation of the Commission's recommendations regarding reform of its banking sector.

The **European Central Bank** (ECB) continued to relax its monetary policy last year, lowering its key monetary policy interest rate by 0.25 p.p. to 0.50%, and its President Mario Draghi hinted at future deposit rate cuts below zero. In July this year, the ECB also started to influence market expectations by "forward guidance" and relaxed its requirements for eligible collateral in refinancing operations. The ECB is continuing to conduct its main refinancing operations as fixed rate tender procedures with full allotment this year. At the start of this year, it clarified the procedure to be followed by counterparties intending to make early repayment of three-year refinancing operations. Also at the start of this year, the ECB published a survey of Eurosystem central banks' holdings of bonds acquired under the discontinued Securities Market Programme (SMP). Italian bonds account for almost half of the total outstanding amount (EUR 218 billion). The bond holdings of countries with excessive debt problems may have a significant adverse effect on the quality of the ECB's balance sheet and may in the future cause it to come under pressure to increase its capital.

3 CONCLUSION

There is no doubt that the euro area has made progress towards significantly strengthening economic policy coordination and integration. The elements of a new future architecture in the euro area are gradually being prepared and implemented. The euro area is heading towards the establishment of a banking union and indirectly also a fiscal, transfer and debt union.

The Czech Republic and the CNB still regard some specific aspects of the banking union as problematic. Concerns remain about the possibility of direct recapitalisation of financial institutions from ESM funds, which may ultimately lead to a further increase in the risk of moral hazard, subsequent riskier bank behaviour and a greater probability of financial crisis. If

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[14] Spain and Cyprus are already drawing on assistance from the ESM.

it became a contracting party of the ESM as a result of adopting the euro, the Czech Republic would have to pay about CZK 40 billion into the capital of the ESM and undertake to supply a further amount of up to around CZK 310 billion in the event of non-repayment of loans or a large decrease in the contracting parties' solvency. The proposed unification of the deposit insurance system is also viewed as problematic, as it would further increase the risk of transmission of the consequences of irresponsible behaviour from risky regions or banks to responsible entities.

It will take time to comprehensively evaluate the impacts of the measures taken. In addition, new proposals and initiatives are making it more difficult to identify the effects of previous measures.[15] The measures being adopted thus imply a sizeable increase in the (potential) financial (and non-financial) costs associated with adopting the euro overall. Also, the heavy new workload is making economic policy coordination in the EU more difficult from the organisational point of view. This is increasing the demands on national and EU resources. It is therefore possible that new authorities will start to be created specifically for euro area countries.

It does not seem that the euro area reform process is over yet, and so other major proposals,, and the elaboration of existing ones, can be expected. This implies considerable uncertainty about the future form of the basic economic, political and institutional architecture of the euro area. This uncertainty is a major obstacle to reliably assessing the benefits and costs to the Czech Republic of joining the euro area.

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[15] A quantitative assessment of the impact of structural reforms on economic growth (Babecký and Campos, 2011; Babecký and Havránek, 2012) shows the importance of maintaining a time gap, without which it is impossible to identify the significant positive effect of reforms on growth. In addition to reform measurement itself, it is important to include variables assessing the situation of institutions and the initial conditions of economies.

E RESULTS OF THE ANALYSES

1 CYCLICAL AND STRUCTURAL ALIGNMENT

Greater similarity in economic structure and the business cycle between the Czech Republic and the euro area will lead to lower euro adoption costs. For the Czech economy, the risk of time misalignment or suboptimal intensity of the response of the single monetary policy to economic shocks will decrease. The functioning of the monetary policy transmission mechanism will also converge. The direct indicators of alignment (describing various aspects of similarity with the euro area) and the effect of international relations and the financial sector (which can increase or decrease alignment) are both monitored.

1.1 DIRECT ALIGNMENT INDICATORS

The principal direct alignment indicators are the development of domestic economic activity, the exchange rate and interest rates compared to the euro area. Convergence in economic and price levels increases the likelihood of similar processes proceeding in the economy and of there being no major differences in equilibrium development. High synchronisation of the business cycle increases the probability that economic developments will not differ substantially going forward. Disequilibrium pressures could stem, among other things, from different economic structures and from insufficient convergence at the interest rate level.

1.1.1 Real economic convergence

The degree of real convergence, as measured by GDP per capita at purchasing power parity and the relative price level of GDP derived from this parity, is a fundamental indicator of the similarity of two economies. A low degree of real convergence with the euro area may indicate numerous challenges as regards euro adoption, as it can be assumed that the gap in the degree of relative maturity will close further after entry into the monetary union. The real convergence process is often associated with convergence of price levels towards more advanced countries. The related real appreciation of the exchange rate vis-à-vis the euro may make fulfilment of the Maastricht convergence criteria more difficult.[16] Following the adoption of the euro, price convergence will imply a positive inflation differential compared to the euro area average because the option of a real strengthening of the exchange rate through nominal appreciation will be closed. One of the consequences will be lower real interest rates compared to the euro area average. Real interest rates may even be negative in some cases. Low real interest rates can have many favourable impacts, such as investment support, faster long-term convergence and lower public debt service costs. However, as the experience of many converging economies with fixed exchange rates in recent years shows, they can contribute to creating serious macro-financial imbalances such as excessive lending, property market bubbles and high current account deficits (Ahrend et al., 2008; Taylor, 2009; Martin, 2010).

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[16] The simultaneous restriction placed on the inflation differential and the appreciation of the nominal exchange rate represents an implicit restriction on the speed of appreciation of the real exchange rate. If the equilibrium real appreciation is faster than this restriction, the fulfilment of the convergence criteria may require a temporary undervaluation of the exchange rate. However, this problem is mitigated by the fact that the exchange rate criterion is significantly more tolerant of nominal appreciation than depreciation. Moreover, the increased emphasis laid in recent years on sustainable fulfilment of the price stability criterion means that a converging country – like Slovakia in 2009 – may be willing to adopt the euro with an overvalued real exchange rate so as to avoid inflationary pressures associated with price level convergence in the years following euro area entry.

As Table 1 shows, the convergence process of **GDP per capita at purchasing power parity** has not resumed yet. The level of Czech economic activity now stands at 73.5% of the euro area average. This is lower than in 2007, when Europe had yet to be hit by the deep economic crisis. It thus still lags well behind the advanced euro area countries under review (Austria and Germany). Slovenia also has a slightly higher economic level, although the difference has narrowed in the last five years. By contrast, some of the least advanced monetary union countries have lower GDP per capita than the Czech Republic (Slovakia and Portugal).[17] The same still applies to the new non-euro area EU Member States (Hungary and Poland).

Table 1: GDP per capita at purchasing power parity (EA-17 = 100)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
CZ	69.7	71.6	72.7	73.3	76.1	74.3	76.1	73.6	73.9	73.5
AT	116.2	117.4	115.1	115.5	113.6	114.3	115.3	117.4	119.1	121.8
DE	105.3	105.9	106.5	105.8	106.3	106.6	105.9	109.4	111.4	113.1
PT	71.9	70.8	73.1	72.5	72.1	71.7	73.7	74.3	71.7	69.8
HU	57.0	57.6	58.0	57.8	56.6	58.8	60.0	60.0	60.7	61.1
PL	44.3	46.6	46.9	47.7	50.0	51.8	55.7	57.7	59.6	61.1
SI	75.9	79.7	80.4	80.2	81.3	83.5	79.6	77.4	77.2	76.4
SK	50.4	52.1	55.1	58.1	62.1	66.5	67.1	67.5	67.6	69.8

Source: Eurostat, CNB calculations.

Table 2 illustrates the **price level of GDP**. The Czech Republic's level in terms of this indicator is higher than in the pre-crisis period, but has been flat since 2008. In 2012, the Czech price level was less than 70% of the euro area average, lagging well behind not only Austria and Germany, but also, to a lesser extent, Portugal and Slovenia. By contrast, Slovakia, and particularly Hungary and Poland, had a lower price level.

Table 2: Average price level of GDP (EA-17 = 100)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
CZ	50.5	51.5	56.0	59.6	60.9	70.8	66.0	70.0	70.5	69.3
AT	101.4	100.5	103.3	103.1	105.3	105.6	106.0	105.0	105.6	105.7
DE	105.1	103.0	101.0	100.9	100.9	100.6	101.6	100.8	100.2	100.4
PT	80.9	82.3	79.7	79.7	80.2	80.4	79.5	79.0	79.0	78.6
HU	54.5	57.7	60.4	58.5	63.4	63.8	56.2	58.2	58.2	56.4
PL	47.9	47.2	54.1	57.0	59.2	65.5	54.1	57.6	56.8	56.7
SI	72.2	70.4	71.3	73.2	76.4	78.6	80.9	81.1	80.3	79.4
SK	46.2	49.6	51.5	54.1	59.1	63.7	64.2	65.0	66.3	66.4

Source: Eurostat, CNB calculations.

An analysis of the empirical relationship between the price level of GDP and GDP per capita at purchasing power parity for 36 European countries[18] reveals that the Czech price level in 2012 continued to lie below the level corresponding to the performance of the economy. According to the estimated relationship, the Czech price level should be roughly 8 p.p. higher in relation to the euro area average, i.e. it should be roughly the same as in Slovenia or Portugal.

Table 3 presents the **evolution of the real exchange rate** against the euro. Between 2003 and 2012, the real exchange rate of the koruna appreciated by more than 30%, i.e. at an average rate of 3.1% a year. The rate of real appreciation of the Czech currency was distinctly

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[17] In Portugal, this largely reflects the problems which the country has been facing in recent years. This applies even more so to Greece, which was clearly ahead of the Czech Republic in 2010 and now lags behind it (69.8% of the euro area average). Estonia, with GDP per capita at purchasing power parity of 63.6%, is also less advanced than the Czech Republic. As from 2014, the same will hold true for Latvia. However, Greece, Estonia and Latvia are not monitored in the following parts of the Alignment Analyses.

[18] See the *Methodological Part* and Čihák and Holub (2003; 2005).

higher than in the current euro area countries under comparison except Slovakia. In the case of Germany, the real exchange rate actually depreciated somewhat, helping to increase its price competitiveness.[19] The Hungarian forint and Polish zloty have also appreciated less since 2003 than the Czech koruna. Since 2008, however, the real koruna-euro exchange rate has been broadly flat on average. Its medium-term fluctuations have contributed to economic stabilisation (depreciation during the recessions in 2009 and 2012 and appreciation during the recovery in 2010–2011).

Table 3: Real exchange rate against the euro (HICP deflated; 2002 = 100; average annual rate in %)

	Basic index (2002=100)										Avg. annual rate	
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2003–2012	Outlook[a]
CZ	95	95	101	106	109	125	118	123	126	124	3.1	(1,7 ; 2,3)
AT	99	99	99	98	98	98	98	99	99	99	0.0	(0,8 ; 1,5)
DE	99	99	98	98	98	98	97	97	97	96	-0.3	(0,8 ; 1,4)
PT	101	101	101	102	102	102	101	100	101	102	0.0	(-0,1 ; 0,2)
HU	98	103	106	102	113	116	108	113	113	112	1.5	(2,5 ; 3,4)
PL	86	85	96	98	101	110	93	102	100	99	1.5	(3,0 ; 4,1)
SI	100	99	99	100	101	103	104	104	104	104	0.4	(0,5 ; 0,5)
SK	109	119	124	131	145	157	164	163	165	167	4.8	(1,7 ; 2,3)

Note: a) Interval estimate of the average rate of equilibrium real appreciation for the next five years (see the *Methodological Part*).
Source: Eurostat, CNB calculations.

Continued equilibrium real appreciation can be expected for the currencies of the converging countries once the anti-growth impacts of the European debt crisis and domestic fiscal consolidation have faded away and long-term convergence is renewed. Interval estimates of equilibrium real appreciation for the next five years based on a panel estimation of price convergence (see the *Methodological Part* for details) are given in the last column of Table 3. The range for the Czech koruna is 1.7–2.3% and is higher than for most current euro area countries except Slovakia, for which the estimates are the same as those for the Czech Republic.[20] For countries outside the euro area, i.e. Hungary and Poland, the estimates are higher than those for the Czech koruna, reflecting their lower initial GDP per capita and the real depreciation of their currencies since 2008. The above range corresponds to the average inflation differential vis-à-vis the euro area which could be expected in the Czech Republic if the euro were to be adopted within the next five years. Assuming average euro area inflation of 2%, inflation in the Czech Republic could therefore increase to about 3.7–4.3% during the initial years following euro area entry. This would mean a marked increase in inflation compared to the 2% target set by the Czech National Bank as from 2010.

Owing to higher inflation, the Czech Republic and the other countries of the region would face lower **real interest rates** (see Table 4) compared to the average in the euro area and to most of the countries under review (Austria, Germany, Portugal and Slovenia) in the event of euro adoption. Short-term real money market interest rates could even be negative in the Czech Republic and in the other converging countries. In the Czech Republic, the real three-month interest rate would be -0.5–0.1% on average. On the other hand, the Czech Republic has had

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[19] The price levels of Germany and Austria are thus below the level corresponding to their GDP per capita in international comparison. For this reason, the estimates presented in Table 3 predict equilibrium real appreciation going forward, even though these countries are not converging economies. This could occur, for example, via low inflation or even deflation in other euro area countries which have lost price competitiveness and must now undergo a process of "internal devaluation". One such example is Portugal, whose price level is above the level corresponding to its GDP per capita and whose outlook does not suggest any real appreciation (not even if one assumes real GDP convergence, which will be difficult for this country to achieve in practice over the next few years).
[20] Starting with Inflation Report IV/2013, the CNB's forecasts work on the assumption of long-term equilibrium real appreciation of the koruna vis-à-vis the "effective euro area" at a rate of 1.5% a year.

low average real rates since 2003, so euro adoption would not generate a strong economic shock in this respect, unlike in the case of Hungary and Poland.

Table 4: Three-month ex-post real interest rates (%; HICP deflated)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Average[a]	Outlook[b]
CZ	2.3	-0.2	0.4	0.2	0.1	-2.1	1.6	0.1	-0.9	-2.4	-0.1	(-0,5 ; 0,1)
AT	1.0	0.2	0.1	1.4	2.0	1.4	0.8	-0.9	-2.1	-2.0	0.2	(0,3 ; 1,0)
DE	1.3	0.3	0.3	1.3	2.0	1.8	1.0	-0.3	-1.1	-1.5	0.5	(0,4 ; 1,0)
PT	-0.9	-0.4	0.1	0.0	1.8	1.9	2.1	-0.6	-2.1	-2.1	0.0	(1,6 ; 1,9)
HU	3.7	4.3	3.6	2.8	0.0	2.5	5.0	1.4	2.5	2.1	2.8	(-1,6 ; -0,7)
PL	4.9	2.5	3.0	2.9	2.1	2.1	0.4	1.2	0.6	1.2	2.1	(-2,3 ; -1,2)
SI	1.0	1.0	1.5	1.0	0.5	-0.9	0.4	-1.3	-0.7	-2.2	0.0	(1,3 ; 1,3)
SK	-2.1	-2.6	0.1	0.1	2.4	0.2	0.3	0.1	-2.6	-3.1	-0.7	(-0,5 ; 0,1)

Notes: [a] Average for 2003–2012.
[b] Estimated "equilibrium" real average interest rate for the next five years derived from the range of the estimated pace of equilibrium real exchange rate appreciation as set out in Table 3, assuming a zero money market risk premium and an equilibrium real interest rate in the euro area of 1.8%.

Source: Eurostat, CNB calculations.

Wages are another aspect of economic convergence. The evolution of wages in market economies is related mainly to labour productivity growth and the share of the service sector. Chart 10 compares the average annual wage with the figure for the euro area in 2012. The purchasing power of wages on the domestic market is described by the purchasing power parity (PPP) indicator, while the euro data converted using the market exchange rate reveal the external purchasing power and wage competitiveness of the economy. The chart shows a persisting large difference between the average wage level in the euro area as a whole and in Germany and Austria (and partly in Slovenia) on the one hand, and in the rest of the countries under comparison on the other hand. The wage level in the Czech Republic is just over 40% of the euro area average when converted using the exchange rate (compared to 28% in 2003) and roughly 60% using PPP data (up from just under 56% in 2003). Hungary, Poland and Slovakia have slightly lower wage levels. At the start of the global crisis in 2007–2008, the long-term convergence process also halted for wages. However, once the European debt crisis fades away, it can be expected that the renewed convergence of GDP and labour productivity will be accompanied by further wage catch-up with the advanced euro area countries.

Chart 10: Average annual wage in 2012 (EA-17 = 100)
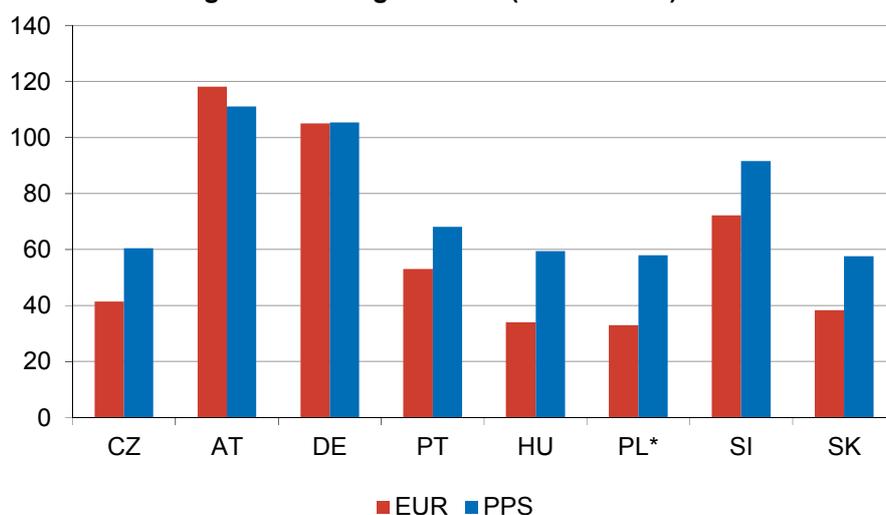
Notes: * Data for Poland for 2011. Data in PPP are preliminary.
Source: Eurostat, CNB calculations.

To sum up, the Czech Republic's convergence towards the euro area halted in 2008. It would thus not currently pose a major challenge to the functioning of the Czech economy within the monetary union. However, this does mean that going forward there is still room for faster growth in economic activity compared to the euro area average and for an increase in the relative Czech price level. The equilibrium real appreciation of the exchange rate associated with this process may thus still imply higher inflation compared to the core of the monetary union and low or even negative real interest rates in the event of euro adoption.

1.1.2 Correlation of economic activity

Upon euro area entry, domestic monetary policy decision-making independence will be replaced by a single monetary policy responding to economic developments at the monetary union level. For a country that is in a different phase of the business cycle than the euro area average, the monetary policy settings may be suboptimal and cause economic costs. From the point of view of the optimum currency area theory, the loss of independent monetary policy is thus less costly for a country with a more correlated business cycle. The following analysis focuses on the degree to which the cycles of the Czech economy and the other countries under review are similar to that of the euro area.

Chart 11 compares economic activity in the Czech Republic with that in the euro area both overall using annual real GDP growth and specifically in industry using the annual changes in the industrial production index (IPI).[21] In the pre-crisis period the Czech Republic recorded almost double the rate of growth of both GDP and the IPI compared to the euro area, but with the onset of the global financial crisis the growth rates levelled off. The gradual recovery from the crisis observed from 2009 onwards resulted in positive growth in 2010. Owing to the European debt crisis, both economies saw a renewed slowdown in economic growth in 2011 and a decline into negative values in 2012.

Chart 11: Year-on-year changes in real GDP and in the industrial production index (%)
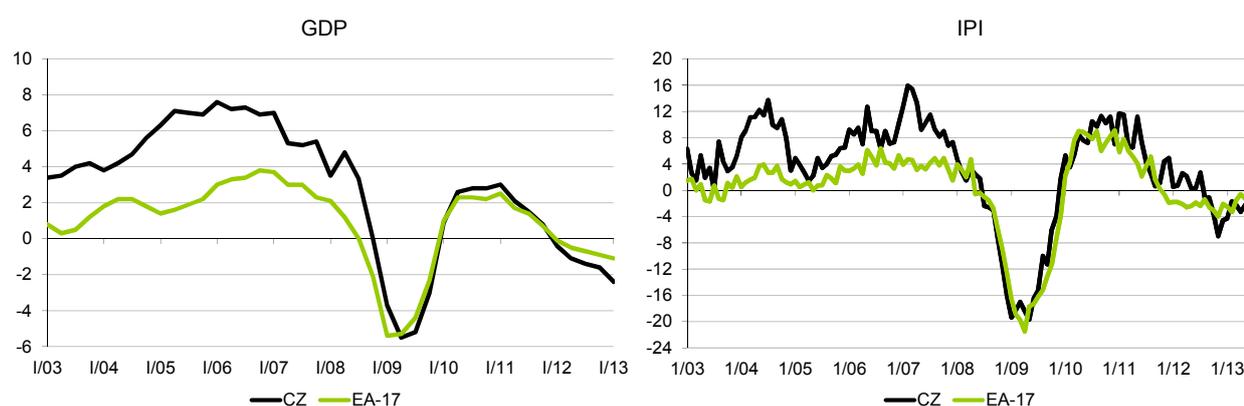
Source: Eurostat, CNB calculations.

Table 5 summarises the results of the **simple correlation analysis** for GDP and the IPI for various lags of the individual countries' time series compared to the euro area time series (lag

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[21] The industrial production index responds to changes in the economic environment more flexibly than total GDP. The information obtained by comparing the correlation of industrial production is only complementary, as industry typically accounts for less than one-third of total output in the advanced economies, and, moreover, the economies of the countries under comparison differ in terms of structure (see section 1.1.5). Boone and Maurel (1999) criticise the use of the industrial production index for analysing the similarity of economies and business cycles, because of its high volatility.

t to t-2Q for GDP and t to t-3M for the IPI). This method allows us to assess whether and with what lag the economic activity of the euro area is correlated with economic activity in individual countries and to what extent this mechanism changed with the onset of the crisis. To sum up, the correlation between the GDP and IPI of the euro area and the countries under review has been much higher since the financial crisis started than it was before the crisis. In comparison with other countries, the correlations measured for the Czech Republic can be evaluated as above average.[22] At the same time, the propagation of economic shocks seems to have accelerated. For example, in the first period the highest GDP correlation was, for most countries, measured with a lag of one quarter behind the euro area, whereas since the start of the crisis the maximum correlations have been attained with no lag. The rise in correlations can partly be attributed to deepening cyclical alignment. However, in the crisis and post-crisis period, it was also due to extraordinary negative shocks affecting every economy.[23]

Table 5: Correlation coefficients of economic activity – evolution over time

	GDP			GDP		
	2003Q1−2008Q3			2008Q4−2013Q1		
	t	t-1	t-2	t	t-1	t-2
CZ	0.23	**0.61 ****	0.51 **	**0.96 ****	0.53 **	0.12
AT	0.38 *	**0.61 ****	0.40 *	**0.66 ****	0.42 *	0.00
DE	**0.84 ****	0.67 **	0.48 **	**1.00 ****	0.45 *	-0.12
PT	**0.70 ****	0.57 **	0.46 **	**0.80 ****	0.24	-0.36
HU	0.12	**0.52 ****	0.22	**0.93 ****	0.50 **	0.23
PL	**0.53 ****	**0.53 ****	0.35	**0.53 ****	0.42 *	0.42
SI	0.55 **	**0.71 ****	0.52 **	**0.94 ****	0.51 **	0.08
SK	0.14	0.51 **	**0.54 ****	**0.80 ****	0.44 *	-0.23

	IPI				IPI			
	2003M1−2008M9				2008M10−2013M5			
	t	t-1	t-2	t-3	t	t-1	t-2	t-3
CZ	0.26 **	0.07	**0.36 ****	0.07	**0.40 ****	0.26 **	0.35 **	0.13
AT	0.31 **	-0.12	**0.38 ****	0.10	0.30 **	**0.46 ****	0.40 **	0.37 **
DE	**0.58 ****	-0.22 *	0.16	0.30	**0.79 ****	0.54 **	0.38 **	0.32 **
PT	**0.42 ****	-0.25 **	-0.05	0.23	**0.29 ****	0.12	0.27 **	-0.06
HU	0.07	**0.34 ****	0.05	-0.05	**0.35 ****	0.31 **	0.28 **	0.10
PL	**0.49 ****	-0.25 **	0.15	0.18	**0.23 ***	0.06	0.21 *	0.06
SI	0.12	0.02	0.02	0.23	0.34 **	**0.40 ****	0.21 *	0.03
SK	0.20	-0.05	0.08	0.10	0.21 *	**0.36 ****	0.20	0.04

Note: The calculation is based on the quarter-on-quarter/month-on-month differences in the logarithms of the data seasonally adjusted using the TRAMO-SEATS method. The significance of the correlation coefficient is marked ** and * for the 5% and 10% significance levels respectively. The columns indicate the lag of the given country's time series relative to the euro area time series. For example, t-1 denotes a lag of one period (quarter/month). The highest statistically significant correlations for each country in the period under review are highlighted in bold.

Source: Eurostat, CNB calculations.

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[22] The high correlations for Germany are due to the high share of its economy in total euro area GDP (30%). In this case too, however, the correlation increased between the two periods under review, while the share in euro area GDP remained flat. In the case of Austria, the low level is partly due to volatility in quarter-on-quarter GDP growth. If year-on-year data are used, the correlation increases but the order of the countries remains roughly the same.

[23] The measured correlations are conditional on the existence of a single monetary policy in the case of the euro area countries and the existence of own monetary policies in the case of the non-euro area countries. The correlations for the latter group are therefore not necessarily fully informative for the period after euro adoption.

Exports are the most important channel through which a small open economy such as the Czech Republic is linked with the euro area economy. The results of the analysis of the **correlation of exports to the euro area with euro area GDP** are summarised in Table 6. As in the case of overall economic activity, we can see a strong increase in correlation and faster propagation of fluctuations in the period since the outbreak of the crisis. In the pre-crisis period, the lag in the response of exports was about two quarters for most countries, including the Czech Republic, whereas recently the lag has mostly been zero. Hungarian and Polish exports are an exception from the trend, as they are not statistically significantly correlated with euro area GDP either in the first period or in the second period.

Table 6: Correlation coefficients of exports to the euro area with euro area GDP – evolution over time

	EXP to EA-17 vs. GDP EA-17					
	2003Q1−2008Q3			2008Q4−2013Q1		
	t	t-1	t-2	t	t-1	t-2
CZ	0.40 *	0.39 *	**0.45 ****	**0.91 ****	0.47 *	0.10
AT	0.37 *	0.34	**0.57 ****	**0.89 ****	0.37	-0.02
DE	**0.60 ****	0.42 **	0.58 **	**0.93 ****	0.66 **	0.05
PT	0.30	0.45 **	**0.51 ****	**0.97 ****	0.36	-0.39 *
HU	0.35	0.23	0.12	0.40	0.36	0.27
PL	**0.39 ***	0.08	-0.20	-0.19	-0.16	0.32
SI	-0.09	0.31	**0.50 ****	**0.87 ****	0.59 **	0.01
SK	0.31	**0.43 ****	0.28	**0.81 ****	0.53 **	0.08

Note: The calculation is based on the quarter-on-quarter differences in the logarithms of the data seasonally adjusted using the TRAMO-SEATS method. The significance of the correlation coefficient is marked ** and * for the 5% and 10% significance levels respectively. The columns indicate the lag of the given country's time series relative to the euro area time series. For example, t-1 denotes a lag of one quarter. The highest statistically significant correlations for each country in the period under review are highlighted in bold.

Source: Eurostat, CNB calculations.

Chart 12: Rolling correlations of economic activity
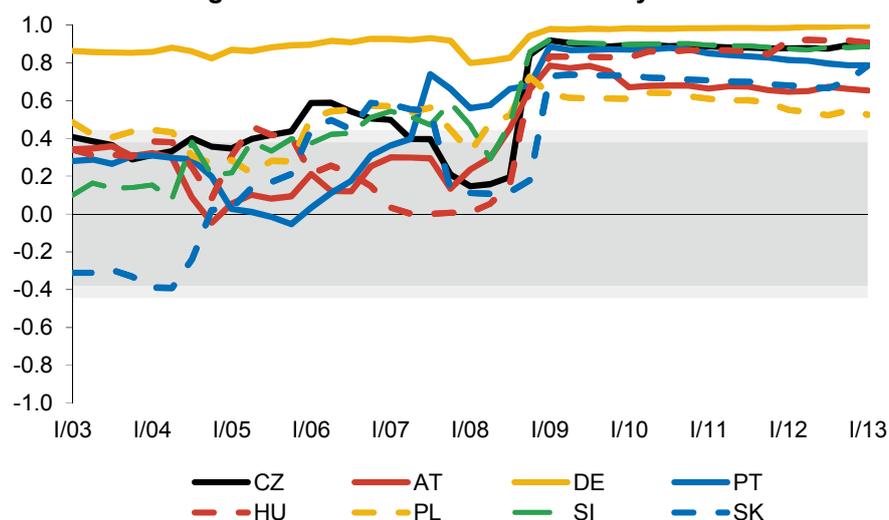
Note: The time data indicate the end of the rolling window of 5 years. The calculation is based on the quarter-on-quarter differences in the logarithms of the data seasonally adjusted using the TRAMO-SEATS method. The statistical significance of the correlation coefficients is indicated in the chart: values statistically significant at the 5% level lie in the white area of the chart, and values statistically significant at the 10% level lie in the white or light grey parts of the chart. Values in the dark grey part of the chart are not statistically significant at the 10% level.

Source: Eurostat, CNB calculations.

Supplementary information on the evolution of the correlation of economic activity over time is provided by an analysis of the correlation for moving five-year time periods (rolling correlation). Chart 12 shows the **rolling correlations** of real GDP growth. According to this method, the alignment has gradually increased over time. The correlation values have been positive and statistically significant for most of the countries under review since 2006. Following a dip in 2008 resulting from different timings of the impacts of the global financial crisis, the correlation of economic activity rose sharply and then remained unchanged. The Czech Republic currently has one of the highest correlations of the countries under review.

Chart 13 illustrates the **dynamic correlation** results based on spectral analysis of the time series of quarterly GDP changes. The aim of this method is to separate medium-term economic fluctuations, which correspond to the business cycle, from short-term and long-term movements of the variables describing economic activity. In the chart, the standard cycle length of 1.5–8 years is depicted by vertical dashed lines. The results of this analysis indicate a fundamental increase in the correlation in the second period across all the countries under review.

Chart 13: Dynamic correlations of economic activity (q-o-q changes in real GDP) with the euro area
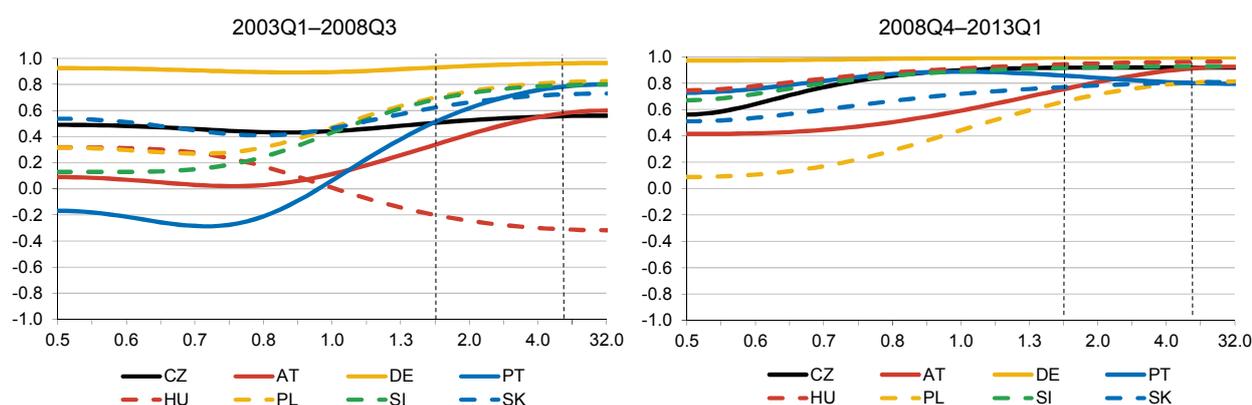
Note: The x-axis shows the spectrum of possible duration of the cycle in years on a logarithmic scale. The interval depicted by the two vertical dashed lines indicates the cycle length considered, i.e. 1.5–8 years. The calculation is based on the quarter-on-quarter differences in the logarithms of the data seasonally adjusted using the TRAMO-SEATS method.

Source: Eurostat, CNB calculations.

To sum up, the cyclical alignment of economic activity in the Czech Republic and the euro area has increased significantly compared to the pre-crisis period. This is evidenced both by the simple correlations of overall economic activity, industrial production and exports, and by the rolling and dynamic correlations of economic activity. However, the cyclical alignment has been greatly affected by exceptionally strong common shocks in the form of the real economic impacts of the global financial and economic crisis and European debt crisis. At the same time, it can be seen that the real convergence process in Central European countries has halted and the significance of idiosyncratic shocks has shrunk in the wake of the crisis. These countries are now following the euro area more closely and with a shorter lag. For this reason, the results from the recent period should be taken with a pinch of salt, as it is not clear whether the increased business cycle alignment will persist once European economies get back to normal.

1.1.3   Structural similarity of the economies

Greater similarity of the structure of economic activity between an acceding economy and the monetary union reduces the risk of occurrence of an asymmetric shock. The structural similarity of the economies of the countries under comparison with the euro area can be

measured using the **Landesmann index**, which compares the shares of the ten main sectors of the economy in total value added between the countries under comparison and the euro area. The index takes values in the range [0, 1]. The closer the index is to zero, the more similar is the structure of the economies under comparison. Chart 14 shows that the Landesmann index has long been relatively high for the Czech Republic and is increasing over time, i.e. the structural differences are significant and growing over time. The largest increase in structural differences between the Czech Republic and the euro area was recorded in 2003–2008. A return to a rising path was observed in 2010. In 2012, the structure of economic activity in the Czech Republic, together with Slovakia and Poland, was the least similar to the euro area average of all the countries compared. The difference in GDP structure in the above economies consists mainly in a high share of industry and in a slightly lower share of value added in services (sectors K–U; see Chart 15). In Poland it also reflects a higher share of wholesale and retail trade, transport, accommodation and food service activities (sectors G–I). Slovenia recorded a slight decline in the Landesmann index in 2012 compared to 2011, while the structural similarity in Slovakia, the Czech Republic and Austria fell somewhat.

Chart 14: Structural similarity vis-à-vis the euro area
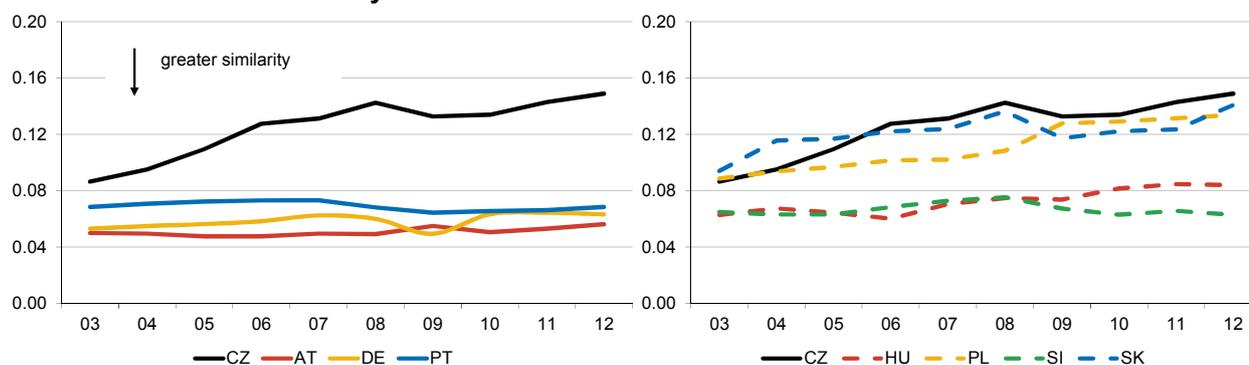
Source: Eurostat, CNB calculations.

Chart 15: Shares of economic sectors in GDP in 2012 (%)
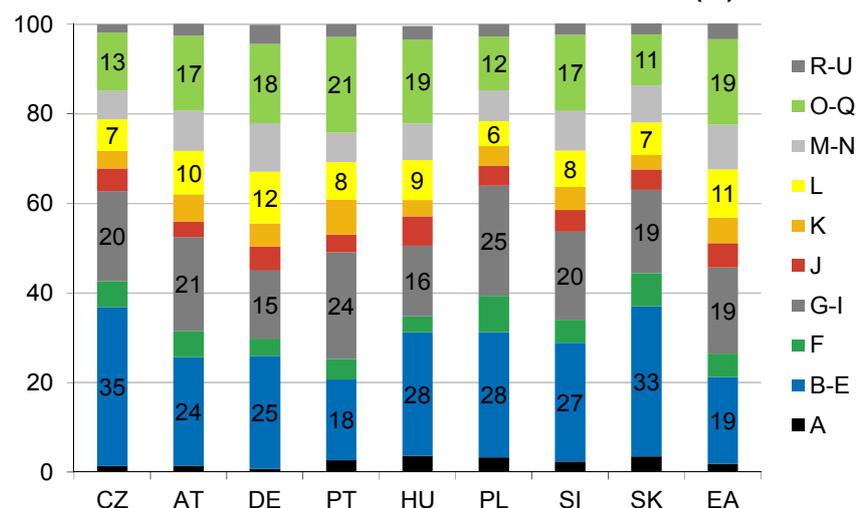
Note: The sectors are broken down according to the NACE classification: A – Agriculture, forestry and fishing, B–E – Industry (except construction), F – Construction, G–I – Wholesale and retail trade, transport, accommodation and food service activities, J – Information and communication, K – Financial and insurance activities, L – Real estate activities, M–N – Professional, scientific and technical activities; administrative and support service activities, O–Q – Public administration, defence, education, human health and social work activities, R–U – Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organisations and bodies.

Source: Eurostat, CNB calculations.

The high share of industry (car manufacture in particular) and the lower share of services compared to the euro area may lead to asymmetric shocks to which the monetary policy is unable to respond in full. The relatively low structural similarity of the Czech economy to that of the euro area thus creates a risk with regard to adopting the single currency.

1.1.4 Interest rate convergence

Some countries entering the euro area faced fast nominal interest rate convergence[24] to the union level, which acted as an asymmetric shock manifesting itself, for example, in the emergence of property market bubbles and weaker fiscal discipline. Earlier nominal interest rate convergence – gradual and based on fundamentals – is thus better for smoother accession to the euro area, as it will not leave room for the asymmetric shock associated with euro adoption and sudden elimination of the risk premium.[25]

The following comparison of the **nominal interest rate differential** vis-à-vis the euro area/Germany[26] reflects the probability of the asymmetric shock described above. The closer the nominal interest rate differential is to zero, the smaller is the risk that joining the monetary union will cause a rapid change in both nominal and real interest rates, which would have a destabilising effect on the economy.

Chart 16: Differences in three-month interest rates vis-à-vis the euro area (p.p.)
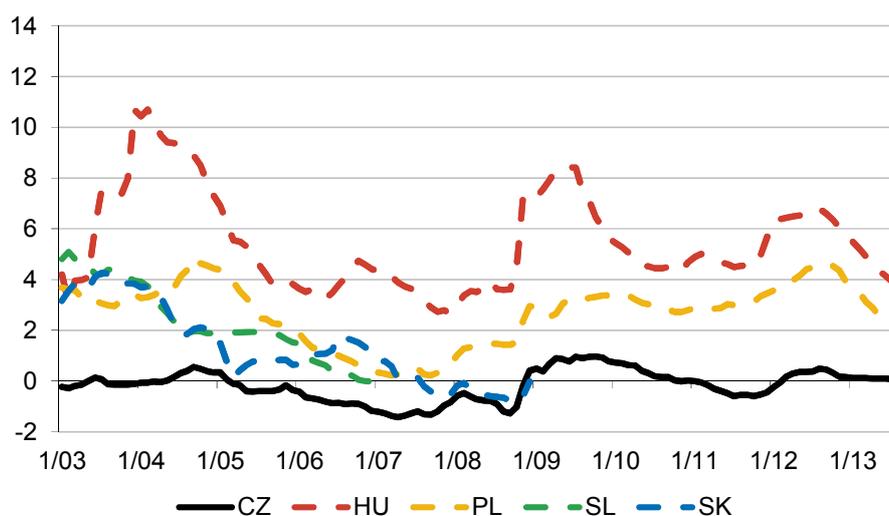
Source: Datastream, CNB calculations.

Chart 16 shows the nominal interest rate differential for short-term rates. Convergence can be seen for all the countries under review until 2008 Q3. The subsequent financial turbulence led to an increase in the spreads for Poland and Hungary, while in the Czech Republic the short-term interest rate differential did not deviate far from zero and even turned slightly negative in many cases. The differential remains at 0.1 p.p. in mid-2013, while being 2–4 p.p. in the other two Central European economies under review.

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[24] Although real economic activity is affected primarily by real interest rates, nominal interest rates may also have a significant effect via some credit or budgetary constraints (e.g. the loan repayment to financial income ratio).
[25] See also section 1.1.1.
[26] EURIBOR is used as the reference rate for short-term rates. German government bond rates are used for long-term rates. The long-term rates of some euro area countries have been showing extreme values in recent years, so the euro area average influenced by such countries cannot be considered a suitable benchmark.

Chart 17 shows the interest rate differentials for ten-year government bonds. As with money market rates, the long-term interest rate differentials were close to zero in the Czech Republic, Slovakia and Slovenia in the pre-crisis period. In 2009, however, bond yields surged and the differentials vis-à-vis German assets widened. The euro area debt crisis led to a further decline in German bond yields and hence a widening of the differentials. In mid-2013, long-term rates in the Czech Republic remain closest to Germany's levels, followed by rates on Slovak bonds. The yield differentials in Hungary and Slovenia are currently at around 4 p.p.

Chart 17: Differences in ten-year interest rates vis-à-vis Germany (p.p.)
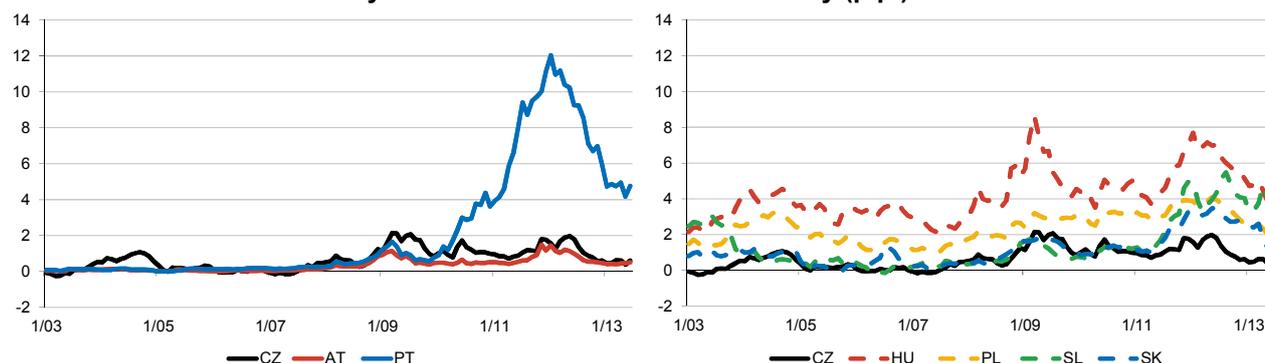
Source: Eurostat, CNB calculations.

To sum up, Czech nominal interest rates have long been close to rates in stable euro area countries and so do not create a risk of a rapid fall in rates and related generation of macroeconomic imbalances and threats to financial stability upon euro adoption. This also indicates that financial markets view the Czech Republic's government debt situation as sustainable.

1.1.5 Alignment of the exchange rate

Similar movement in the exchange rates of two currencies in the long term vis-à-vis a third (reference) currency reflects similarity in the factors which affect those exchange rates. A high **exchange rate correlation** of two currencies vis-à-vis a reference currency can thus be an indicator that the two countries could share a single currency.[27] The following analysis uses a GARCH model to estimate the correlation between the exchange rates of the Czech koruna, the Hungarian forint and the Polish zloty on the one hand and the euro on the other hand vis-à-vis the US dollar.[28] A high degree of correlation reflects high similarity of exchange rate movements and less intense asymmetric pressures; the exchange rate correlation of currencies in a monetary union would be one.

Chart 18 plots the correlation coefficients for the new EU member countries under review which have not yet adopted the single currency. In the long run, the correlation between the Czech koruna and the euro is the highest and most stable of the three currencies under review although a minor decline was observed from August 2012 to mid-2013. By contrast, the largest fluctuations in the correlation coefficient were recorded by the Hungarian forint.

To sum up, the relatively high correlation between the exchange rate of the Czech koruna against the dollar and the exchange rate of the euro against the dollar observed in recent

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[27] See Aguilar and Hördahl (1998).
[28] GARCH estimates of the correlations of the Slovenian tolar and the Slovak koruna until joining the monetary union can be found in previous issues of this publication.

years suggests that the Czech currency responds to changes in the external environment outside the euro area similarly as the euro, indicating a high degree of alignment.

Chart 18: Correlation coefficients of exchange rates against the US dollar

CZK/USD and EUR/USD

HUF/USD and EUR/USD

PLN/USD and EUR/USD

SKK/USD and EUR/USD
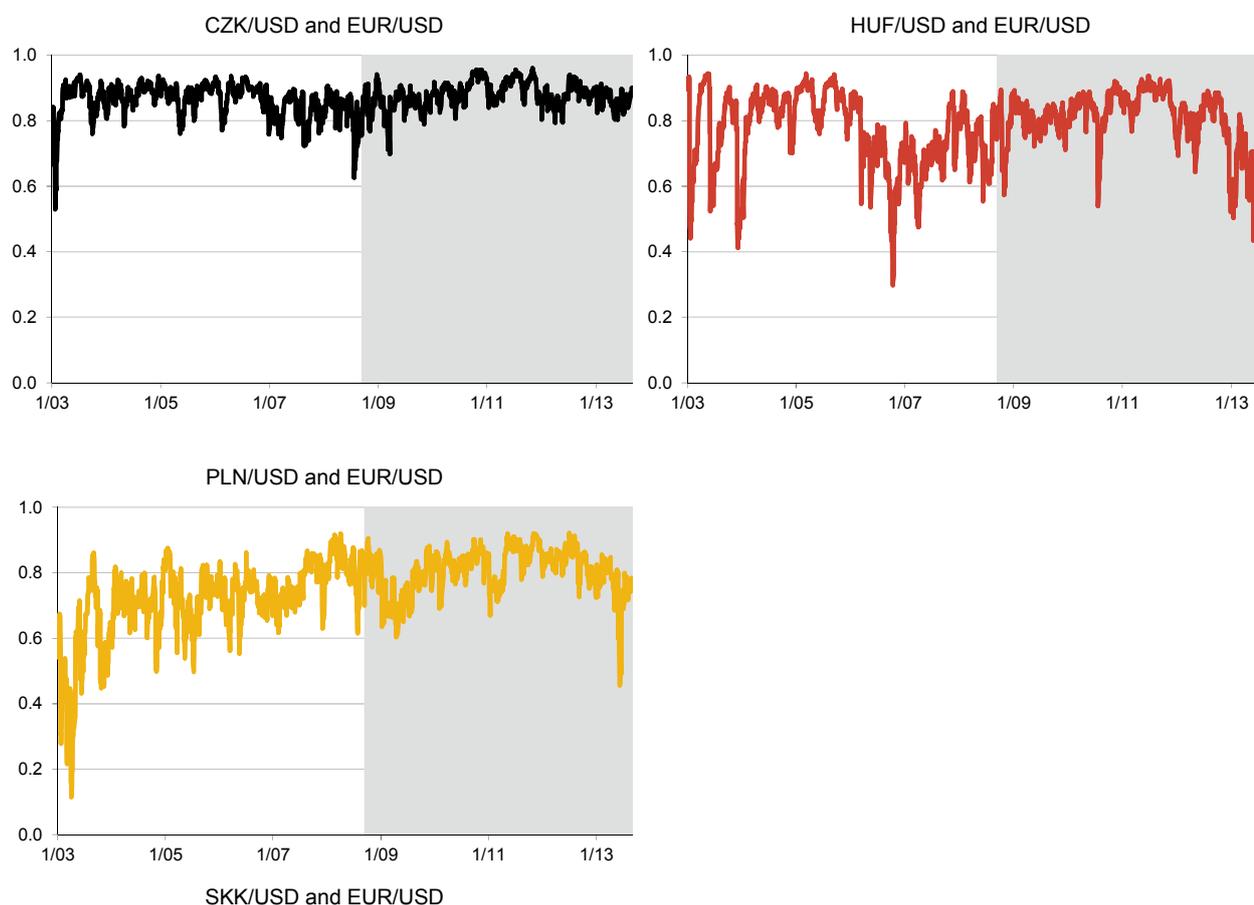
Note: The grey colour of the background marks the period since the crisis began.
Source: Thomson Datastream, Eurostat, CNB calculations.

1.1.6   Analysis of exchange rate volatility

Another way of assessing the risk of occurrence of asymmetric shocks in the Czech economy vis-à-vis the euro area is to analyse exchange rate volatility. Low volatility of the exchange rate between two countries may be regarded, under the current floating exchange rate regime, as an indicator of their potential to share a single currency (see also section 1.1.5).

Chart 19 describes the historical volatility of selected countries' exchange rates vis-à-vis the euro. The volatility indicator is the **annualised standard deviation of daily returns** for the last six months. The volatility of the Czech koruna has been significantly lower than that of the currencies of the other Central European countries over the past decade, despite the use of foreign exchange interventions in the other countries.

Chart 19: Historical volatility of exchange rates vis-à-vis the euro (%)
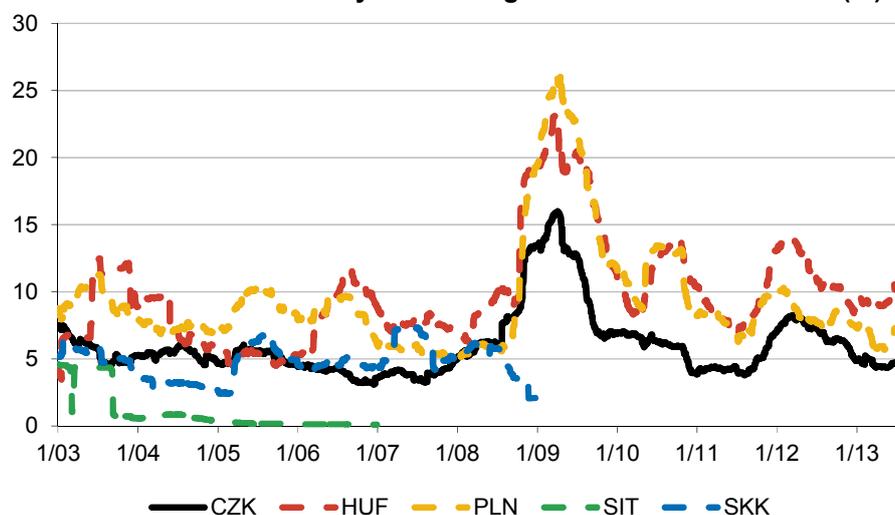
Note: Six-month annualised historical volatility of daily returns.
Source: Datastream, CNB calculations.

Although all Central European currencies saw an increase in volatility due to the global financial and European debt crisis, the impact on the Czech currency was the smallest. The historical volatility of the currencies under review has been declining since the start of 2012. The first half of 2013 saw a decline in the historical volatility of the Czech koruna below the average value for the period from January 2003 to June 2007.

Chart 20: Implied volatility of exchange rates vis-à-vis the euro (%)
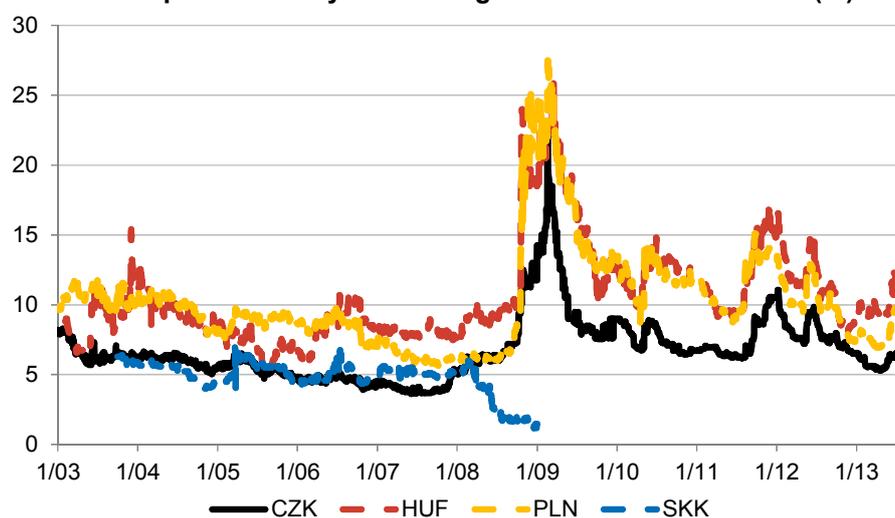
Source: Datastream.

An outlook for **exchange rate volatility** can be derived from financial market data. Chart 20 shows the movements in the expected volatility of the exchange rates of the countries under review as reflected in the prices of options for the individual currencies (implied volatility). The relatively similar volatility in Central European economies, especially in the post-crisis period,

suggests a spillover effect among Central European currency markets.[29] As in the case of historical volatility, the indicator of implied volatility for the Czech koruna was the lowest on average in the period under review.[30] The implied volatility of all three Central European currencies has been decreasing since the start of 2012 and, despite a temporary slight increase, has been close to the levels usual in the pre-crisis years.

To sum up, except during the financial crisis, the volatility of the koruna's exchange rate against the euro was relatively low and stable, which is a favourable factor for euro adoption. At the same time, the relatively high volatility immediately before the crisis and after its onset largely reflects desirable dampening of the impacts of economic shocks on the Czech Republic via the exchange rate.

1.1.7 Integration of the economy with the euro area

The degree of integration of an economy into trade and ownership relations with the monetary union states is crucial for assessing the benefits and costs of the single currency. Greater integration into trade with euro area countries increases the potential benefits of joining the monetary union, as the adoption of the single currency reduces the exchange risk and transaction costs of such trade. At the same time, greater intensity of international economic relations usually leads to greater synchronisation of economic shocks, higher cyclical alignment and hence lower costs of the single monetary policy.[31]

International trade with the euro area

Greater trade integration increases the benefits of the single currency and simultaneously magnifies the transmission of shocks between economies. The **intensity of trade** between the countries under review and the other euro area countries is shown in Charts 21 and 22. The share of exports to the euro area in total exports is very high in the Czech Republic,[32] higher than in any of the other economies under review; only Portugal has a comparable level. The share for imports is similarly high, reaching the highest levels of the countries under review along with Portugal and Austria. These relatively high shares have stayed essentially unchanged in recent years despite a gradual downward trend as exporters have tried to penetrate emerging markets and non-European countries in general, which have been hit less hard by the global economic crisis.

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[29] According to Bubák, Kočenda and Žikeš (2011), the volatility spillover effects among markets are marked between the Polish and Czech currencies, while the MNB's interventions on the Hungarian foreign exchange market have dampened the effects on this currency. An overall increase in the spillover effect is apparent in the post-crisis period.

[30] The CNB (2009) estimates fundamental-based (i.e. theoretically expected) exchange rate volatility; the situation for Slovakia and Slovenia is hypothetical. It can be said that the lower the fundamental-based exchange rate volatility, the higher the ability of two countries to share a common currency (for more details, see, for example, Horváth, 2005).

[31] Closer trade links thus foster higher correlation of economic activity within a single currency area (Frankel and Rose, 1997). On the other hand, higher trade intensity may lead to growing specialisation and decreasing structural similarity and thus to less economic symmetry (Krugman, 1993).

[32] Six countries of the monetary union account for almost 90% of the Czech Republic's trade with the euro area. Slovakia accounts for 12%, followed by Austria, France, the Netherlands and Italy each with around 6–7%.

Chart 21: Shares of exports to the euro area in total exports (%)
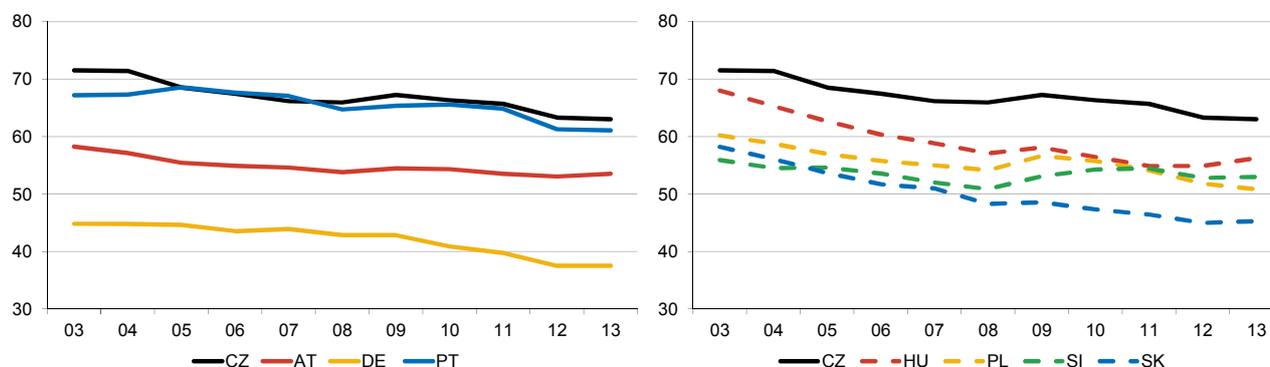
Note: The preliminary value for 2013 was calculated from the data for the first seven months of 2013. Data are not available for Hungary and Poland for July 2013. The euro area is defined in its current composition (EA-17) over the entire period under review.

Source: Eurostat, CNB calculations.

Chart 22: Shares of imports from the euro area in total imports (%)
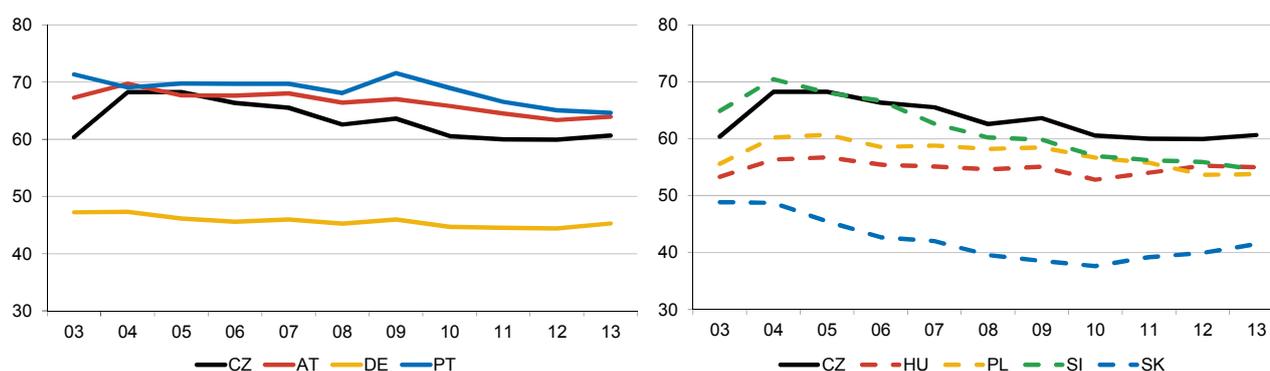
Note: The preliminary value for 2013 was calculated from the data for the first seven months of 2013. Data are not available for Hungary and Poland for July 2013. The euro area is defined in its current composition (EA-17) over the entire period under review.

Source: Eurostat, CNB calculations.

The statistics on **intra-industry trade** (international trade within a single industry) give a more detailed view of trade. Intra-industry trade is usually significant between countries with a similar factor structure and is thus another indicator of the structural similarity of economies. Strong intra-industry trade fosters cyclical convergence[33] and can also affect the economy's ability to absorb economic shocks.[34] The theory of intra-industry trade assumes the greatest intensity of intra-industry trade in capital- and research-intensive industries, which can benefit most from economies of scale; as a rule these are industries with high market concentration. On the other hand, the lowest level can be expected in industries associated with natural resources. To analyse intra-industry trade we used the Grubel-Lloyd index, which indicates the share of the absolute amount of intra-industry trade with the euro area in total foreign trade turnover. Chart 23 plots this indicator for the countries under review.

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[33] Frankel and Rose (1997). For the theory of intra-industry trade see also Krugman (1981) and Hoekman and Djankov (1996).
[34] Among other things, intra-industry trade growth may have a positive effect on the costs and speed of restructuring, since the transfer of resources may be faster and less expensive if effected within an industry than between industries. An increase in the proportion of intra-industry trade (horizontal in particular) after accession to a monetary union may also indicate refutation of the specialisation hypothesis based on inter-industry foreign trade.

Chart 23: Intensity of intra-industry trade with the euro area under SITC5
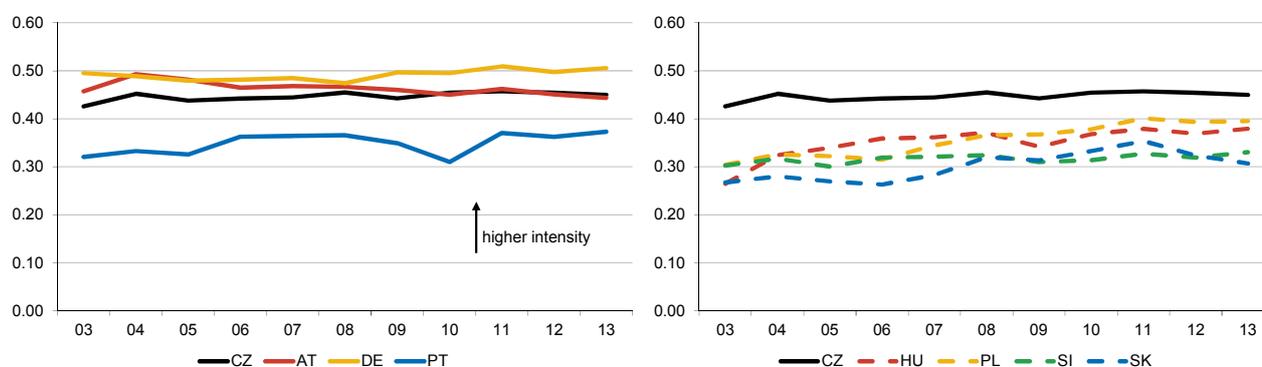
Note: The results were calculated using the five-digit SITC classification. The preliminary value for 2013 was calculated from the data for January–July 2013.

Source: Eurostat, CNB calculations.

The SITC5-based Grubel-Lloyd index showed a more or less unchanged situation for the Czech Republic and a slight upward trend for the other Central European countries in 2003–2013, the exception being Austria (where it declined slightly). The Grubel-Lloyd index values for the Czech Republic are still among the highest of the countries under comparison and are similar to those in Austria. The Czech Republic is therefore characterised by an above-average share of intra-industry trade with the euro area compared to the other countries.

Table 7: Grubel–Lloyd indices for 2012 by degree of aggregation

	SITC 1	SITC 2	SITC 3	SITC 5
CZ	0.77	0.68	0.59	0.45
AT	0.77	0.69	0.62	0.45
DE	0.77	0.69	0.61	0.50
PT	0.70	0.60	0.50	0.36
HU	0.79	0.64	0.54	0.37
PL	0.81	0.66	0.54	0.39
SI	0.72	0.59	0.46	0.32
SK	0.73	0.62	0.47	0.32

Note: SITC 1, 2, 3 and 5 represent the one-, two-, three- and five-digit SITC breakdowns.

Source: Eurostat, CNB calculations.

Foreign trade thus remains a wide channel for the transmission of economic impulses from the euro area to the Czech economy. Volatility in euro area demand has been the main source of the business cycle in the Czech Republic in recent years. This link creates potential for large benefits stemming from the removal of exchange risk and from transaction cost savings upon euro adoption, and has therefore long been one of the most significant arguments for the Czech Republic's joining the euro area.

Foreign direct investment

Ownership links also foster higher alignment of economic activity. If domestic companies are part of multinational groups, this may help to transmit economic impulses.[35] In addition, capital integration between two countries can help to dampen negative unilateral demand

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[35] Thanks to the penetration of technology, foreign investment also has a favourable effect on the productivity of domestic firms (Javorcik, 2004; Havránek and Iršová, 2010); the high investment volumes from the euro area are therefore furthering convergence.

shocks. Ownership links with the euro area are measured by the share of **foreign direct investment** (FDI) from the euro area in the countries under review in GDP (see Table 8) and by the share of direct investment (DI) from the surveyed country in the euro area in GDP (see Table 9).

Table 8: Shares of FDI from the euro area in GDP (%)

	2003	2004	2005	2006	2007	2008	2009	2010	2011
CZ	36.7	37.2	41.3	42.8	47.0	50.0	51.6	53.0	48.5
AT	11.8	14.3	20.0	24.5	28.7	27.2	30.0	24.6	22.3
DE	15.6	14.7	15.1	16.1	16.4	16.8	17.8	17.5	-
PT	18.9	19.6	21.8	26.7	31.4	25.4	31.9	-	-
HU	34.8	37.3	36.9	42.6	51.4	43.1	50.6	51.1	47.0
PL	17.7	23.3	23.4	26.1	28.7	23.9	30.6	33.6	30.6
SI	12.2	13.9	14.9	15.9	22.6	23.7	23.4	23.5	24.6
SK	28.1	29.7	33.9	34.8	34.5	37.3	44.6	44.9	43.7

Source: Eurostat, national central banks for the Czech Republic, Austria, Germany and Slovakia, CNB calculations.

The share of FDI from euro area countries in GDP in the Czech Republic is the highest among the countries under comparison, despite a slight decline in 2011.[36] Hungary and Slovakia have similar shares of direct investment in GDP and also display similar trends: a rising share until 2010 and a decline in 2011.

Table 9: Shares of DI in the euro area in GDP (%)

	2003	2004	2005	2006	2007	2008	2009	2010	2011
CZ	1.6	1.7	1.8	2.2	3.1	5.0	5.1	5.8	5.1
AT	7.0	7.4	8.5	10.6	11.7	13.2	13.7	16.0	17.4
DE	11.2	10.9	11.8	12.6	14.1	15.5	18.7	18.9	-
PT	9.7	10.5	11.6	12.9	13.6	-	13.6	-	-
HU	1.5	2.7	3.8	4.4	4.5	4.7	4.5	3.5	3.8
PL	0.4	0.6	0.5	1.7	1.6	1.9	2.8	4.3	5.4
SI	1.3	1.7	1.8	1.9	1.9	1.9	1.9	1.6	1.6
SK	0.2	-0.3	-0.4	0.2	0.3	0.9	1.1	1.4	1.1

Source: Eurostat, national central banks for the Czech Republic, Austria, Germany and Slovakia, CNB calculations.

Ownership links defined in the other direction, i.e. direct investment from the countries under review in the euro area as a percentage of their GDP, are so far still low in the case of the new EU members.[37] Moreover, this percentage declined for the Czech Republic in 2011 and was outpaced by the ratio for Poland, where the share of direct investment to the euro area in GDP increased by more than one percentage point in the same year.

The Czech economy's intensive economic integration with the euro area, coupled with its high degree of openness, increases the probability of alignment. This is confirmed by developments in recent years. The decline in economic integration observed in the last year under review seems to have been just a blip and the Czech Republic still shows the greatest degree of ownership links of all the new EU Member States under review.

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[36] According to CZSO data (2013 Q2), the share of foreign-controlled corporations in the non-financial sector can be estimated at about 52% of the sector's total gross value added. However, the data used cover only about 80% of the sector's total value added. In addition, they relate solely to direct ownership, not to the final ownership structure of corporations. So, if, for example, a Czech owner controls a corporation in the Czech Republic through a foreign intermediate owner, that corporation is registered as a foreign-controlled corporation.

[37] The stock of Slovak investment in the euro area in 2004 and 2005 was even slightly negative, as credit relations were dominated by liabilities of Slovak parent companies to their subsidiaries in the Netherlands.

1.2 SIMILARITY OF MONETARY POLICY TRANSMISSION

An important issue when assessing entry into a monetary union is the extent to which similar transmission of the single monetary policy can be expected. Given the high degree of alignment of real economic activity and strong links between the Czech economy and the euro area core, the chances are relatively high that the European Central Bank's single monetary policy would often be in line with the needs of the Czech economy. However, to take advantage of this possible benefit, monetary policy transmission, i.e. the transmission of an impulse from monetary policy rates (or other instruments) through the money market, client rates, loan demand and supply, and investment and consumer decision-making of corporations and households, to real economic activity and inflation, needs to be similar to the transmission mechanism in the entire euro area.

This section presents analyses of alignment in areas relating to monetary policy transmission. These areas include similarity of the financial system, the structure of assets and liabilities of households and corporations, the relationship between market and client rates, the degree of financial market integration, inflation persistence and the degree of euroisation of the Czech economy.

1.2.1 Financial system

The **depth of financial intermediation** in the Czech Republic remains low relative to the euro area. The ratio of financial institutions' assets to GDP was around 160% in the Czech Republic and almost 600% in the euro area in 2012. The significance of the financial sector thus remains much higher in the euro area than in the Czech Republic; in this respect, the domestic financial system is rather comparable with that in Hungary, Poland or Slovakia (see Chart 24).

Chart 24: Depth of financial intermediation (assets of financial institutions as % of GDP, 2012)
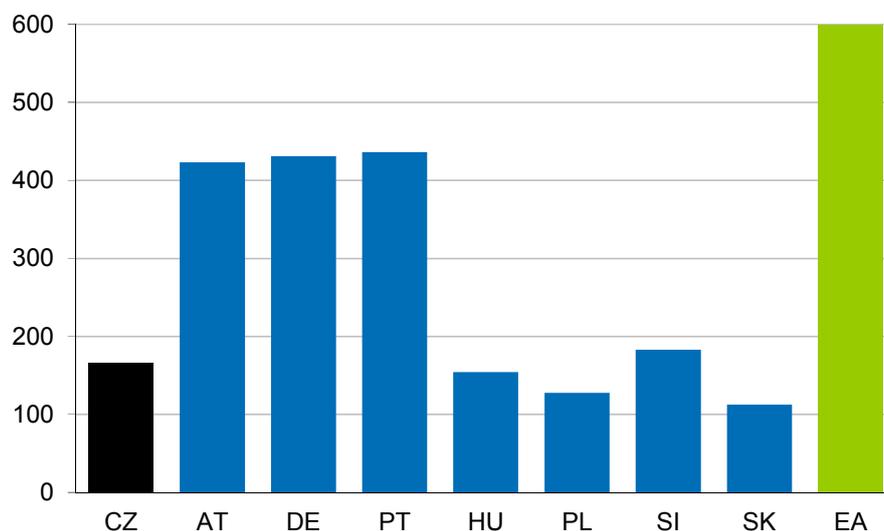
Note: The euro area value exceeds the other countries in the charts owing to the large volume of assets of financial corporations in Luxembourg, Ireland, the Netherlands and France both as a percentage of their GDP and in comparison with the total financial assets of the euro area.

Source: CNB, ECB, Eurostat, central banks

As the annual growth rate of financial intermediation suggests, the degree of financial intermediation increased in both the Czech Republic and the euro area in 2012 (see Chart 25). In both cases, this was due mainly to a rise in the assets of the financial sector rather than a

decline in GDP, which remained flat year on year in nominal terms in both the Czech Republic and the euro area in 2012. Growth in the depth of financial intermediation was 3.6 p.p. higher on average in the Czech Republic than in the euro area in year-on-year comparison.

Chart 25: Growth in financial intermediation (annual change in ratio of assets of financial institutions to GDP, %)
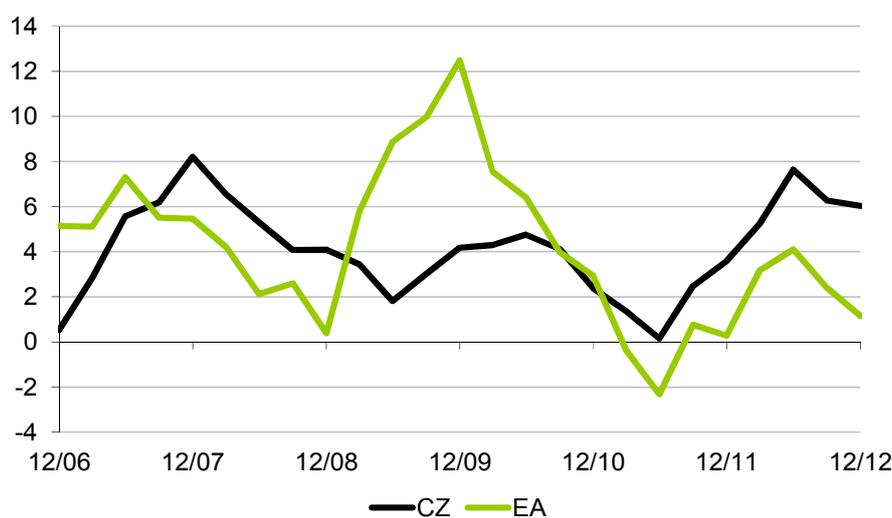
Source: CNB, ECB.

Although financial intermediation in the Czech Republic is still at a relatively low level, the depth of financial intermediation in the euro area cannot be considered a target to which the Czech financial sector should converge. On the contrary, a too large financial sector can represent a substantial risk, limiting the ability of institutions or states to solve current and other potential problems in the financial system.

The depth of financial intermediation is closely linked to the **private sector indebtedness.** Czech households and corporations remain significantly less indebted than their euro area counterparts and are comparable more with Central European countries such as Hungary, Poland and Slovakia in this respect (see Chart 26). Although loan growth in the Czech Republic has slowed considerably from the pre-crisis levels in 2005–2007 (around 15% annually) as a result of the global financial crisis, it has stayed positive, unlike in many euro area countries. For this reason, debt of the private sector in the Czech Republic has continued to edge up in recent years, reaching 57% of GDP in 2012.

The uncertainty surrounding future developments in the global and domestic economy is an important factor affecting the supply of, and demand for, loans. This uncertainty has played an important role in the last five years and its effect persists, albeit to a lesser extent, also in 2013. It can be assumed that private sector debt in the Czech Republic is still below its long-term equilibrium level and convergence to it will continue only when the economy recovers.[38] By contrast, numerous euro area countries are showing signs of overleveraged private sector, and a gradual decline in the private sector debt in these states may also aid convergence.

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[38] See Geršl and Seidler (2011).

Chart 26: Private sector debt (% of GDP)
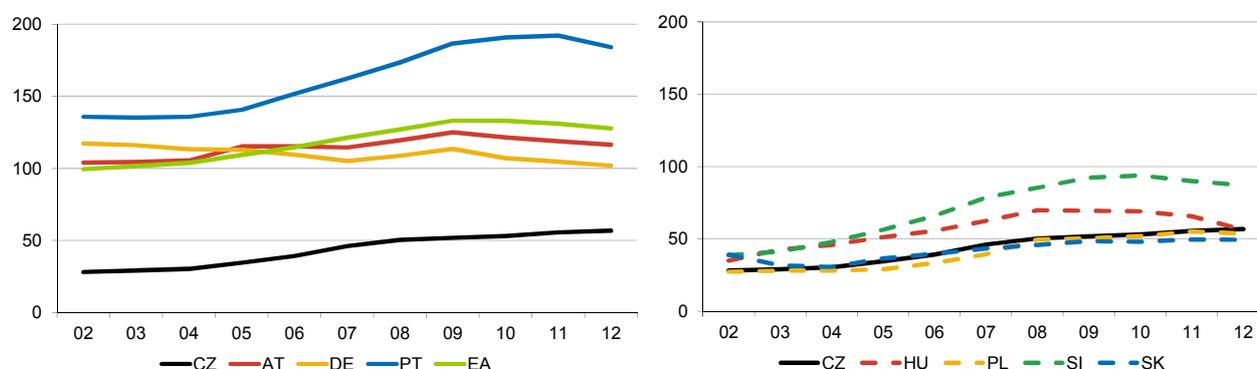
Note: EA represents the average of the euro area member countries weighted by the size of GDP.
Source: IMF IFS, Eurostat.

1.2.2 Structure of financial assets and liabilities of corporations and households

A similar financial position and structure of financial assets and liabilities of real sectors of individual economies is a key condition for the single monetary policy to have a symmetric effect and for the transmission mechanism to function. The financial position, as expressed by net financial assets, can be used to compare to what extent the sectors of non-financial corporations and households in individual countries are able to finance other sectors and to what extent they need the funds of other sectors to finance their activities. Given the different responses of different financial asset and liability items to a monetary policy impulse, it is necessary to compare not only the level, but also the structure of the net position. Owing to the links between balance sheet items across sectors, a look at the financial balance sheets of real sectors also provides information about the link to the financial sector and especially to the banking sector, whose exposure to real sectors is high in all the economies under comparison on both sides of the balance sheet.

Chart 27: Ratios of net financial assets of non-financial corporations to GDP (%)
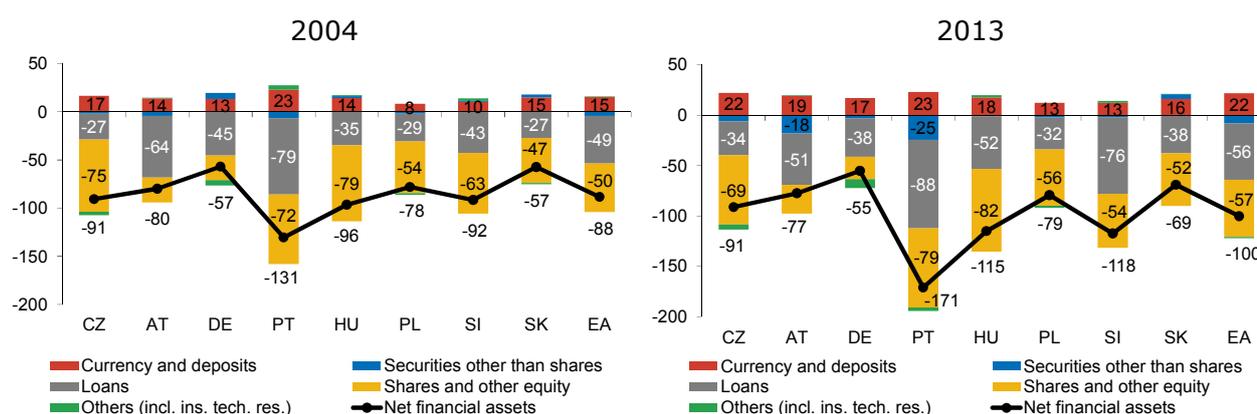
Note: Data are available from 2004 onwards. The 2004 and 2013 data are for Q1.
Source: ECB, CNB calculations.

Chart 27 shows the **net financial assets of non-financial corporations** as a percentage of GDP. The net debtor position of the non-financial corporations sector, which is due largely to a large proportion of non-financial assets in the balance sheet, increased in most countries

compared to 2004. The deterioration in the net position was fostered largely by an increase in loan debt. In the Czech Republic, by contrast, the net position of corporations remained unchanged while Germany and Austria saw a slight increase coupled with a decline in loan debt. As regards the level of corporate loan debt, the Czech Republic is comparable to Germany but below the euro area level. Debt also increased in the other non-euro area countries compared to 2004. Hungary is now almost at the euro area average.

Unlike in the advanced euro area countries, shares have a higher weight in the net debtor position in the other countries (including the Czech Republic). This is due mainly to a far lower proportion of shares in financial assets, related to lower ownership links between corporations and other non-financial corporations both in the domestic economy and, in particular, abroad. Although debt securities have a slightly higher weight in corporate financing in the Czech Republic and in some of the euro area countries under review (Austria and Portugal in particular) compared to 2004, they still contribute to corporate financing to a relatively limited extent. Currency and deposits of non-financial corporations recorded an increase in all the countries under comparison compared to 2004. Their ratio to GDP in the Czech Republic is comparable to that in the euro area.

Unlike non-financial corporations, the **household sector** is in a net creditor position (see Chart 28). The ratio of the net creditor position of households to GDP increased slightly in all the countries under review except Poland. The net financial position of Czech households was about half that in the euro area, corresponding to about half the level of financial wealth.

Chart 28: Ratios of net financial assets of households to GDP (%)
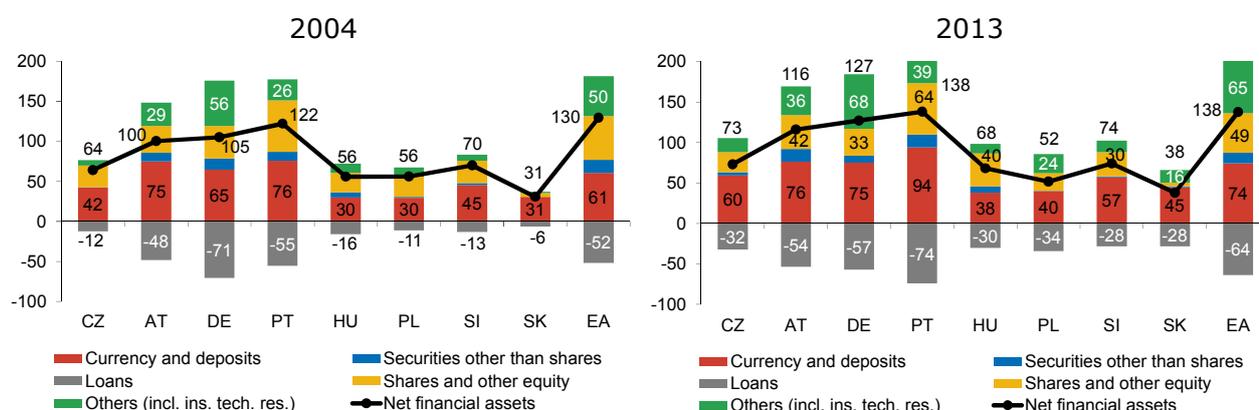
Note: The 2004 and 2013 data are for Q1.
Source: ECB, CNB calculations.

Households in the Czech Republic slightly reduced their share holdings at the expense of currency and deposits and other assets. The euro area also recorded a shift towards more liquid assets and other assets including insurance reserves. The share of currency and deposits increased in all the countries under review, and most of all in Portugal and the Czech Republic. The ratio of currency and deposits to total financial assets of residents in 2013 was highest in the Czech Republic and Slovakia, in line with the historically conservative investment behaviour of households in these countries.

With the exception of Germany, all the countries recorded an increase in household loan debt. Debt in the Czech Republic rose by around 20% of GDP compared to 2004, as it did in the other non-euro area countries and in Slovakia, Portugal and Slovenia. Although the increase in the euro area as a whole was smaller, Czech household debt remains half that in the euro area.

The net creditor position of the Czech household sector still remains well below the euro area average. Moreover, as in the case of corporations, there are persisting differences in structure – in particular a 50% lower debt ratio and a 25% lower share of other assets including insurance reserves. These differences may give rise to an asymmetric effect of monetary policy, as the lower ratio of assets and liabilities of households to GDP in new Member States may lead to weaker transmission. The lower share of debt financing of corporations than in the euro area may also lead to a weaker response to interest rate changes.

Selected **balance sheet indicators** can be used to describe a sector's balance sheet structure.[39] The purpose of these indicators is to reveal any mismatch between financial asset and liability items. This determines the vulnerability of the sector (and, given the links between sectors, the vulnerability of the whole economy) to adverse shocks. Balance sheet indicators are therefore assessed in terms of the similarity of their levels to the euro area provided that the levels of the euro area indicators are not indicating elevated risks. It is reasonable to assume that a high degree of similarity to some extent guarantees the same reaction to economic shocks and thus alignment between individual economies.

Most countries, including the Czech Republic, recorded an increase in **liquidity in non-financial corporations** in response to the financial crisis. When assessed using this indicator, non-financial corporations in the Czech Republic overtook the other countries under comparison. The movement in this indicator is due to steady growth in currency and deposits for most countries except Portugal, for which this item has been declining since the start 2011. A fall in short-term loans after the outbreak of the financial crisis also had a large effect on both the euro area countries and the Czech Republic. This development is linked with deleveraging in the banking sectors of euro area countries, whereas in the Czech Republic it is more a reflection of falling corporate demand for loans due to a lower number of profitable projects. In Poland and Hungary, by contrast, short-term loans maintained a slightly rising trend. Of the euro area countries, only Germany has recently seen some renewal of growth in loans. The liquidity indicator in the euro area is displaying a stable upward trend, but is lower than that in the Czech Republic.

The **solvency ratio** of non-financial corporations is slightly lower in the Czech Republic than in more advanced euro area countries. Despite a downward trend, it is still higher than in the other countries under comparison. However, the solvency of Czech corporations recorded a relatively slight decline during the crisis.

The **share of short-term liabilities** in total debt is much lower for the non-financial corporations sector in the Czech Republic than in the euro area. Czech non-financial corporations also have a lower share of short-term liabilities compared to the other countries. The value of this indicator is comparable only in Poland. The shorter maturity of liabilities in the euro area than in the Czech Republic may result in a different effect of monetary policy, especially in the event of changes in the slope of the yield curve.

Although debt financing of the non-financial corporations sector as expressed by the **debt/equity ratio** rose significantly in most of the countries under review after the onset of the financial crisis, it has been falling again in most countries since then. The Czech Republic is showing the opposite trend, with debt financing rising slowly but steadily and breaking through the 100% level in 2013. Of the non-euro area countries, Poland currently stands at a comparable level, while Slovakia and Hungary have dropped well below the Czech level.

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[39] Balance sheet indicators are based on the balance sheet approach to studying financial crises, which was comprehensively defined in Allen et al. (2002) Applications of the balance approach to the Czech Republic can be found in Kalous (2009) and especially in Kubicová, Komárek and Plašil (2012).

Chart 29: Selected balance sheet indicators of the non-financial corporations sector (%)

Liquidity

Solvency

Share of short-term liabilities

Debt to equity
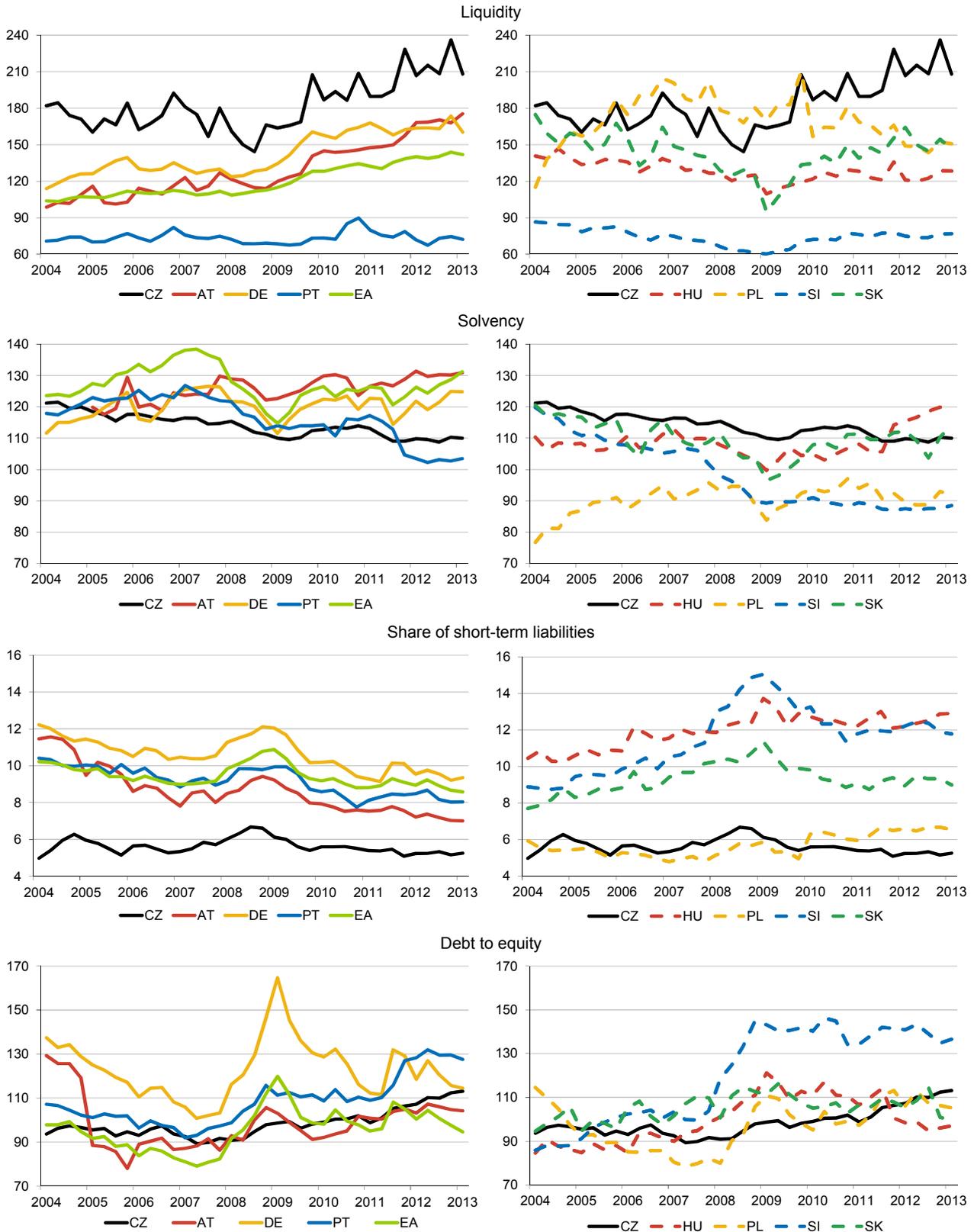
Source: ECB, CNB calculations.

The non-financial corporations sector in the Czech Republic is generally showing differences from the euro area in terms of the levels of some indicators and their evolution over time. Above all, non-financial corporations in the Czech Republic are less responsive to adverse shocks. Czech non-financial corporations have longer liability maturity and a related greater predominance of short-term assets over short-term liabilities. The extent of debt financing is more stable and is not subject to such large fluctuations as in some other countries.

Chart 30: Selected balance sheet indicators of the household sector (%)

Solvency

Share of short-term liabilities
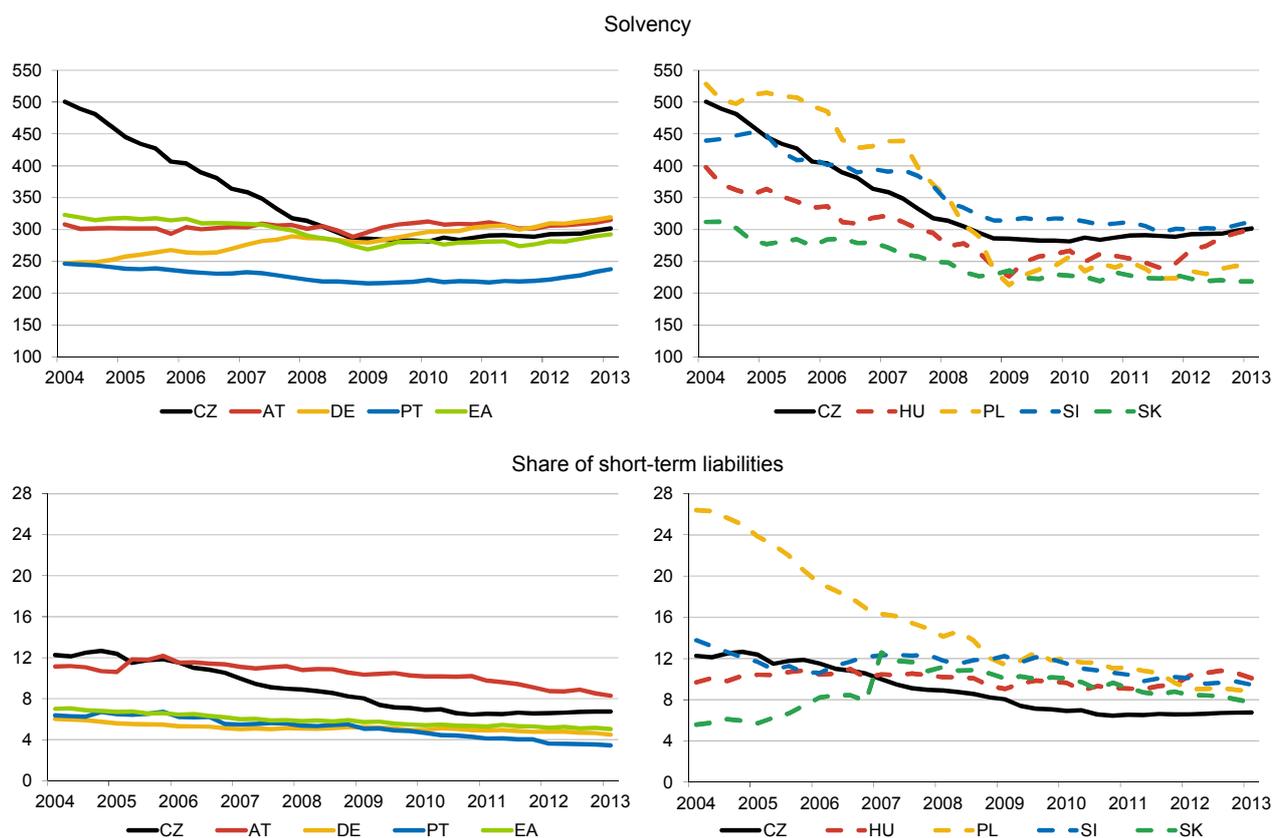
Source: ECB, CNB calculations.

The **solvency of Czech households** was declining until the end of 2008, signalling faster growth in debt than in total financial assets. Since 2009, the rate of growth of debt has slowed and the decline in the solvency ratio has halted. This is in line with the other non-euro area economies and also with Slovenia and Slovakia. The solvency of Czech households has been comparable with the euro area in recent years, while Germany and Austria remain at a slightly higher level. The solvency ratios of the household sectors in Portugal, Slovakia and Poland are noticeably lower.

As for the maturity structure in the Czech household sector, the **share of short-term liabilities** was slowly decreasing until the end of 2010. It is now above the level in Germany and the euro area. Austria is an exception among the advanced countries, having a higher share of short-term liabilities. The Czech Republic has been recording lower levels than the other countries under comparison in recent years.

Overall, in terms of the balance sheet indicators under comparison, the Czech household sector neared the levels typical of euro area households in the second half of the period under examination. In this respect, therefore, the household sector is aligned with the euro area and shows an identically low risk of overall insolvency.

1.2.3 Effect of monetary policy on client interest rates

A similar function of the interest rate channel of monetary policy transmission, i.e. transmission of changes in financial market interest rates to client rates, is a prerequisite for a successful functioning of an economy under a single monetary policy. Moreover, a low degree of alignment of client interest rates before accession to the euro area may be a source of possible asymmetric shocks associated with the sudden unification of rates after the single currency is adopted.

Transmission of changes in financial market interest rates to client rates is relatively fast in the Czech Republic, although full pass-through is observed only for mortgage loans. Rates on large and small loans with short fixations or floating rates follow money market developments relatively quickly, with around 60% of the transmission taking place within a month (Horváth and Podpiera, 2009; Babecká Kucharčuková et al., 2013). Client rates on corporate loans with a fixation of over one year (whose weight is low though; see below) are affected by long-term government bond yields, with the transmission taking around 2–3 months. The pass-through time for mortgage loan rates, which are also linked to government bonds, is about three months. The transmission of interest rates during the financial crisis was somewhat weakened as a result of an increase in client risk premia. This, however, is a traditional sign of cyclicality associated with a tightening of credit conditions due to the increasing level of risk associated with clients and their projects and with more prudential behaviour by banks. In the euro area, client interest rates with short fixations are also derived from money market rates, and long-term rates are derived from long-term government bond yields. Client rates on loans to non-financial corporations are more affected by changes in interbank rates than loans to households. This applies both to financial crisis episodes (higher volatility) and to quiet times (Aristei and Gallo, 2012). In the euro area, the strength of transmission differs considerably across the Member States. The pass-through of changes in financial market rates to client rates is usually incomplete and the dynamics of adjustment of client rates are different for rises and falls in money market rates (Beckmann et al., 2013).

Chart 32 shows the structure of new loans to non-financial corporations broken down by interest rate fixation period. A higher share of loans with short-term rates generally indicates greater **sensitivity of new loans to non-financial corporations to changes in** monetary policy rates and, subsequently, **market rates**. In all the countries under review, a large majority of corporations take out loans with floating rates or rates with a fixation of up to one year. Of the countries under review, only Germany has a larger share of loans with longer fixations. A high share of loans with short fixations enables relatively fast transmission of client interest rates to corporate balance sheets and is quickly reflected in demand for loans. Large loans (i.e. loans of over EUR 1 million) have the largest share in all the countries except Poland, and this share has generally increased since 2004. Only in Poland has the share of small loans increased significantly since 2004.

Chart 31: Structure of new loans to non-financial corporations by interest rate fixation (%)
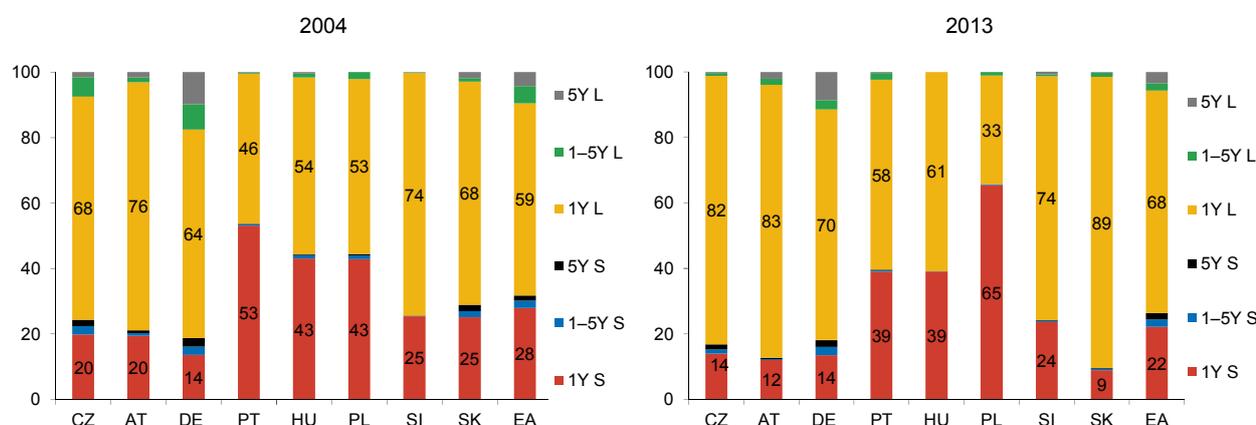
Note: 1Y S and 1Y L stand, respectively, for small (up to EUR 1 million) and large (over EUR 1 million) loans with a floating rate or a rate fixed for up to one year, and the other items in the key denote such loans with longer interest rate fixations. The structure of the euro area total varies according to the number of euro area member countries. The 2013 data are as of June. Data for Poland were not available for 2004 and are therefore replaced by the 2005 data.

Source: ECB, CNB calculations.

A simplified estimate of the strength and lag of the transmission from market to client rates in the countries under review can be obtained by conducting a correlation analysis of changes in these rates. This analysis identifies the maximum value of the coefficients of correlation between interest rates on client loans and the relevant market interest rate for several possible lags. Table 10 shows the correlations between three-month money rates and rates on loans to non-financial corporations (fixed for up to one year), lagged by 0–2 months. The correlations of most countries reach statistically significant levels with no lag, suggesting fast pass-through of changes in market rates to client rates. The exceptions are Poland and Portugal, where there is a one-month lag. There is also a one-month lag for large loans in Portugal. These results indicate strong and largely symmetrical links between client interest rates and the relevant interbank rates.

Table 10: Correlation between changes in rates on loans to non-financial corporations (fixed for up to one year) and changes in three-month market rates

	loans up to EUR 1 million 2004M1–2013M6			loans over EUR 1 million 2004M1–2013M6		
	t	t-1	t-2	t	t-1	t-2
CZ	**0.37** ***	0.13 *	0.033	**0.48** ***	0.19 **	0.08 *
AT	**0.86** ***	0.72 ***	0.581 ***	**0.78** ***	0.58 ***	0.49 ***
DE	**0.77** ***	0.65 ***	0.451 ***	**0.75** ***	0.48 ***	0.33 ***
PT	0.56 ***	**0.71** ***	0.445 ***	0.33 ***	**0.48** ***	0.33 ***
HU	**0.68** ***	0.30 ***	0.178 **	**0.62** ***	0.25 **	0.04
PL	0.58 ***	**0.70** ***	0.471 ***	**0.42** ***	0.34 ***	0.25 **
SI	**0.56** ***	0.39 ***	0.180 **	**0.48** ***	0.30 ***	0.12 *
SK	**0.36** ***	0.10 *	0.118 *	**0.49** ***	0.27 ***	0.19 **
EA	**0.91** ***	0.78 ***	0.554 ***	**0.87** ***	0.60 ***	0.46 ***

Note: The highest correlations between the interest rate on loans to non-financial corporations and the relevant three-month market interest rate (mostly the 3M EURIBOR, otherwise the 3M PRIBOR, the 3M WIBOR or the 3M BUBOR) are shown in bold. The correlation analysis was performed on the first differences of the individual time series.

Source: ECB, CNB calculations.

Different risk premia can be another source of asymmetry of client interest rates after entry into a monetary union. Chart 32 shows the **spreads between the interest rate on new loans to non-financial corporations and the relevant market rates**. The chart reveals that the spread in the Czech Republic is comparable with that in Germany and Austria and that the current spread in the Czech Republic is at its lowest level since the outbreak of the financial crisis in 2009 and is the lowest among the countries under review. The current developments in the Czech Republic are due to banks' very low interest margins on new loans to non-financial corporations and on mortgage loans. The premium remains at an elevated level in the euro area due to fragmentation of financial markets, uncertainty regarding the economic recovery and the still existing macrofinancial risks implied by the links between banks' balance sheets and sovereign risk. A much higher spread is observed in Portugal and Slovenia. This may be limiting the effect of the single monetary policy in these countries. The countries hit by the debt crisis may thus see the emergence of undesirable tighter monetary (or credit) conditions due to a higher premium than in the core euro area countries.

Chart 32: Spreads between interest rates on loans to non-financial corporations and 3M market rates (p.p.)
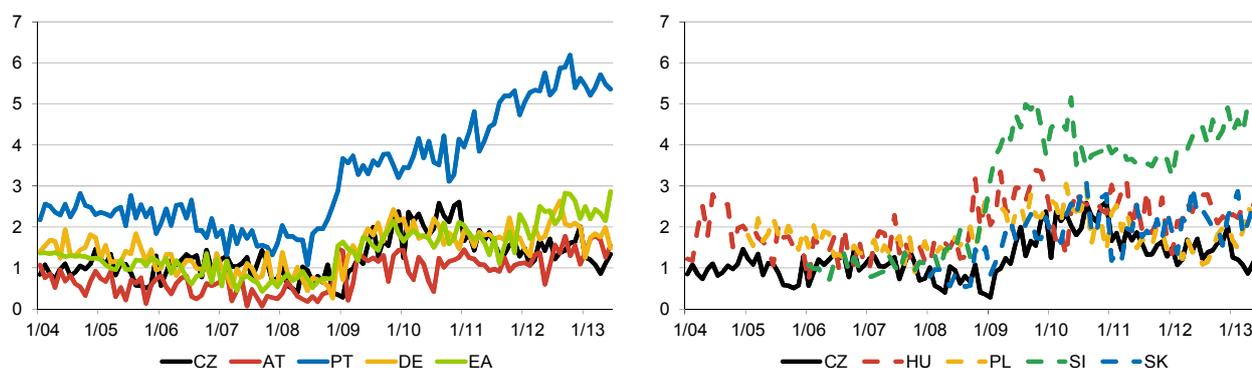
Note: The spreads for Poland and Hungary are calculated from interest rates on domestic currency loans (in Poland's case the rate with a fixation of up to one year). For the other countries, the spread is calculated from the average interest rate on total corporate loans. The structure of the euro area total varies according to the number of euro area member countries.

Source: ECB, CNB calculations.

Chart 33 shows the structure of new **loans for house purchase broken down by interest rate fixation period**. Such loans make up the main segment of household debt. In the Czech Republic, as in Germany, Slovakia and the euro area as a whole, households mostly take out loans with fixations of over one year. This creates conditions for similar monetary policy transmission to households' balance sheets. While loans with fixations of over one year and up to five years are predominant in the Czech Republic, loans with longer fixations dominate in the euro area on average. In recent years, the share of loans fixed for up to one year in the Czech Republic at first increased to 30% in 2012, but fell sharply to 9% in 2013. This can be attributed to very low interest rates and households' motive to fix mortgage loans at these low levels for a longer period of time. Similar developments can be observed in Hungary, Portugal, Slovakia and the euro area as a whole. A majority share of loans fixed for up to one year, and thus a higher sensitivity of transmission, can be observed in Austria, Portugal, Hungary, Poland and Slovenia. The differences between countries are due to different financial products, market structure and some regulatory measures.[40]

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[40] In Poland, for example, standard mortgages have a floating interest rate linked to the WIBOR (or LIBOR for foreign currency loans) and are usually changed once every three or six months. The volume of longer fixations is negligible.

Chart 33: Structure of new loans to households for house purchase by interest rate fixation (%)

2004 — 2013
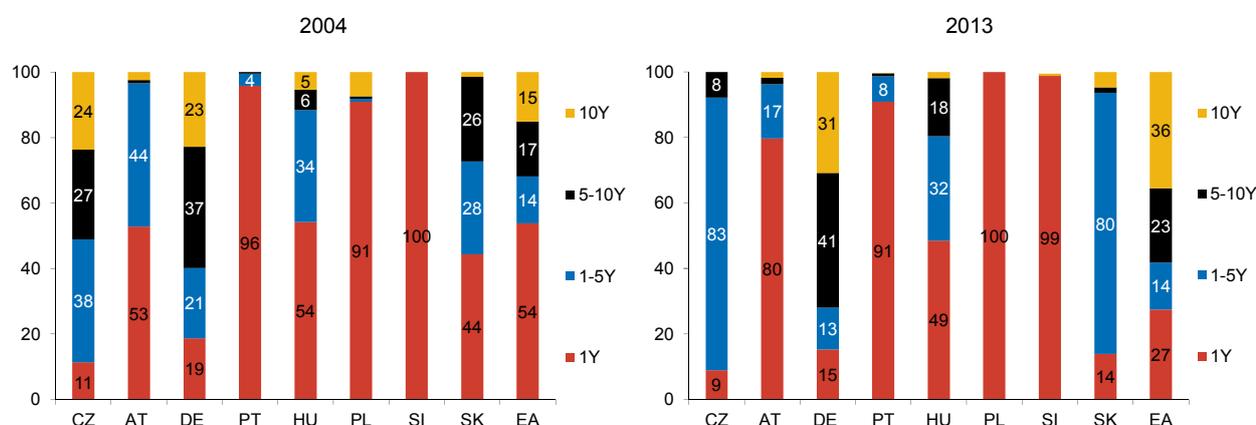
Note: The structure of the euro area total varies according to the number of euro area member countries. The 2013 data are as of June.
Source: ECB, CNB calculations.

In all the countries under review, changes in mortgage rates fixed for up to one year are correlated most strongly with changes in relevant three-month market rates[41] with a one-month lag. This suggests that interest rate transmission is fairly fast in the countries under review (see Table 11). Rates on new mortgage loans fixed for over one year are statistically significantly correlated with yields on ten-year government bonds in the Czech Republic, Germany, Slovakia and the euro area as a whole.[42] Most mortgage loans in these countries are fixed for a period of longer than one year, usually between one year and five years, or up to ten years in Germany. The lag on the strongest response of client rates to a change in market rates on these loans ranges between one month in Germany and three months in the Czech Republic. As regards Hungary, where there is also a higher share of mortgage loans fixed for over one year, the weaker correlation with government bonds may be due to an elevated and fairly volatile risk premium since the outbreak of the financial crisis.

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[41] For completeness, and due to interest rate developments during the financial crisis, the correlations were also performed for the EONIA, but the results were practically the same.
[42] Links between client rates and government bonds are observed for two reasons. First, ten-year bonds approximate the longer end of the yield curve, thus representing the long-term cost of financing. The other reason is the previously econometrically confirmed link between Czech government bonds and koruna mortgage loans (Babecká Kucharčuková et al., 2013).

Table 11: Correlation between changes in rates on mortgage loans and changes in market rates

	fixed rate up to one year				fixed rate over one year		
	3M market interest rates				10Y government bonds		
	2004M1–2013M6				2004M1–2013M6		
	t	t-1	t-2	t	t-1	t-2	t-3
CZ	0.13 *	**0.23 ****	0.17 **	-0.06	0.13 *	0.25 **	**0.37 *****
AT	0.53 ***	**0.54 *****	0.51 ***	0.01	-0.10	0.05	0.07
DE	0.69 ***	**0.73 *****	0.50 ***	0.43 ***	**0.71 *****	0.55 ***	0.35 ***
PT	0.68 ***	**0.91 *****	0.67 ***	0.02	0.05	0.04	-0.03
HU	0.24 ***	**0.41 *****	0.31 ***	0.03	0.03	0.18 **	0.13 **
PL	0.58 ***	**0.74 *****	0.56 ***		–		
SI	0.77 ***	**0.85 *****	0.60 ***		–		
SK	0.14	**0.49 *****	0.29 ***	0.03	0.21	**0.25 ****	0.01
EA	0.81 ***	**0.87 *****	0.72 ***	0.27 ***	0.53 ***	**0.53 *****	0.42 ***

Note: The highest correlations over time between the interest rate on mortgage loans and the relevant three-month market interest rate (3M EURIBOR for the euro area countries, otherwise the 3M PRIBOR for the Czech Republic, the 3M WIBOR for Poland and the 3M BUBOR for Hungary) are shown in bold; the figures for bonds relate to the ten-year government bonds of the given country. For the euro area, the table shows the correlation with German government bonds. In Poland and Slovenia, the share of mortgage loans fixed for over one year is almost negligible. The correlation analysis was performed on the first differences of the individual time series.

Source: ECB, CNB calculations.

To sum up, the degree of heterogeneity of client interest rates in the euro area has increased further due to the financial crisis and subsequently the debt crisis. This represents one of the main challenges to ensuring that the single monetary policy has a symmetric effect. Client interest rates in EU countries can be expected to remain more differentiated in future than in the pre-crisis period, as liquidity and risk premia remain very significant, reflecting the financial soundness of each economy. However, greater competition for clients, and thus greater differentiation among clients by banks, can also be expected. The spread of client rates on loans to non-financial corporations in the Czech Republic is currently at the German and Austrian level, as is the spread in Poland. The correlation between client rates on loans to non-financial corporations and market rates in the Czech Republic is strong and similar to that in euro area and accession countries. As regards mortgage loans, maturities of over one year are significant in terms of volume in the Czech Republic, as they are in Germany and the euro area as a whole. This is related to a stronger correlation between client rates in these countries and government bond yields. The pass-through of changes in financial market interest rates to client rates in the Czech Republic thus does not differ greatly from that in the euro area and so represents no barrier to future euro adoption.

1.2.4 Inflation persistence

The ability of the economy to absorb shocks effectively also depends on price flexibility. One of the ways of examining **price flexibility** is to analyse inflation persistence (inertia), i.e. the speed at which inflation returns to equilibrium after a shock. It can be said that high inflation persistence signals price inflexibility (Coricelli and Horváth, 2009). Substantial differences in inflation persistence in the countries of a monetary union can result in the single monetary policy having different impacts. According to Angeloni and Ehrmann (2004), the differences in inflation observed between individual euro area countries can be largely explained by different inflation persistence.

Inflation persistence is measured by three different methods. The first, non-parametric, method (Method 1) uses a procedure proposed by Marques (2004), according to which the longer it takes actual inflation to return to its mean value, the more rigid is the inflation. This

indicator takes values between 0 and 1. The closer the values are to one, the more persistent is inflation.

The second and third methods are based on a model of inflation as an autoregressive process, monitoring the sum of the coefficients of the autoregressive terms. The values of persistence indicators in Methods 2 and 3 increase with inflation persistence. Method 2 assumes a constant mean value of inflation. Marques (2004) and Cecchetti and Debelle (2006) showed that the results of modelling inflation persistence are largely dependent on the assumption regarding the mean to which inflation converges. If the inflation time series contains structural changes or breaks in trend which the model process does not allow for, the inflation persistence estimate is typically biased upwards. Because of the transformation process, accompanied by disinflation, price convergence, gradual price deregulation and changes in monetary policy regime, it is the time series of transition countries that are most affected by breaks in the mean values of inflation. Method 3 therefore models the autoregressive process with the mean value of inflation changing over time.

Table 12 summarises the inflation persistence estimates for 2003 Q1–2013 Q2. Compared to the other countries under review, inflation persistence in the Czech Republic is the third or fourth highest, depending on the estimation method used. However, the differences in the estimated persistence between the countries in the tested group are economically insignificant and there is no obvious difference between the existing euro area countries and the non-euro area countries.[43] The potential impacts of the single monetary policy would thus be similar in this respect.

Table 12: Inflation persistence estimates

	Method 1	Method 2	Method 3
CZ	0.86	0.85	0.42
AT	0.75	0.79	0.40
DE	0.81	0.72	0.55
PT	0.89	0.82	0.52
HU	0.83	0.73	0.40
PL	0.83	0.79	0.39
SI	0.89	0.90	0.48
SK	0.83	0.88	0.36

Notes: Method 1 – non-parametric technique.
         Method 2 – sum of autoregression coefficients, constant mean assumed.
         Method 3 – sum of autoregression coefficients, time-varying mean assumed.
Source: OECD MEI, CNB calculations.

1.2.5 Financial market integration

Financial markets can be identified as integrated if financial assets having comparable risk factors and yields are priced identically by the markets no matter which country they are traded in. The similarity in the behaviour of prices of comparable financial assets across markets thus illustrates the level of financial market synchronisation or integration in the countries under review. This application of the law of one price has been used to measure the integration of the financial markets of selected countries with the euro area. The more the individual segments of the financial markets of countries planning to adopt the euro become

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[43] Baxa et al. (2012) estimate inflation persistence through the lens of the new Keynesian Phillips curve with an assumption of stochastic volatility and show that inflation persistence in the Czech Republic is considerably lower than that in Poland and Hungary and is thus the closest to the low persistence levels observed in the euro area.

integrated with the euro area market, the more these asset prices should be affected by common (global) factors rather than by national (local) factors.

The following analysis of the integration of financial markets (money, foreign exchange, government bond and stock markets) applies two methods based on the law of one price: (i) price-based measures and (ii) news-based measures.[44] Price-based measures use the concepts of beta-convergence and sigma-convergence. Beta-convergence enables identification of the speed of convergence of the national market to the euro area, while sigma-convergence identifies the degree of convergence. News-based measures are based on the assumption that in the case of an integrated market, prices of individual national assets respond to common news rather than to local news. The sensitivity of asset prices to global news is measured by gamma, which shows the extent to which countries' asset prices respond to news in the same way as euro area asset prices.[45]

The results of the analysis for the individual financial market segments are shown in Table 13 for beta, in Chart 34 for sigma and in Chart 35 for gamma. When interpreting the results, we take particular account of the financial crisis period, which was marked by generally high market price volatility.

Table 13: Beta coefficients

	Money market		Forex market		Bond market		Stock market	
	1/03–7/07	8/07–7/13	1/03–7/07	8/07–7/13	1/03–7/07	8/07–7/13	1/03–7/07	8/07–7/13
CZ	-0.65	-0.39	-1.11	-0.88	-0.70	-0.74	-0.94	-0.80
AT	-	-	-	-	-0.68	-0.88	-0.88	-0.67
DE	-	-	-	-	B	B	-0.79	-0.88
PT	-	-	-	-	-0.68	-0.88	-1.04	-0.92
HU	-0.84	-0.78	-0.95	-0.90	-0.92	-0.69	-0.85	-1.04
PL	-0.52	-0.42	-0.78	-0.97	-0.84	-0.80	-0.91	-0.87
SI	-	-	-	-	-	-	-0.73	-0.83
SK	-0.55	-0,56*	-0.98	-	-0.70**	-0.85	-0.69	-0.94
EA	B	B	B	B	-	-	B	B

Note: The closer the value of the beta coefficient is to -1, the higher is the speed of convergence. The first time interval is the period before the outbreak of the financial crisis (up to August 2007); the second is the period containing the impacts of the financial crisis. Other symbols: B – benchmark, "-" – data not available, * – up to 31 December 2008, ** – from 22 June 2002. All the estimates were statistically significant at the 1% level.

Source: Thomson Datastream, CNB calculations.

The results of **price-based measures** signal that in the pre-crisis period the speed of price convergence/divergence on the stock, bond and foreign exchange markets of the countries under review vis-à-vis the euro area (or Germany in the case of the government bond market) was relatively high (beta coefficients close to -1; see Table 13). The level of convergence achieved did not differ much across the countries under review in the case of these markets (sigma coefficients; see Chart 34). The results of the analysis of convergence of individual financial markets rank the Czech Republic among the countries with a higher degree of integration, i.e. those where global factors have a greater effect on financial asset prices. The integration of the said three Czech markets with the euro area is not following a clear trend

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[44] The literature also provides some other approaches to measuring integration which are based not on the law of one price but, for example, on quantitative indicators (quantity-based measures). These usually entail various surveys of statistical information monitoring change in investor behaviour in the process of financial market integration.
[45] Asset prices are monitored at an aggregate level and it is assumed that euro area assets respond primarily to global news.

over time,[46] with the exception of a decrease in integration during the highly volatile crisis period in 2008 and 2009.

Chart 34: Sigma coefficients

Money market

Forex market

Government bond market

Stock market
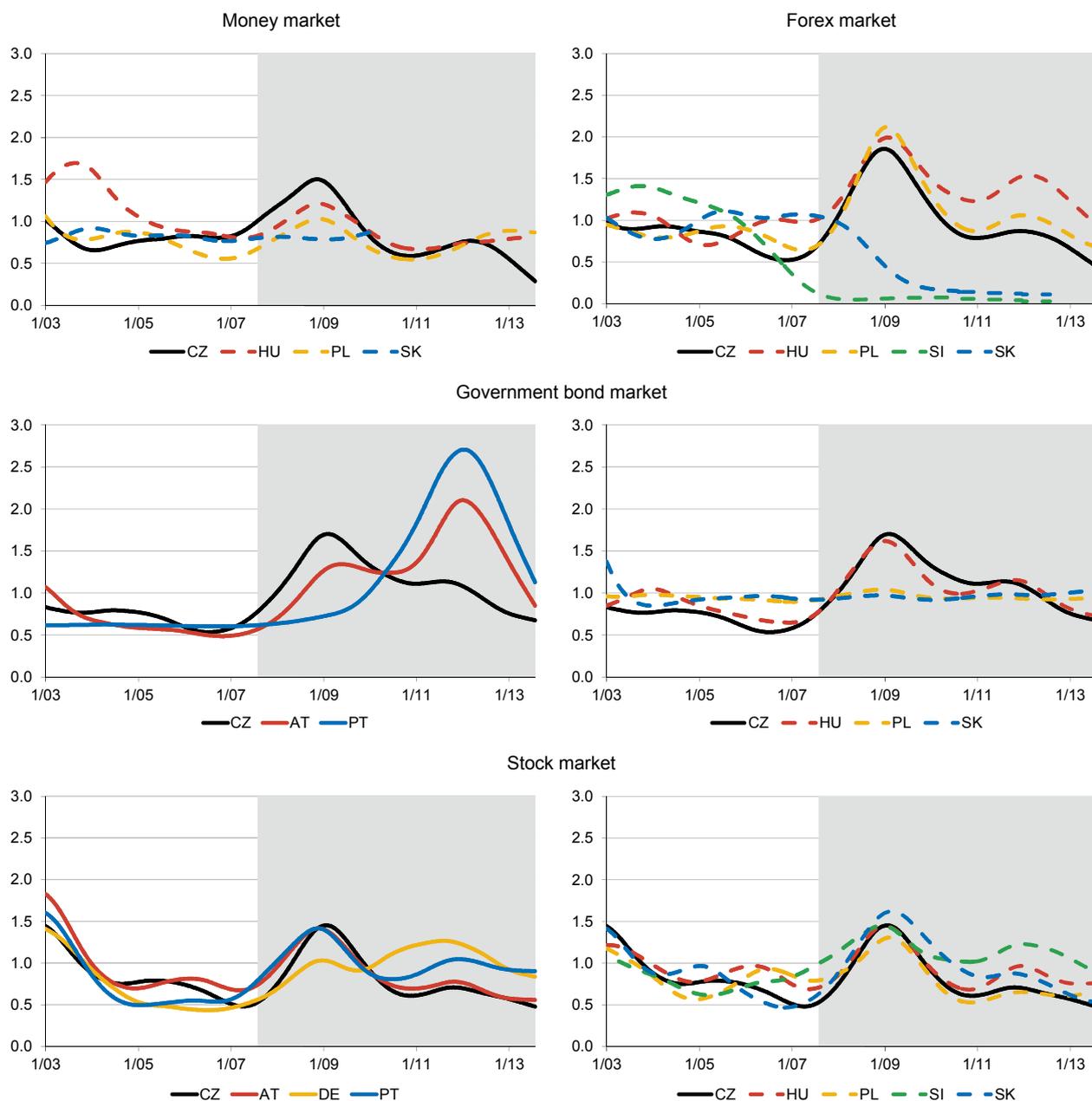
Note: Lower standard deviation values (y-axis) correspond to a higher convergence level. The grey area marks the period since August 2007.

Source: Thomson Datastream, CNB calculations.

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[46] In a detailed analysis of the bilateral linkages between EU sovereign bond markets, Claeys and Vašíček (2012) show that the spillover between markets has increased substantially over time. The Czech, Polish and Hungarian markets affect one another and are simultaneously significantly affected by developments in the euro area. This effect of euro area markets on Central European markets is more pronounced than that on, for example, other non-euro area EU countries such as Denmark, Sweden and the United Kingdom.

The results of **news-based measures** indicate that the local factors affecting the national markets were quite significant in the pre-crisis period (see Chart 35). Increased importance of global news is apparent on stock and foreign exchange markets during the crisis. The transmission of global shocks also intensified on these markets in the Czech Republic. Higher sensitivity to global shocks can be expected for both these markets given the greater influence of foreign investors there. The reaction to common news is low in the Czech Republic relative to the advanced euro area countries. On the other hand, it is one of the highest among the Central European countries under review, especially on the stock and bond markets.

Chart 35: Gamma coefficients
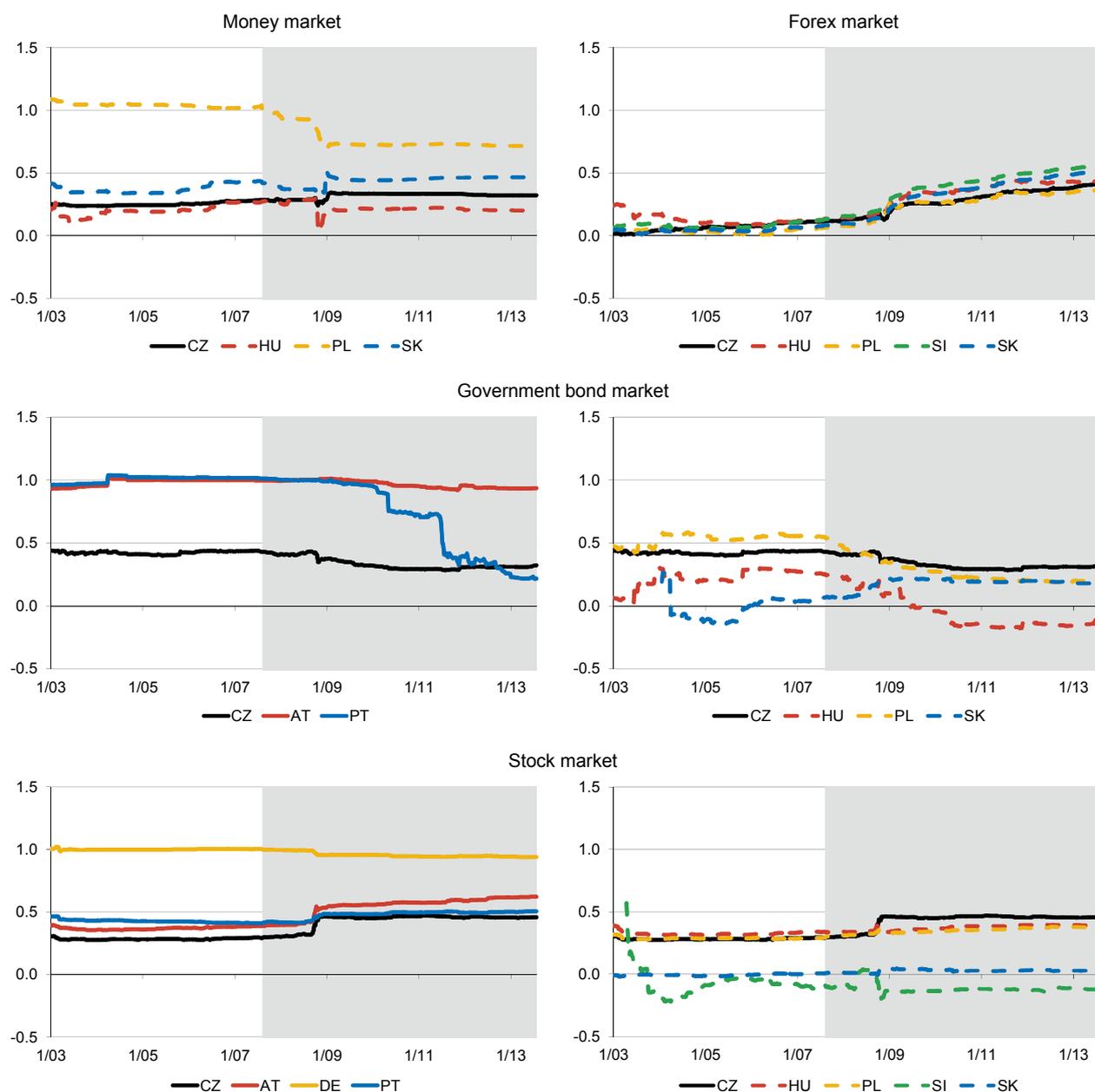
Note: Positive (negative) gamma values close to one express same (opposite) directional and similarly strong sensitivity to news and therefore a higher degree of integration; values close to zero express low integration. The grey area marks the crisis period.

Source: Thomson Datastream, CNB calculations.

Both methods signal that the **financial crisis and the euro area debt crisis** had a significant impact on the financial market integration of all the countries under review with the euro area. Chart 34 shows that increased price mismatch, and in some cases divergence, are apparent from the outbreak of the crisis almost until mid-2009, when the situation on most financial markets started to calm gradually.[47] However, divergence re-emerged in some markets at the start of the debt crisis due to increased price volatility. This is especially true of the Austrian and Portuguese government bond markets, although higher sensitivity of market prices to common or global news is evident in Austria, while largely domestic effects can be seen in Portugal (see Chart 35).[48] Convergence could be observed again for most markets and countries only last year, when asset prices were strongly affected by the ECB's announcement of the introduction of the new OMT programme (see Chart 34) and the persisting easy policy of G4 central banks.[49] The announcement reduced the short-term risks associated with financial assets and hence the market volatility of their prices (e.g. on the Portuguese government bond market). Despite this calm-down and apparent convergence, some fragmentation prevails on European markets. This is due to the behaviour of investors, who on the one hand are seeking highly demanded and overvalued "safe" assets owing to the persisting uncertainty, and on the other hand are trying to find financial returns in an environment of sustained low rates.

To sum up, the temporarily suspended process of financial integration with the euro area started to renew in individual segments of the Czech financial market last year.

1.2.6 Spontaneous euroisation

A high share of foreign currency assets and liabilities in residents' balance sheets, known as **euroisation**, may limit the conduct of independent monetary policy and pose risks to financial stability. The adoption of the single currency may be a natural solution, and the costs of entering the monetary union may be lower for a highly euroised economy.

The degree of euroisation in the Czech Republic has long been relatively low. This reflects the high confidence in the domestic currency due to low and stable inflation and low interest rates under a freely floating exchange rate. Foreign currency is used in financial transactions mainly by corporations, naturally as a result of their high trade integration with the euro area. Tkalec (2012) suggests that the lower degree and volatility of euroisation in the Czech Republic and Poland are due to **trust in the macroeconomic and institutional environment**.[50] By contrast, the degree of euroisation in some other new Member States responds significantly and non-linearly to exchange rate movements and interest rate differentials.

The share of foreign currency deposits and loans of **non-financial corporations** with domestic banks has long been around 20% in the Czech Republic (see Chart 36). Given the importance of euro area business partners, foreign currency corporate deposits and loans are usually denominated in euros. Moreover, exporting corporations hedge using foreign currency loans and other liabilities directly abroad (corporations naturally hedge almost 60% of

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[47] Only the Slovak forex market recorded "artificial" convergence at the beginning of the crisis, owing to euro adoption.

[48] The sources of the response of asset prices are different for these two countries. While the response of assets in Portugal stems from adverse macroeconomic developments and deepening structural imbalances, that in Austria stems from financial sector developments.

[49] The G4 comprises the Bank of England, the Bank of Japan, the European Central Bank and the Federal Reserve System. For more on OMTs (Outright Monetary Transactions) see http://www.ecb.europa.eu/press/pr/date/2012/html/pr120906_1.en.html. The markets reacted strongly to the announcement of the new OMT programme in July 2012, when the ECB President M. Draghi stated: "Within our mandate, the ECB is ready to do whatever it takes to preserve the euro. And believe me, it will be enough".

[50] Beckmann et al. (2013) shows that the financial and debt crisis had an adverse impact on trust in the EU. Households' trust in the EU has fallen further in the Czech Republic, Poland and Hungary over the last two years. The debt crisis has also caused trust in the EU to drop sharply in the euro area itself, from almost 50% to about 30%.

exports[51]).[52] On the other hand, the share of foreign currency payments and receipts in total domestic payments and receipts of corporations has long been fluctuating around 10% only. While the shares of foreign currency deposits and loans with domestic banks in Poland are similar to those in the Czech Republic, they remain significantly higher in Hungary, at around 40% for deposits and 60% for loans.

Chart 36: Foreign currency loans and overnight deposits of non-financial corporations (shares in total loans and overnight deposits of non-financial corporations with domestic banks, %)

Foreign currency loans   Overnight foreign currency deposits
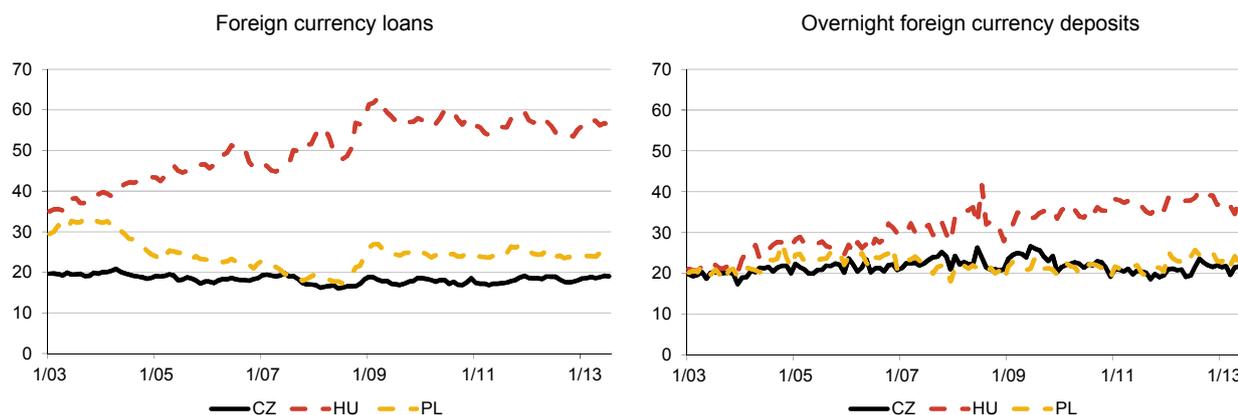
Source: Central banks, CNB calculations.

The demand of **households** for foreign currency deposits and loans in the Czech Republic has long been negligible and is far lower than in Poland and Hungary, especially in the case of loans. The share of foreign currency overnight deposits in households' total overnight deposits with banks has been decreasing over the last ten years and is currently around 3% (see Chart 37). Foreign currency savings have been showing a similar trend and also have a share of around 3%. Households' demand for foreign currency loans remains de facto at zero in the Czech Republic, while accounting for a still sizeable 33% and 55% in Poland and Hungary respectively. However, the global financial and debt crisis has led to a fall in the foreign currency debt of households in the latter two economies. High demand of households for foreign currency loans increases their financial vulnerability if the currency depreciates (as their wage income is denominated mostly in the domestic currency) and consequently the vulnerability of the whole financial system.

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[51] A total of 184 companies exporting at least 50% of their sales or output worth at least CZK 1 billion a year participated in a survey that formed part of the research project of Čadek, Rottová and Saxa (2011). The companies' replies relate to 2005–2009.
[52] Foreign currency corporate debt abroad accounts for around 80% of total corporate debt abroad.

Chart 37: Foreign currency loans and overnight deposits of households (shares in total loans and overnight deposits of households with domestic banks, %)

Foreign currency loans

Overnight foreign currency deposits
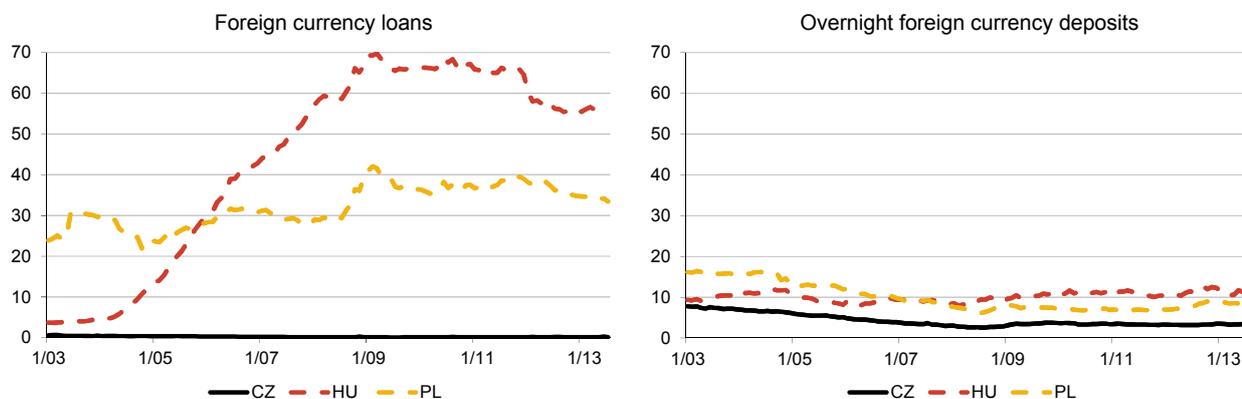
Source: Central banks, CNB calculations.

To sum up, the use of foreign currency in the Czech economy is based naturally on corporations' heavy involvement in foreign trade, while the level of euroisation in the household sector is minimal. The effect of the CNB's independent monetary policy on the economy is this not fundamentally endangered by this factor, and the current level of euroisation thus does not represent an additional argument for euro adoption beyond the framework of corporations' global integration.

2   ADJUSTMENT MECHANISMS

The adoption of the single currency and the related loss of independent monetary policy will mean that the adjustment of the economy to shocks will place higher demands on other adjustment mechanisms. The theory of optimum currency areas indicates the importance of the stabilising function of public budgets, price and wage elasticity, labour market flexibility and the ability of the financial system to absorb shocks.

2.1   FISCAL POLICY

In the absence of independent monetary policy, the stabilising effect of fiscal policy can to some extent substitute for the missing monetary adjustment mechanisms in the event of asymmetric shocks. By contrast, fiscal policy may itself be a source of asymmetrical shocks if the parameters are set or measures chosen inappropriately. The current condition of, and in particular the outlook for, public finances are therefore important measures of the preparedness of the Czech economy to join the euro area.

2.1.1   Stabilising function of public budgets

Fiscal policy can affect the economy either directly, i.e. via discretionary measures on the revenue or the expenditure side of the public budgets, or indirectly, by creating conditions for optimal functioning of automatic fiscal stabilisers. The negative experience with activist fiscal policy in the advanced countries in the 1970s is an argument against the wider application of discretionary fiscal measures, since such policy failed to produce the desired results or was even counterproductive.[53] This was also reflected in a paradigm shift in theoretical economics, with belief in the effectiveness of discretionary measures being replaced by a hypothesis that adherence to pre-defined rules is more effective. In the fiscal area, such rules consist primarily in a simple, stable tax system, consolidated and sustainable public finance and predictable government expenditure based on fiscal discipline. However, numerous discretionary measures of a fiscal nature were adopted during the financial and economic crisis in 2008–2010, since the real and expected economic decline was so large that the political representation considered automatic stabilisers to be insufficient on their own.[54] In addition to the positive impacts of discretionary measures, the related sizeable growth in fiscal deficits entailed costs and risks, especially in countries with a high initial level of government debt. This was later reflected in the response of the financial markets. Stabilisation of public budgets therefore became a fiscal policy priority in 2011–2012. However, the fall of the economy into recession in 2012–2013 resulted in a reassessment of this objective and a temporary slowdown in the pace of fiscal consolidation.

The EU fiscal rules recommend a broadly balanced government budget policy over the business cycle and the free operation of automatic fiscal stabilisers, which can absorb shocks without the need for ad hoc discretionary fiscal measures. In a period of recession, public finances should thus stimulate aggregate demand by means of lower collection of taxes and higher

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[53] The long lags that arise between the identification of shocks, the implementation of fiscal measures and the effects of those measures, the existence of institutional constraints and the inertia of fiscal decisions are generally regarded as the main causes. A typical example of this problem is the risk of "procyclical fiscal policy", i.e. fiscal policy that tries to smooth the business cycle (which can be viewed as one specific type of economic shock) but in reality – owing to the aforementioned lags – amplifies the cycle.

[54] For details on the assessment of the impact of discretionary measures and the operation of automatic stabilisers in the Czech Republic in 2001–2011, see Ambriško et al. (2012).

transfers (deficits), while in a period of expansion they should subdue demand by creating fiscal surpluses. In order for the automatic function of public budgets to work, while avoiding – except in very exceptional cases – breaches of the maximum agreed deficits, public finance must be balanced or, preferably, in surplus during a growth phase of the business cycle. This reasoning serves as the basis for the convergence criterion for the general government deficit as a percentage of GDP, where the 3% limit is considered sufficient to allow automatic stabilisers to function freely in the event of a minor economic downswing.

The influences of the macroeconomic environment and of interventions by the government on public budgets can be differentiated by decomposing the fiscal balance into the cyclical component, i.e. the part that results from the business cycle, and the "cyclically adjusted balance", which yields information on how government fiscal policy contributed to fiscal performance. Moreover, for a more precise assessment of the nature of the government's fiscal policy in a given period, the "structural balance" is generally used. In addition to fluctuations caused by the economic cycle, this is adjusted for the effects of temporary or one-off fiscal measures that are not related to the basic characteristics of fiscal policy.

Chart 38 shows the CNB's current estimates of the **Czech Republic's general government balance broken down into its cyclical and structural components**. The estimates are carried out using both the European Commission method and the ESCB method (see the *Methodological Part*).

Chart 38: The fiscal balance and its cyclical and structural components (% of GDP)
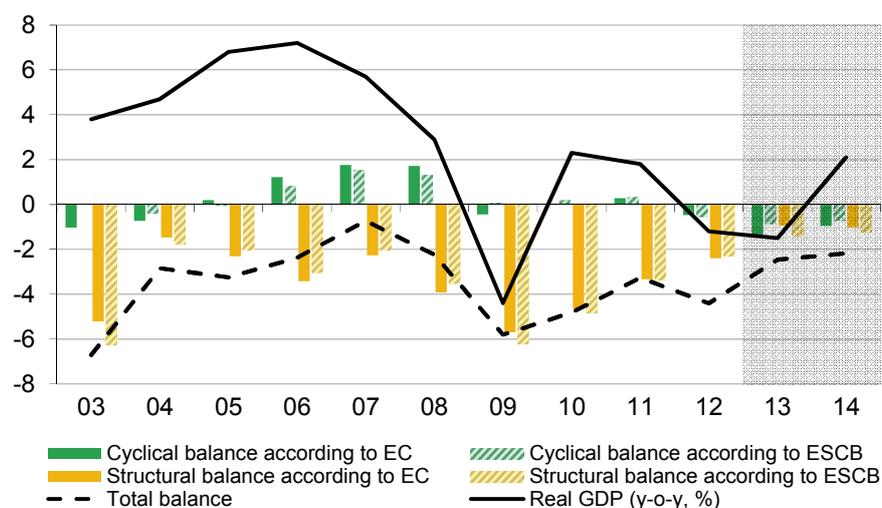
Note: Positive values represent a public budget surplus and negative values a public budget deficit. The sum of the cyclical and structural balance does not equal the total balance since the structural balance is adjusted for extraordinary one-off fiscal measures in addition to the effect of the cycle.

Source: CZSO, CNB calculations (the 2013 and 2014 figures – in the grey-shaded area – come from the CNB's forecast published in Inflation Report III/2013).

The assessment of the trend in the structural component and its share in the overall deficit is basically the same for both methods. The structural balance[55] shown in the chart indicates that the government's fiscal policy was persistently in deficit and procyclical for most of the period under review, since the structural deficit was not reduced even in the years of economic growth in 2003–2008. In this period, windfall tax revenues were employed to generate new

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[55] The quantification of the structural and cyclical components of the public finance balance depends on the value of potential GDP (EC method) or on the trend values of macroeconomic tax bases (ESCB method), which are unobserved variables whose estimation is usually subject to a relatively high level of uncertainty.

public expenditures rather than reduce the deficit. Tax cuts affecting the revenue side were not accompanied by relevant austerity measures on the public expenditure side. Fiscal policy was countercyclical in 2009, the year most affected by the crisis, when government anti-crisis measures leading to a widening of the structural deficit were adopted. In the following period, fiscal policy turned procyclical again as a result of public finance consolidation efforts. A sizeable decline in the structural deficit due to fiscal consolidation (of around 1.5–2% of GDP year on year depending on the methodology selected) thus occurred in a phase of lengthy recession in 2011–2013. According to the CNB's current estimate, fiscal policy should have a broadly neutral effect in 2014 and be slightly expansionary in 2015 based on the approved budgetary measures.

The cyclical component played a less important role in the total budget balance in the period under review (except for 2006–2008). The action of automatic stabilisers, which smooth the business cycle, was very limited in the Czech Republic. Economic growth had a stronger effect on the cyclical balance in 2006–2008, when favourable economic growth gave rise to extraordinary tax revenues. In 2009, the cyclical balance returned to levels of around zero, where it remained until 2012. According to the CNB's forecast in Inflation Report III/2013, the cyclical component will clearly foster an increase in the overall general government deficit in 2013–2014.

The assessment of the roles of the structural and cyclical components of the total budget balance in the period under review shows that the Czech government sector deficits were due mainly to non-cyclical effects – the total deficit was very close to the structural component over most of the period.

The overall budget deficit in 2009 was well above the reference value of 3% laid down in the Stability and Growth Pact, owing mainly to the government's anti-crisis fiscal policy and the simultaneous action of automatic stabilisers. The excessive deficit procedure was therefore opened against the Czech Republic at the end of 2009. A deadline of 2013 was set for bringing the deficit below the reference value. The European Council also recommended ensuring an average annual decline in the structural deficit of 1% in 2011–2013, specifying measures necessary to correct the deficit within the deadline, and speeding up the reduction of the deficit if economic or budgetary conditions improve. In response to these requirements, but mainly in order to stabilise public budgets, the government adopted numerous revenue and expenditure measures starting in 2010 which greatly contributed to reducing the public finance deficit in 2010–2013.[56] Nevertheless, the fall of the economy into recession in 2012–2013 resulted in a reassessment of the pace of fiscal consolidation and a withdrawal from the previously declared fulfilment of the medium-term objective (MTO)[57] in the form of a structural deficit of 1% of GDP in 2015.[58] This objective has been postponed until the confidence of economic agents is restored and sustainable growth has been started up again.[59] According to the Czech Republic's Updated Euro-area Accession Strategy, fulfilment of the MTO is a condition for fiscal policy to be able to effectively perform its macroeconomic stabilising role

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[56] An increase in the deficit to 4.4% in 2012 was due mainly to one-off expenditure measures amounting to around 1.8% of GDP (financial compensation of property settlement between the state and churches amounting to 1.5% of GDP and flat-rate corrections of refunds from EU funds amounting to 0.3% of GDP).

[57] The originally uniform requirement of balanced finances has been replaced under the amended European fiscal rules (Council Regulation No. 1055/2005 of 27 June 2005) by country-specific medium-term objectives, which differ from economy to economy depending on the existing level of public government debt, future population ageing costs and the prospects for economic growth. Fast growing economies with a low general government public debt level may, instead of maintaining balanced public sector accounts, reach a deficit of up to 1% of GDP. The MTO was set at this level for the Czech Republic, but under the April 2013 Convergence Programme its fulfilment was postponed beyond 2016 in order to boost the economic recovery.

[58] Convergence Programme of the Czech Republic, April 2012.

[59] Convergence Programme of the Czech Republic, April 2013.

following the loss of independent monetary policy. It can thus be stated that fiscal policy is not yet able to take over fully the stabilising function of monetary policy, despite the consolidation efforts in past years.

2.1.2 Government deficit and debt and the scope for stabilising fiscal policy

Ensuring long-term sustainability of public budgets is a precondition for effective use of their stabilising function and an important condition for the ability of the Czech Republic to fulfil its commitments under the Stability and Growth Pact in the long term. The fiscal policy objective in the run-up to euro area accession should be to take the public budgets close to a zero balance (or to the MTO) so that sufficient room is left for stabilising fiscal policy in bad times. Table 14 summarises the forecast for the **fiscal balance** of the countries under review as published by the European Commission in spring 2013. The left-hand side of the table shows the total general government balance, while the right-hand side contains the structural balance calculated under EC methodology. The last line in the table contains the current estimate of the total and structural balance according to the CNB forecast.

Table 14: General government balance, European Commission estimate (% of GDP)

	Total balance						Structural balance					
	2003	2010	2011	2012	2013	2014	2003	2010	2011	2012	2013	2014
CZ	-6.7	-4.8	-3.3	-4.4	-2.9	-3.0	-	-4.5	-3.0	-1.7	-1.6	-2.1
AT	-1.5	-4.5	-2.5	-2.5	-2.2	-1.8	-0.8	-3.3	-2.2	-1.5	-1.6	-1.7
DE	-4.2	-4.1	-0.8	0.2	-0.2	0.0	-3.2	-2.3	-0.9	0.3	0.4	0.3
PT	-3.7	-9.8	-4.4	-6.4	-5.5	-4.0	-2.2	-8.8	-6.6	-4.2	-3.6	-2.0
HU	-7.3	-4.3	4.3	-1.9	-3.0	-3.3	-	-3.3	-4.1	-0.7	-1.1	-1.8
PL	-6.2	-7.9	-5.0	-3.9	-3.9	-4.1	-	-8.3	-5.4	-3.8	-3.3	-2.9
SI	-2.7	-5.9	-6.4	-4.0	-5.3	-4.9	-	-4.7	-4.7	-2.7	-2.4	-3.3
SK	-2.8	-7.7	-5.1	-4.3	-3.0	-3.1	-	-7.1	-5.2	-4.1	-3.0	-2.4
EA-17	-3.1	-6.2	-4.2	-3.7	-2.9	-2.8		-4.5	-3.6	-2.1	-1.4	-1.5
CZ [a)]	*-6.7*	*-4.8*	*-3.3*	*-4.4*	*-2.5*	*-2.2*	*-5.2*	*-4.6*	*-3.3*	*-2.4*	*-1.0*	*-1.0*

Note: The general government deficit is calculated according to ESA95 methodology and the "Excessive Deficit Procedure" definition.
[a)] Total balance: data according to the CZSO's statistics and notifications (April 2013) for 2010–2012, and the CNB's estimates for 2013 and 2014 from Inflation Report III/2013. The structural balance is calculated under EC methodology. The difference from the European Commission's data for the Czech Republic stems mainly from differences in the GDP forecast and related public budget revenues and expenditures.

Source: European Commission (2005, 2013a), CNB.

The data on the fiscal balance of the government sector (see Table 14 and Chart 38) show that, despite the consolidation measures taken in 2010–2013, the outlook expects most countries (except Germany and Austria) not to return below the 3% deficit reference value (according to the European Commission's forecast, the Czech Republic should get down to this level but not go below it). The positive public budget performance in 2005–2007, based mainly on extraordinary revenues and windfalls, was not sustainable and did not create sufficiently stable conditions for the economy. In this respect, the fact that the structural deficit in the countries under review remained relatively high at a time of favourable economic developments and buoyant growth in this period is a cautionary tale.

In addition to other factors, the government's room for manoeuvre for the application of discretionary fiscal policy measures is determined by the nature of fiscal expenditure. While the adoption of a government resolution or a change to a statutory instrument is sufficient to allow a change in some expenditures, changes to other expenditures require time-consuming and politically difficult amendments to laws or international treaties. The classification into mandatory, quasi-mandatory and non-mandatory expenditures is thus a measure of the speed

at which the government is able to alter such expenditures if the need arises, with mandatory expenditures being the least flexible.[60]

In this regard, the evolution of the expenditure structure in the Czech Republic is not very encouraging. Following a decline in the share of mandatory expenditure in total state budget expenditure and revenues in 2007, the share increased again in 2008–2009 (see Table 15) as a result of adverse cyclical effects and thereafter also as a result of the government's budget austerity measures. Moreover, the current data, based on the government's draft state budget for 2014, imply a further, albeit more moderate, rise in the share of mandatory expenditure.

Table 15: Shares of mandatory state budget expenditure (%)

	2003	2007	2008	2009	2010	2011	2012	2013	2014
Shares of mandatory expenditure in total SB expenditure	53.0	50.8	53.7	53.3	54.3	56.5	56.7	58.3	59.4
Shares of mandatory expenditure in total SB revenue	61.0	54.1	54.6	63.8	62.8	64.4	62.1	63.7	65.4

Note: Data for 2003–2012 are actual figures; data for 2013 and 2014 are based on the government's August 2013 draft state budget (state budget compilation methodology).

Source: Ministry of Finance of the Czech Republic (2013b), CNB calculations.

The mandatory expenditures of individual countries are not directly comparable, as there is no harmonised definition of the term. However, the structure of general government revenue and expenditure provides some insight (see Table 16). "Statutory" mandatory expenditures consist of social payments (social benefits – pension and sickness insurance benefits in particular – as well as government payments for health insurance) and debt service spending. For both indicators as a percentage of GDP, the Czech Republic ranked among the countries with lower figures, below the euro area average. The Czech Republic's low debt service expenditure ratio is a consequence of its still relatively low government debt in an environment of low interest rates. The situation is similar for compensation of employees (salaries in budgetary and subsidised organisations), which are usually referred to as quasi-mandatory expenditures. Part of expenditure on intermediate consumption and investment in the government sector can be included in mandatory expenditures, but cannot be assigned precisely in the table.

Table 16: Public revenues and expenditures in 2012 (% of GDP)

	CZ	AT	DE	PT	HU	PL	SI	SK	EA-17
Total revenues	40.1	48.7	45.2	41.0	46.5	38.4	45.0	33.1	46.2
- taxes	19.2	27.8	23.4	22.8	24.9	20.1	22.3	15.5	25.4
- social contributions	15.6	16.4	17.0	11.6	13.2	12.3	15.5	12.7	15.9
Total expenditures	44.5	51.2	45.0	51.2	48.4	42.3	49.0	37.4	49.9
- compensation of employees	7.3	9.4	7.7	9.9	9.9	9.7	12.6	7.0	10.5
- intermediate consumption	5.7	4.3	4.9	4.6	7.6	5.6	6.9	4.3	5.5
- social payments	20.0	24.8	24.4	22.6	17.6	16.4	19.7	18.6	23.5
- gross fixed capital formation	3.1	1.0	1.5	1.8	3.0	4.6	2.9	1.9	2.1
- interest expenditure	1.5	2.6	2.5	4.4	4.2	2.8	2.1	1.9	3.1

Source: European Commission (2013b).

A high share of mandatory expenditures limits the room for government fiscal policy. On the one hand, high mandatory expenditures can restrict the room for discretionary measures, especially in the short term. On the other hand, they are a source of stability for the economy

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[60] The definition of mandatory expenditures used in this analysis is given in the *Methodological Part*.

over the cycle and can thus have a countercyclical effect. However, a large share of mandatory expenditures may imply a risk for public finances in a phase of economic contraction if the cyclical elasticities of revenues and mandatory expenditures differ significantly, especially when the share of mandatory expenditures is high and tax revenues are very sensitive to changes in GDP growth. This occurred in the Czech Republic in the years after the outbreak of the crisis, when the high share of mandatory expenditures posed a major problem.

The current stock of, and prospects for, **government debt** through its effect on debt service spending and through its effect on governments' ability to finance budget deficits and to refinance maturing government debt, which may have serious macroeconomic impacts, may also become important factors limiting the stabilising ability of fiscal policy.[61] Moreover, fiscal policy will have to take into account the fact that in the reform of the Stability and Growth Pact the debt criterion gains much greater weight than before, comparable to that of the deficit criterion.[62] Table 17 provides a comparison of the ratios of gross consolidated debt to GDP.

Table 17: Government debt, European Commission estimate (% of GDP)

	2003	2007	2008	2009	2010	2011	2012	2013	2014
CZ	28.6	27.9	28.7	34.2	37.8	40.8	45.8	48.3	50.1
AT	65.3	60.2	63.8	69.2	72.0	72.5	73.4	73.8	73.7
DE	64.4	65.2	66.8	74.5	82.4	80.4	81.9	81.1	78.6
PT	59.4	68.4	71.7	83.7	94.0	108.3	123.6	123.0	124.3
HU	58.6	67.0	73.0	79.8	81.8	81.4	79.2	79.7	78.9
PL	47.1	45.0	47.1	50.9	54.8	56.2	55.6	57.5	58.9
SI	27.2	23.1	22.0	35.0	38.6	46.9	54.1	61.0	66.5
SK	42.4	29.6	27.9	35.6	41.0	43.3	52.1	54.6	56.7
EA-17	69.2	66.4	70.2	80.0	85.6	88.0	92.7	95.5	96.0
CZ [a)]	*28.6*	*27.9*	*28.7*	*34.2*	*37.9*	*41.0*	*45.9*	*47.2*	*48.0*

Note: [a)] Data according to the CZSO's notifications (April 2013) for 2003–2012, and the CNB's estimate from the forecast for 2013 and 2014 in Inflation Report III/2013. The creation of a government debt financing reserve (excess issuance of bonds in a situation of extremely low interest rates) contributed to the increase of several percentage points in the debt-to-GDP ratio in 2011–2013.

Source: European Commission (2013a), CNB.

Like the other fiscal indicators, debt was affected by dramatic changes in the economic situation in 2008–2010. In the countries under review, the slightly declining government debt path as a percentage of GDP observed in the pre-crisis years was replaced by a more or less sharp increase in line with the growth in deficits and other extraordinary fiscal measures taken by individual countries to dampen the impacts of the financial and economic crisis. Although the Czech Republic with its government debt below the reference value of 60% of GDP is among the less indebted EU countries, the risk to debt sustainability remains (see section 2.1.3), especially given its fast and constantly rising level. It should also be taken into account that the increasing debt is being reflected in a further rise in mandatory expenditure connected with debt service (see Table 18), although this trend has so far been curbed by the prevailing low interest rates.

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[61] As the euro area debt crisis has shown, if it is unable to finance its government debt, the state may be forced to take tough consolidation measures even in a strongly adverse macroeconomic situation.
[62] See also section 2 in part D.

Table 18: Debt service, European Commission estimate (% of GDP)

	2003	2007	2008	2009	2010	2011	2012	2013	2014
CZ	1.1	1.1	1.1	1.3	1.4	1.4	1.5	1.6	1.6
AT	2.9	2.7	2.6	2.8	2.7	2.6	2.6	2.6	2.6
DE	3.0	2.8	2.8	2.7	2.5	2.6	2.5	2.4	2.3
PT	2.6	2.9	3.0	2.8	2.8	4.1	4.4	4.4	4.3
HU	4.1	4.2	4.2	4.7	4.1	4.1	4.2	4.2	4.0
PL	3.0	2.3	2.2	2.6	2.7	2.7	2.8	2.7	2.5
SI	2.0	1.3	1.1	1.3	1.6	1.9	2.1	2.3	2.8
SK	2.5	1.4	1.2	1.4	1.3	1.6	1.9	1.9	1.9
EA-17	3.3	3.0	3.0	2.9	2.8	3.0	3.1	3.1	3.1

Source: European Commission (2013b).

The overview in the table shows that, despite having a low debt service expenditure level compared to the other countries under review, the Czech Republic ranks among the faster growing countries in terms of this expenditure in the period up to 2012. In the outlook for 2014, the growth rate of this indicator exceeds those in the other countries under review (except Slovenia), including the average for the euro area and the EU as a whole, where this expenditure is expected to be flat at 3.1% and 2.9% of GDP respectively in 2012–2014.

2.1.3 Sustainability of public finance

Sustainability of public finance, i.e. controlled government deficits and debt in the long term, is a key prerequisite for those finances to have a stabilising effect on the economy. In the long run, however, virtually all EU countries are exposed to the problem of population ageing and the related rise in pension, social and health expenditure, which may generate instability in the future. The long-term outlook for age-related government expenditure (mainly on pensions, health care and long-term care) is shown in Table 19.

Table 19: Age-related government expenditures (% of GDP)

	Pensions		Health care		Long-term care		Total	
	2010	2060	2010	2060	2010	2060	2010	2060
CZ	9.1	11.8	6.9	8.6	0.8	1.5	16.8	21.9
AT	14.1	16.1	7.4	9.0	1.6	2.8	23.1	27.9
DE	10.8	13.4	8.0	9.4	1.4	3.1	20.2	25.9
PT	12.5	12.7	7.2	8.3	0.3	0.6	20.0	21.6
HU	11.9	14.7	4.9	6.0	0.8	1.4	17.6	22.1
PL	11.8	9.6	4.9	6.8	0.7	1.7	17.4	18.1
SI	11.2	18.3	6.1	7.2	1.4	3.0	18.7	28.5
SK	8.0	13.2	6.2	8.3	0.3	0.7	14.5	22.2
EA	12.2	14.2	7.3	8.4	1.8	3.5	21.3	26.1

Source: European Commission (2012).

The Czech Republic (together with Slovakia) has the lowest level of expenditure which will be affected by population ageing in the long run, compared to the other selected countries (and also in the broader context of the EU) in the base year. Due to positive effects of parametric changes in the pension system (the "small" pension reform), the Czech Republic maintains a position among the countries with expenditure below the euro area average at the long-term forecast horizon, despite the expected sharp increase in expenditure.

Ensuring public finance sustainability therefore remains a key condition for the future smooth functioning of the Czech economy within the euro area. Limiting growth in age-related expenditure was one of the major objectives of the reform of the pension system prepared by the government and approved by the parliament. As regards public finance sustainability, the increase in the retirement age adopted within the "small" pension reform is a clearly positive measure. The impact of the "large" pension reform launched in January 2013 on public budgets will probably be negligible given the very low interest of the public, and unless major changes are made it does not have the potential to fulfil the declared objective of contributing significantly to the long-term stabilisation of public budgets.

To sum up, despite a relatively low government debt level (compared to that in the other selected countries and to the 60% Maastricht debt criterion), fiscal policy in the Czech Republic has been facing a relatively high structural deficit throughout the period under review and since 2009 has also been facing a growing government debt-to-GDP ratio and increasing debt service expenditure. A relatively high share of mandatory expenditures, which are time-consuming and politically challenging to change, is limiting for fiscal policy. Coping with population ageing will be of key importance for sustainability, even though the "small" pension reform has made an important partial step in this respect. Although compliance with the fiscal convergence criteria can be expected in the years ahead, the effectiveness of fiscal adjustment mechanisms remains a limiting area in the assessment of the Czech Republic's ability to adopt the euro.

2.2 LABOUR MARKET FLEXIBILITY

According to the optimum currency area theory, labour market developments are one of the most important adjustment mechanisms. Adjustment mechanisms in the labour market (wages, employment and employment structure) can significantly aid in absorbing the negative impacts of asymmetric shocks in a currency area. Labour market flexibility is defined by both labour force flexibility and institutional factors.

2.2.1 Unemployment and internal labour market flexibility

As regards labour market flexibility, it is particularly important to track long-term unemployment and regional differences and skills mismatches in the supply of and demand for labour. High long-term unemployment is one of the indicators of high structural unemployment, regional differences in unemployment may be related to low regional mobility of labour, and skills mismatches may point to inappropriate configuration of the education system.

Table 20 shows the **long-term unemployment** rate. This indicator gradually declined in most of the countries under review until 2010, when it reflected the impact of the economic recession with a lag and went up. The long-term unemployment rate in the Czech Republic is one of the lowest in the sample of countries under review despite increasing slightly in 2010 and then stagnating at around 3%. Currently, only Austria and Germany have lower rates. By contrast, much higher levels are recorded in Slovakia, Portugal and Hungary.

Table 20: Long-term unemployment rate (%)

	2003	2007	2008	2009	2010	2011	2012
CZ	3.8	2.8	2.2	2.0	3.0	2.7	3.0
AT	1.1	1.2	0.9	1.0	1.1	1.1	1.1
DE	4.9	4.9	4.0	3.5	3.4	2.8	2.5
PT	2.5	4.2	4.0	4.7	6.3	6.2	7.7
HU	2.4	3.4	3.6	4.2	5.5	5.2	4.9
PL	11.1	4.9	2.4	2.5	3.0	3.6	4.1
SI	3.5	2.2	1.9	1.8	3.2	3.6	4.3
SK	11.5	8.3	6.7	6.5	9.3	9.3	9.4

Note: Shares of persons unemployed for 12 months or more in the labour force (under ILO methodology).
Source: Eurostat.

Cyclical and structural unemployment can be analysed by means of the Beveridge curve.[63] The Beveridge curve plots the vacancy rate against the unemployment rate. Decreasing unemployment amid a rising number of vacancies is associated with cyclical changes on the labour market, i.e. with movements along the Beveridge curve, whereas movements of unemployment and vacancies in the same direction signal changes in structural unemployment, i.e. movements of the curve itself.[64] There was a cyclical decline in unemployment from the second half of 2004 until mid-2008 amid strong demand for labour stemming from robust growth in economic activity. Amid a decline in vacancies, unemployment then started to record a cyclical rise in approximately mid-2008 as the economy cooled. This was reflected in a shift along the Beveridge curve in the south-easterly direction. A gradual shift in the westerly direction was observed from 2010 Q2 onwards in line with a slight decline in job applicants amid a broadly flat supply of vacancies, reflecting the previous weak economic recovery. The renewed decline in economic activity ongoing since the start of 2012 has resulted in a gradual increase in the number of job applicants, which reached a historical high in 2013 Q2. This is reflected in a shift along the curve in the easterly direction. Overall, cyclical effects have thus dominated structural ones in the Beveridge curve in recent years, so labour market flexibility is not likely to have changed significantly.

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[63] In this section, structural unemployment means the sum of structural and frictional unemployment. Classical structural unemployment refers to the case where it would be possible with a given of supply vacancies to reduce unemployment by transferring the unemployed between industries, professions or regions (Jackman and Roper, 1987). On the other hand, frictional unemployment reflects the duration of job seeking (the unemployed find a job in the end, so this is not structural unemployment). As the duration of job seeking may change depending on the phase of the business cycle, the presented indicators of structural unemployment may be cyclically conditional.

[64] Horizontal or vertical shifts of the Beveridge curve not only reflect changes in structural unemployment, but often also administrative effects on the number of unemployed persons and vacancies. Such shifts occurred probably at the end of 2004 and 2005 in connection with an amendment of the Employment Act and at the start of 2006 in response to tighter conditions for reporting vacancies to labour offices (see CNB, 2006). The duty of firms to report vacancies to labour offices was terminated at the start of 2012 (although this change did not visibly affect the Beveridge curve).

Chart 39: Beveridge curve
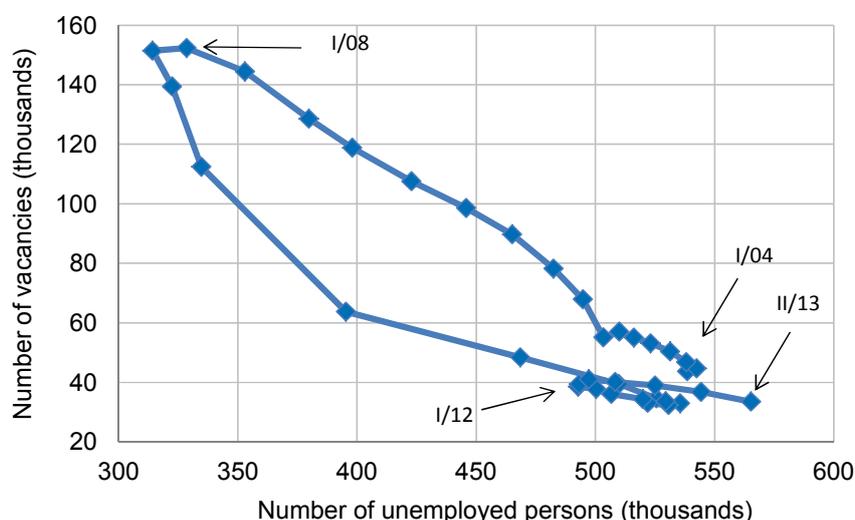
Note: Seasonally adjusted quarterly data.

Source: Ministry of Labour and Social Affairs, CNB calculations.

Regional differences in unemployment can be quantified using the coefficient of variation of the unemployment rate for areas (NUTS II) and regions (NUTS III). Table 21 shows that the coefficient of variation of the unemployment rate for regions in the Czech Republic had been gradually decreasing since 2008 but rose again in 2012. The 2012 rebound in this indicator suggests a slight increase in the mismatch between the regional supply of and demand for labour, with growth in unemployment having been recorded in regions with a traditionally more unfavourable labour market situation. The coefficient of variation also increased in Austria in 2012, while remaining broadly flat in the other countries. The regional differences in unemployment rates in the Czech Republic are among the highest of the countries under review, although not when compared with the core euro area countries (Germany and Austria).

Table 21: Coefficient of variation of the unemployment rate (%)

	NUTS II regions							NUTS III regions				
	2003	2007	2008	2009	2010	2011	2012	2003	2007	2008	2009	2010	2011
CZ	41	42	44	34	31	28	33	44	43	46	35	32	29
AT	40	45	40	31	35	38	44	41	46	41	33	37	40
DE	47	43	45	37	36	41	40	50	49	51	43	42	48
PT	31	20	18	18	20	12	13	36	27	-	-	-	-
HU	33	39	43	31	23	27	25	37	45	48	36	28	31
PL	17	14	18	20	14	15	15	26	39	30	32	28	27
SK	27	38	41	32	27	32	31	35	46	51	38	29	34

Note: The coefficient of variation is the ratio of the standard deviation weighted by region size to the average unemployment rate in per cent.

Source: Eurostat (LFS).

Low regional mobility of the population may be one of the causes of the regional differences in unemployment. Although **internal mobility** (see Table 22) in the Czech Republic has long been greater than in Poland and Slovakia, it is significantly lower than in Austria and especially Germany. This indicator edged up temporarily in the Czech Republic in 2007 compared to the

previous period, but then fell back to its previous level.[65] Sánchez and Andrews (2011) also point to very low population mobility in Slovenia, Slovakia, Poland and the Czech Republic in 2007.

Table 22: Internal migration (per 1,000 inhabitants)

	2003	2007	2008	2009	2010	2011	2012
CZ	21	25	24	22	23	22	22
AT	44	37	38	37	37	38	-
DE	46	44	44	44	44	46	-
HU	24	25	24	21	20	20	19
PL	11	13	11	11	11	11	10
SI	14	19	53	48	52	53	-
SK	16	17	16	15	16	16	15

Note: Migration between municipalities (HU, PL and SI – all changes in permanent residence); SI – only Slovenian nationals until 2007.
Source: Statistical yearbooks, Eurostat, CNB calculations.

To sum up, structural problems persist in unemployment and internal labour market flexibility. In particular, internal geographical labour mobility remains low by comparison with advanced European countries, thus reducing the ability to adjust to asymmetric shocks. On the other hand, the labour market is showing signs of greater flexibility in some aspects that were problematic until recently, for example in the form of rising use of part-time work. Although the regional differences in unemployment in the Czech Republic are still among the highest, they have recently been lower than those in Germany and Austria. The long-term unemployment trend in the Czech Republic is similar to that in the other countries under comparison, although its rate is among the lowest.

2.2.2 Structural unemployment

Structural unemployment is a sign of labour market inflexibility, hindering the smooth two-way transition of economically active persons between employment and unemployment. This type of unemployment shows up, for example, in regional differences in unemployment or skills mismatches between unemployed persons and vacancies. It is not linked with the business cycle, but rather has long-term causes in the institutional settings of the labour market and is associated with inefficient interconnection between the education system and the needs of business practice and with the parameters of national social policy.

Changes in structural unemployment are usually estimated by means of changes in the NAIRU, i.e. the unemployment rate consistent with stable inflation, which abstracts from unemployment due to cyclical effects. However, this economic variable is not directly observable and is estimated by filtering time series using a structural model (for details see the *Methodological Part*). A low or falling NAIRU signals a positive trend in labour market flexibility, while a high or rising NAIRU is an adverse phenomenon.

Chart 40 compares the NAIRUs in the countries under review. It shows that the onset of the global economic crisis in 2008 and 2009 was reflected in an increase in the NAIRUs in all these countries. Longer-term impacts of the economic crisis are apparent mainly in Portugal and Slovenia, where the labour market situation has been deteriorating further. In Poland, Slovakia and Hungary, unemployment rose sharply in 2008 and 2009 but has been flat since then. This

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[65] The figures in Table 32 show migration between communities. The data for Hungary, Poland and Slovenia are likely to be overestimated compared to the other countries, as they relate to all changes in permanent residence. The data in Slovenia were lower until 2007 since they covered Slovenian nationals only.

is reflected in the structural unemployment estimates. On the other hand, Germany coped well with the effects of the crisis, recording only a slight increase in its unemployment rate after the onset of the crisis.

The evolution of the labour market in the Czech Republic was similar to that in neighbouring countries. The rise in the NAIRU halted at just above 6% in 2010 H1. In 2010 and 2011, the labour market situation improved (total unemployment went down) thanks to the more favourable economic situation, but this trend has reversed in the last two years. These changes are reflected in the NAIRU estimates, albeit only slightly. The estimated NAIRU for the Czech Republic is the second lowest (behind Austria) in the sample of countries under review, being closest to the estimated NAIRU for Germany. The Czech labour market has recently been adjusting through a fall in the number of hours worked. This does not reduce the number of employed persons as much and may thus help keep the NAIRU low.

Chart 40: The NAIRU (%)
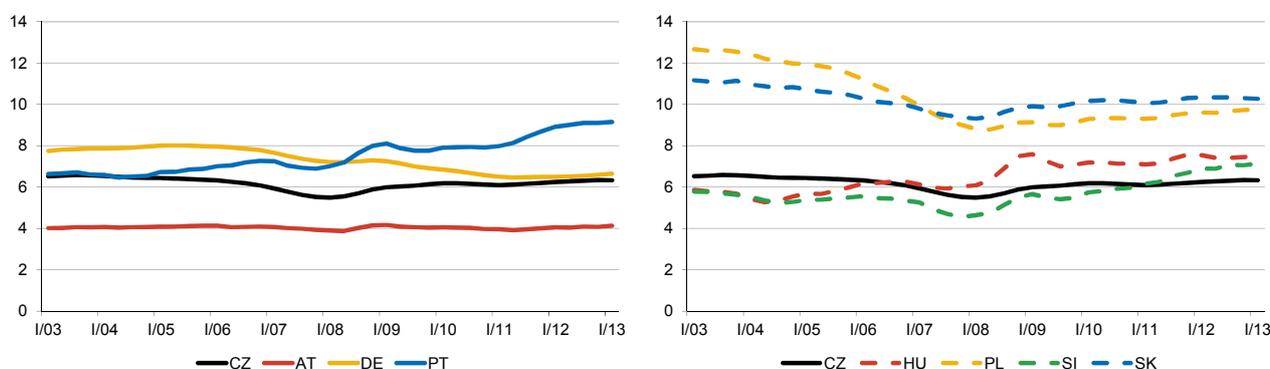
Source: Eurostat, CNB calculations.

2.2.3 International labour mobility

International labour mobility within a currency area is one of the most important channels for the ability of individual economies to absorb asymmetric shocks, in particular those of a long-term nature, through changes in labour supply.[66]

International mobility is also evidenced by the data on the **share of foreigners in the population** (see Table 23). The share of foreigners in the population in the Czech Republic is similar to that in Portugal and Slovenia; in Hungary, Poland and Slovakia, by contrast, it is much lower. Austria and Germany have considerably higher shares of foreigners. In the Czech Republic, the proportion of foreigners in the population rose markedly in 2006–2010 but has been flat since then. Growth in the share of foreigners has also halted in the other countries under review, with the exception of Austria and partly also Germany. The growth in foreign employment before 2010 was a result of rising demand for labour and can be viewed as evidence of an ability to adjust. Foreign workers usually increase labour market flexibility, not least because they are often used as agency workers. According to OECD (2012), the Czech Republic recorded the highest level of immigration from non-EU countries of all the countries that joined the EU in 2004. The data on international migration during the crisis in this study also show that although migration performed its role from the point of view of correcting macroeconomic imbalances, it should by no means be the main, let alone the only, adjustment mechanism. At the same time, the Czech population has long been characterised by a low

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[66] See, for example, Mundell (1961) or McKinnon (1963).

willingness to move abroad in search of work, although internationally comparable data for this area are difficult to obtain.

Table 23: Share of foreign nationals in the population (%)

	2003	2007	2008	2009	2010	2011	2012
CZ	1.8	2.9	3.3	3.9	4.0	4.0	4.0
AT	9.2	9.7	10.0	10.3	10.5	10.8	11.2
DE	8.9	8.8	8.8	8.8	8.7	8.8	9.1
PT	2.3	4.1	4.2	4.2	4.3	4.2	4.2
HU	1.1	1.7	1.8	1.9	2.0	2.1	2.1
PL	0.1	0.1	0.2	0.1	0.1	0.1	0.1
SI	2.2	2.7	3.4	3.5	4.0	4.0	4.2
SK	0.6	0.6	0.8	1.0	1.2	1.3	1.3

Source: Eurostat, CNB calculations.

2.2.4 Institutional environment

The institutional set-up of the labour market has a fundamental influence on its function as an adjustment mechanism. Economic adjustment in the event of a shock may be limited by a distorted relationship between wages and labour productivity, overly strict employment protection measures, or a social system which fails to sufficiently motivate unemployed people to seek jobs.

Trade unions and collective bargaining

Wages carry information about the cost of labour, which influences the allocation of production resources. Setting wages so that they reflect labour productivity and the overall macroeconomic environment is an important prerequisite for economic stability. If industry (or higher) level collective bargaining plays a significant role, it may weaken the link to labour productivity and lead to a higher wage level and higher unemployment (Calmfors and Driffill, 1988).[67] If industry-level bargaining predominates, it may result in lower wage flexibility, thereby reducing the ability of the labour market to absorb shocks. The negative impact of industry-level bargaining can be intensified by regulations extending the binding effect of collective pay agreements beyond the contractual parties (Brandt, Burniaux and Duval, 2005).

According to CZSO data, the **coverage of employees by collective agreements** was relatively stable until 2010 (see Table 24). A sizeable fall in coverage was recorded in 2011, although this may have been a statistical effect (a rise in "not specified" answers rather than "no collective agreement" answers), and this situation continued into 2012. The 2010 Alignment Analyses give the latest available international comparison of the coverage of employees by collective agreements (in 2006). This shows that the Czech Republic ranked in the middle of the group of countries under review, with coverage of 51%. Almost full coverage was recorded in Slovenia, Austria and Portugal.

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[67] While some studies confirm this hypothesis, Flanagan (1999) argues that in the case of an open economy, a high degree of economic integration or a large non-trade union organised sector, the given macroeconomic variables can be more or less independent of the collective bargaining structure.

Table 24: Coverage of employees in the Czech Republic by collective agreements (%)

	2006	2007	2008	2009	2010	2011	2012
Collective agreement yes	48	48	46	47	48	38	38
Collective agreement no	28	38	38	35	31	33	34
Not specified	23	15	16	18	21	30	28

Source: CZSO, Trexima.

Minimum wage

The administrative setting of a minimum wage reduces wage differentiation and wage flexibility for low-wage employees. If the minimum wage is too high, it may reduce demand for less skilled labour and for graduates and thereby increase the total and long-term unemployment of people with low skills and unemployment among graduates and school-leavers (OECD, 1998; Gregg, 2000).

The ratio of the **minimum wage** to the average wage has been decreasing since 2006, when it reached almost 40%, owing to a stagnation of the minimum wage.[68] It fell to 31.7% in 2011 (see Table 25) and is significantly lower than in the other countries under review. By contrast, Slovenia has the highest ratio. Therefore, the minimum wage in the Czech Republic probably does not have a stronger negative impact on the labour market than in the other countries.

Table 25: Minimum wage (% of the average wage)

	2003	2007	2008	2009	2010	2011	2012
CZ	38.1	38.1	35.2	34.0	33.3	32.5	31.7
PT	40.7	41.6	44.6	43.2	42.8	42.6	43.3
HU	42.2	39.8	38.5	38.6	38.8	39.1	44.3
PL	33.9	32.4	35.7	39.7	38.4	38.3	40.1
SI	45.8	43.4	41.0	41.1	47.5	49.0	50.0
SK	34.0	-	34.7	36.5	36.6	36.6	36.7

Note: Until 2008, the minimum wage as a percentage of the average wage in industry and services (excluding public administration). After 2008, the same ratio in industry, construction and services. No minimum wage has been defined at the national level in Germany. In Austria it represents around 30% of the average wage.

Source: Eurostat.

The minimum wage's negative impact on wage flexibility can be more pronounced in sectors and professions where the wage is well below the national average. The minimum wage as a percentage of the wage in the first decile of the wage distribution is traditionally high in low-skilled professions (see Table 26). This relationship indicates that for the 10% of lowest-income persons employed in elementary occupations, the minimum wage made up almost 90% of their average earnings in 2012. However, in the case of the average for the business sector and in the case of all three monitored classes of low-skilled professions, the ratio of the minimum wage to the wage in the first decile decreased in 2012. This was due to renewed wage growth in the lowest part of the wage distribution in these profession classes.

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[68] With effect from 1 August 2013, however, the minimum wage was increased from CZK 8,000 to CZK 8,500.

Table 26: Minimum wage and gross monthly wage in selected professions (%)

Main employment class	Minimum wage / 1st decile						
	2003	2007	2008	2009	2010	2011	2012
Total for the Czech Republic (business sector)	63.9	67.2	63.2	63.9	63.5	72.9	69.9
- services and shop workers	87.6	88.8	85.0	85.9	86.5	91.4	85.2
- skilled agricultural and fishery workers	74.4	70.6	67.2	67.9	65.2	71.9	61.5
- elementary occupations	84.3	89.8	87.7	88.1	89.1	91.7	89.4

Note: Besides data for the Czech Republic as a whole, the table lists the three professions with the highest figures in 2010.

Source: Average Earnings Information System (Ministry of Labour and Social Affairs), CNB calculations.

Employment protection

Strict legislative **conditions for the recruitment and dismissal of employees** tend to reduce labour market flexibility and increase long-term unemployment (OECD, 2004; OECD, 2010).[69] It is also appropriate to monitor the relative strictness of the legal framework for temporary and regular employment, as the combination of high costs of dismissing employees with permanent contracts and low regulation of temporary jobs discourages employers from creating permanent jobs.

Table 27: Employment protection legislation (EPL) index[a]

	Regular employment[b]			Temporary employment[c]			Collective dismissals[d]		
	2003	2008	2013	2003	2008	2013	2003	2008	2013
CZ	3.3	3.1	2.9	0.5	1.1	1.4	2.1	2.1	2.1
AT	2.4	2.4	2.4	1.3	1.3	1.3	3.3	3.3	3.3
DE	2.7	2.9	2.9	1.5	1.0	1.1	3.6	3.6	3.6
PT	4.6	4.4	3.2	2.8	1.9	1.8	2.9	1.9	1.9
HU	2.0	2.0	1.6	0.6	1.1	1.3	3.4	3.4	3.6
PL	2.2	2.2	2.2	0.3	1.8	1.8	3.4	2.9	2.9
SI	-	2.7	2.6	-	1.8	1.8	-	3.4	3.4
SK	2.3	2.2	1.8	1.4	1.6	1.8	4.0	3.8	3.4

Note: [a] The indices take values ranging from 1 to 6, a higher value meaning greater employment protection.
[b] Protection against individual dismissal.
[c] Fixed-term contracts, temporary work agencies.
[d] Over and above individual dismissals.

Source: OECD. For a description of the methodology, see Venn (2009).

According to recent OECD data on the EPL index, protection of regular employment continued to decrease and protection of temporary employment continued to increase in the Czech Republic in 2013. As regards collective dismissals, the situation has long been stable. By international comparison, protection of regular employment was still among the highest, while temporary jobs were generally protected less than in the other countries. Overall, labour market regulation is roughly at the same level in the Czech Republic as in the other countries except for Hungary, where it is lower owing to relatively weak protection of permanent jobs.

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[69] By contrast, Bassanini and Duval (2006) confirm the conclusions of other papers that employment protection, as measured by the EPL index (Employment Protection Legislation), has no clear impact on the overall unemployment rate. Higher EPL values, however, adversely affect the entry of young people onto the labour market. A higher EPL index, according to these authors, is also associated with substitution of part-time contracts with full-time contracts for women.

However, European labour markets are generally rather inflexible and as a benchmark they offer a rather low standard in this case.

A major revision to the Labour Code implemented in 2012 (see the 2012 Alignment Analyses) was followed up with an amendment effective from August 2013 which allows repetition of fixed-term contracts in selected seasonal jobs (agriculture, construction and culture), thereby slightly increasing the flexibility of the Czech labour market.

Labour taxation

Labour taxation inclusive of relevant contributions directly affects labour costs, which are an important determinant of job creation. Thus, higher taxation may reduce the ability of the labour market to respond flexibly to asymmetric shocks. Moreover, high labour taxation increases the share of the grey economy[70] and can significantly increase unemployment if the minimum wage is high.[71] The taxation of high earners is also important from the perspective of international competition, as persons with high skills and high incomes have a greater propensity to migrate.

Overall labour taxation in the Czech Republic in 2012 and throughout the period under review was higher than in Portugal, Poland and Slovakia both at the average wage level and for low earners (see Table 28). By contrast, labour taxation is markedly lower in the Czech Republic than in its advanced neighbouring countries – Germany and Austria – and also Hungary. Compared to the previous year, overall labour taxation decreased slightly for both monitored income levels in the Czech Republic, whereas in most countries it increased for low earners.[72]

Table 28: Overall labour taxation

	100 % of average wage					67 % of average wage				
	2003	**2009**	**2010**	**2011**	**2012**	**2003**	**2009**	**2010**	**2011**	**2012**
CZ	43.2	41.9	42.2	42.5	42.4	41.7	38.6	38.9	39.5	39.3
AT	45.0	47.9	47.9	48.4	48.9	40.2	43.3	43.3	43.7	44.2
DE	51.9	50.9	49.1	49.8	49.8	46.6	46.0	44.9	45.6	45.6
PT	32.6	37.2	37.7	39.0	36.7	29.6	32.3	32.8	33.1	32.0
HU	45.6	53.4	46.4	49.4	49.4	40.9	46.3	43.6	45.2	47.6
PL	42.9	34.0	34.3	34.3	35.5	41.6	33.0	33.3	33.4	34.6
SK	41.4	37.6	37.8	38.9	39.6	40.3	34.3	34.5	36.1	36.9

Note: Income tax and contributions paid by employees and employers as a percentage of total labour costs. Data for employees (individuals without children) earning 100% (left-hand part of the table) and 67% (right-hand part of the table) of the average wage.

Source: OECD (2013).

The data on the components of labour taxation (see Chart 41) show that in all the selected countries health and social insurance affects overall labour taxation to a considerably greater extent than income tax. Compared to the other countries, the level of insurance in the Czech Republic is similar to that in Germany and lower than in Hungary and Austria. By contrast, Portugal and Poland have the lowest insurance burden. Since 2006, overall taxation has risen in all the countries under review. The rise in overall taxation in all the countries was mostly

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[70] Brandt et al. (2005)
[71] Bassanini and Duval (2006).
[72] Under an amendment to the Act on Income Tax, the income tax rate on income exceeding four times the average wage was raised by 7 p.p. for 2013–2015 (a "solidarity tax").

due to contributions paid, while the rise in income tax was only moderate (except in Poland, where income tax fell).[73]

Chart 41: Components of labour taxation in 2012 (% of average wage)

■ Insurance paid by employee   ■ Insurance paid by employer   ■ Income tax
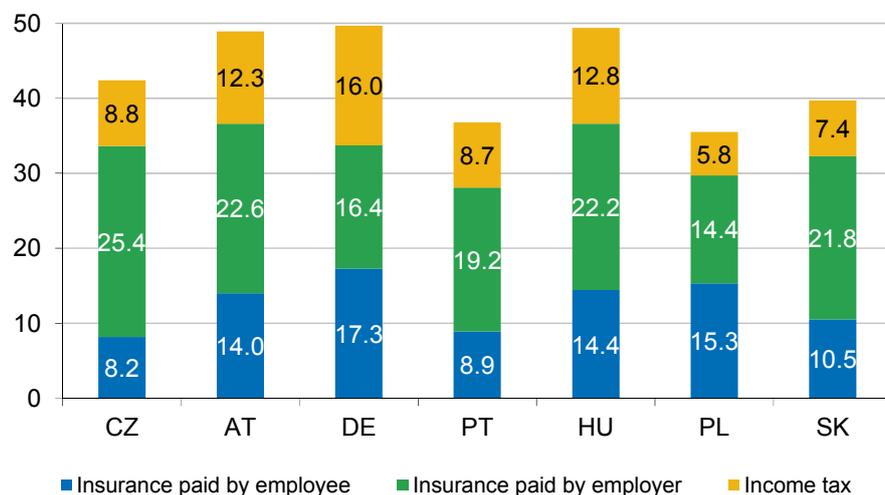
Source: OECD (2013).

The real tax burden, i.e. aggregate tax revenues as a percentage of total compensation of employees, is described by **implicit tax rates** (see Chart 42). Until 2007 the implicit labour taxation rate in the Czech Republic had been the highest of all the countries under review, but in 2008 and 2009 it decreased substantially. This decrease was due to a change in the tax system (a shift to a flat income tax rate calculated from the "super-gross wage") in 2008 and to a reduction in health and social insurance rates and the introduction of a maximum assessment base for both types of insurance in 2009. Since 2010, however, the implicit tax burden has been edging up again; while lower than in Austria, it is still considerably higher than in Portugal, Poland Slovenia and Slovakia and slightly higher than in Germany. With the implicit tax rate in Hungary unchanged, the implicit burden on labour in the Czech Republic was the second highest among the monitored countries in 2011.

Chart 42: The implicit labour taxation rate (%)
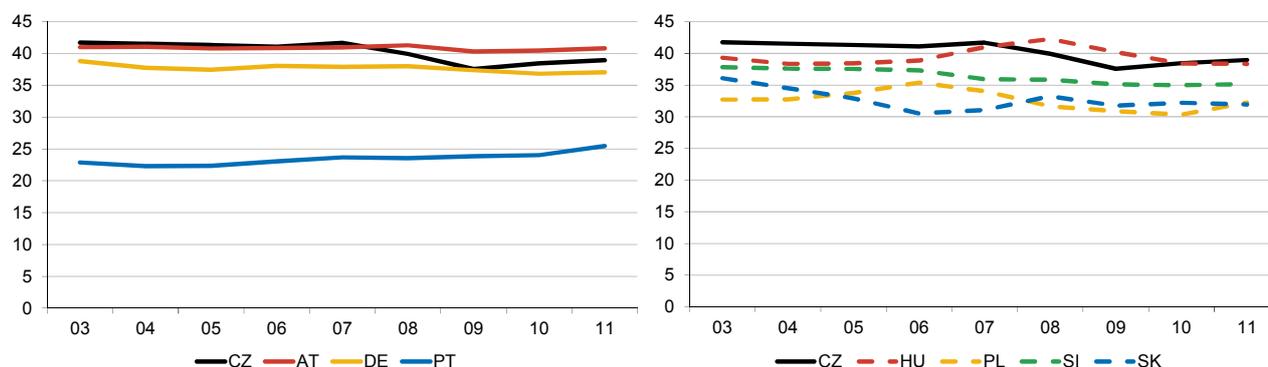
Note: The implicit taxation rate expresses aggregate tax revenues (related to the costs of the production factor of labour) as a percentage of total compensation of employees.

Source: Eurostat (2012).

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[73] In the Czech Republic, an amendment to the Act on Income Tax abolished the cap on health insurance contributions in 2013.

Work-incentive indicators

Taxes affect not only demand for labour, but also, in combination with social benefits, the net income of households and thereby the motivation of unemployed or inactive persons to enter employment (i.e. they affect labour supply). This motivation is measured using the net replacement rate. This is defined as the ratio of net household income when the person under consideration is jobless to that when the same person has a job. Table 29 compares the **net replacement rates** for short-term and long-term unemployment and for two types of households.

As in previous years, the financial incentives to accept a job in the initial phase of unemployment among childless individuals in 2011 were highest in Austria (the lowest replacement rate), followed by Germany and Slovakia. In the Czech Republic, by contrast, the incentive to seek work was the lowest, with the net replacement rate being unchanged from the previous year. In the case of a family with two children, the pressure to find work was the highest in Slovakia. Austria, the Czech Republic and Germany have the highest net replacement rates (i.e. the lowest incentives to work) in the case of long-term unemployment. In Portugal, by contrast, a long-term unemployed person receives only around 25% of potential employment income, which is about one-half the level in the Czech Republic. The net replacement rates for the long-term unemployed in Slovakia, Poland and Hungary were similar to that in Portugal. There are marked differences in the support provided to families with small children in the event of long-term unemployment. As in the initial phase of unemployment, the support provided to families with children is highest in Austria, where the net replacement rate moved close to 100%.

Table 29: Net replacement rates

| | Initial phase of unemployment[a] | | | | | | | | Long-term unemployment[b] | | | | | | | |
| | Individuals without children | | | | Family (2 children)[c] | | | | Individuals without children | | | | Family (2 children)[c] | | | |
	2003	2009	2010	2011	2003	2009	2010	2011	2003	2009	2010	2011	2003	2009	2010	2011
CZ	57	75	77	77	85	79	79	75	48	45	48	49	85	75	74	74
AT	55	55	55	55	84	82	83	97	54	52	54	53	84	82	83	97
DE	60	60	59	59	82	80	77	77	59	50	47	47	82	80	77	77
PT	78	77	75	75	85	77	77	76	24	25	24	25	70	77	73	68
HU	57	73	72	71	64	81	80	78	25	33	32	31	51	71	48	44
PL	75	67	75	75	70	63	72	71	45	34	33	32	64	76	71	69
SK	62	60	61	62	102	57	59	58	58	28	28	27	116	57	59	58

Note: The ratio of net household income when the breadwinner is unemployed and employed (data in %). Income from employment of the breadwinner at 67% of the average wage.
[a] Unemployed persons entitled to unemployment benefits.
[b] Unemployed persons after five years.
[c] The other adult is economically inactive, children of 4 and 6 years of age.

Source: OECD tax benefit models.

Several legislative changes affecting the incentive to work have been made in the Czech Republic in recent years. In addition, changes to the legislation governing unemployment benefits took effect on 1 January 2011. In the event of termination of an employment contract by the employee or by agreement with the employer, the unemployment benefit was reduced to 45% of the previous net wage over the entire support period.[74] Unemployment benefits by law cannot be paid to an applicant who simultaneously receives severance pay, gratuity or termination settlement and will start to be paid only after the applicant ceases to receive these funds. Another important change is the abolition of payment of unemployment benefits

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[74] Employees who prove that they terminated the employment contract for serious reasons are exempt from the reduction in unemployment benefits.

together with so-called "non-clashing" employment, which should increase the incentive to seek "proper" work.[75]

In addition to a rise in the tax discount for children to CZK 11,604 and increases in the minimum subsistence level and the minimum living level affecting claims for some other social benefits (child allowance, maternity allowance and social assistance benefits), normative (deductible) housing expenses were also increased in 2012 and a maximum time limit for drawing housing benefit was introduced. The conditions of unemployment benefits were tightened, as the period within which an applicant must work for at least 12 months was shortened from three to two years.

An analysis of individual data from the household budget surveys in 2011 and 2012 revealed a marked difference in the change in the nominal income of a household with an unemployed person or caregiver compared to a household with economically active persons. The nominal income of households with economically active persons rose between 2011 and 2012. It was driven by growth in nominal wages and pensions across the entire wage distribution.[76] In the case of households with an unemployed person, a person receiving parental allowance or a person caring for a disabled person, nominal income increased mainly in the left part of the wage distribution calculated per economically active person. The stronger wage growth in this segment was partly offset by a drop in allowances paid (parental allowance, child allowances). In addition to subdued wage growth, households with average or slightly above-average income recorded a marked decrease in social benefits. As regards the highest-income households, a significant rise in wages was broadly offset by a decrease in social benefits.

Chart 43: Change in household income in 2012 compared to 2011 (CZK) by type of household and total income per economically active household member
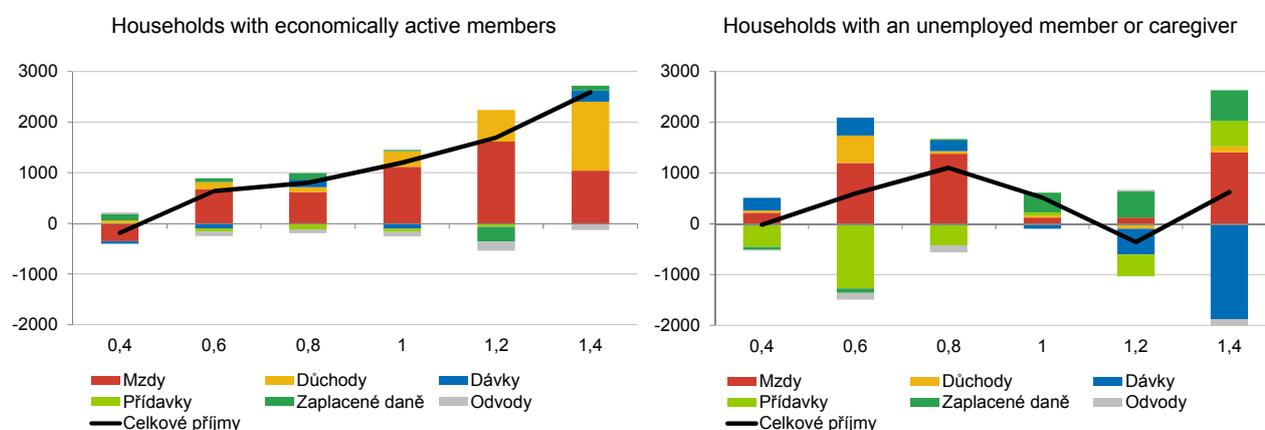
Note: The horizontal axis consists of the wage distribution calculated as the ratio of total household income per economically active member of the household to the gross average wage in 2012. The vertical axis shows the absolute change in household income from 2011 to 2012.

Source: Household budget survey, CNB calculations.

It is therefore likely that the negative contribution of benefits and allowances to income growth is acting towards greater incentives to work, although these incentives are still relatively low as a result of a rise in total household income, especially for low-income households.

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[75] In the case of "non-clashing" employment, unemployed people were allowed to earn up to 50% of the minimum wage (i.e. CZK 4,000 at that time) on top of their unemployment benefit. Since 2011 it has not been possible to combine unemployment benefits with "non-clashing" employment.

[76] The wage distribution calculated as the ratio to the gross average wage per economically active household member.

To sum up, the ratio of the minimum wage to the average wage in the business sector declined. Labour taxation was broadly unchanged in the Czech Republic and its implicit rate is the second highest behind Austria among the countries under review. Despite having risen slightly in the recent period, the incentives to work arising from the configuration of taxes and benefits remain relatively low, especially in the initial phase of unemployment of childless individuals. Low-income families with children receive a similar level of support. The coverage of employees by collective agreements was unchanged from the previous year. Despite a slight decrease, protection of regular employment is still relatively high, while temporary jobs are protected slightly less than in the other countries.

2.2.5 Rate of adjustment of wage growth to the business cycle

The degree of flexibility with which wages respond to the business cycle is an important indicator of an economy's ability to adjust to asymmetric shocks. In countries with weaker or slower wage adjustment, asymmetric shocks have a stronger impact on the real economy in the absence of independent monetary policy. On the other hand, the effects of real shocks on wage inflation are weaker in economies with such inflexible labour markets.

The following analysis examines the dependence (correlation) between the business cycle (measured by the output gap), the unemployment rate and real wages. The fundamental hypothesis that unemployment declines in the boom phase of the cycle is confirmed in all the countries observed. In addition, lower unemployment is correlated with higher wages in most countries. The exceptions are Slovenia, the Czech Republic and the euro area as a whole, where the relationship between unemployment and wages has low statistical significance.

It is reasonable to assume that economies in which wages are more **sensitive to the business cycle** are able to absorb shocks better thanks to a flexible labour market, thereby reducing their impact on unemployment. The results in the table provide weak confirmation of this hypothesis. The sample contains economies with high sensitivity of wages, and lower sensitivity of unemployment, to the business cycle: Poland, Austria and Hungary. By contrast, in Slovenia, the Czech Republic and the euro area as a whole, real wages are less sensitive and unemployment is more sensitive to the business cycle.[77] In Germany and Slovakia, however, high sensitivity of both wages and unemployment is observed. Portugal is an interesting case, as it has low sensitivity of both wages and unemployment to the business cycle. This is caused by the dominance of trend growth in unemployment over the cyclical component of unemployment. The situation in Germany is also somewhat specific. Labour market reforms in the first decade of the 21st century led to a fall in the trend component of unemployment, but the sensitivity of the unemployment gap to the business cycle remained unchanged. Most countries are showing a significant negative correlation between wages and the unemployment rate. The positive correlation in the Czech Republic is probably a result of greater rigidity of nominal wages compared to prices. For example, in the initial phase of the recession we can see an increase in unemployment and a simultaneous rise in real wages caused by falling inflation.

There appears to be significant heterogeneity across countries as regards the sensitivity of the analysed variables to the business cycle. This heterogeneity is particularly pronounced in the case of real wages.[78] Therefore, we cannot say that the monitored countries are aligned in

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[77] Recently, however, the Czech Republic has seen adjustment of the labour market through shorter average working hours. This can be assessed as being an element of greater flexibility reducing growth in structural unemployment. It has also seen a decline in real wages, through which the labour market is adjusting to the subdued economy activity.
[78] The heterogeneity of real wage flexibility in EU Member States is analysed in more detail in Babecký and Dybczak (2012). While nominal wages showed downward rigidity during the 2008–2009 crisis, real wages moved in both directions depending on the specific institutional settings of the labour market in individual countries.

these characteristics, but on the other hand the analysis does not find a systemic difference between old euro area members, new members and acceding countries.

Table 30: Correlations of the cyclical components of the following variables

	GDP vs. wages	GDP vs. unemployment	Wages vs. unemployment
CZ	0.06	-0.92 ***	0.27 *
AT	0.45 ***	-0.78 ***	-0.76 ***
DE	0.58 ***	-0.96 ***	-0.72 ***
PT	0.04	-0.65 ***	-0.77 ***
HU	0.47 ***	-0.65 ***	-0.72 ***
PL	0.71 ***	-0.85 ***	-0.74 ***
SI	-0.3 *	-0.94 ***	-0.17
SK	0.6 ***	-0.94 ***	-0.63 ***
EA	-0.11	-0.94 ***	-0.34 *

Note: Results for 2003 Q1–2013 Q1. The typical phase shift for the correlation between output and unemployment is one quarter, while for the correlations between output and wages and wages and unemployment it is four to five quarters. Statistical significance: *** significance at 1%, ** significance at 5%, * significance at 10%.

Source: Eurostat, CNB calculations.

2.3 PRODUCT MARKET FLEXIBILITY

2.3.1 Administrative barriers to entrepreneurship

High **business start-up costs and barriers** and **complicated administrative regulations** governing entrepreneurship reduce competitive pressures, productivity and thus flexibility on product markets. In the long run, this also has a negative impact on job creation and employment.[79] Lower product market flexibility limits adjustment mechanisms in the event of an asymmetric shock.

According to a World Bank assessment forming part of a regular survey of conditions for doing business, the Czech Republic ranked 75th out of the total of 189 countries assessed in 2013. This means a fall of ten places compared to 2012. World Bank data signal that the Czech Republic's position as regards the conditions for starting a business worsened again year on year and was the worst of all the countries under review. The Czech Republic's fall is due to a relative improvement of the conditions in other countries. An increase in property transfer tax also had a negative effect. By contrast, a partial improvement was seen in the area of closing a business (due, among other things, to a speeding up of court proceedings and subsequent increased enforcement of court decisions). The conditions for closing a business in the Czech Republic are therefore comparable to those in most of the countries under review except Hungary, where closing a business is administratively more demanding.

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[79] Nicoletti and Scarpetta (2004).

Table 31: Conditions for starting and closing a business

	Starting a business					Closing a business				
	2009	**2010**	**2011**	**2012**	**2013**	**2009**	**2010**	**2011**	**2012**	**2013**
CZ	113	130	138	140	146	116	32	33	35	29
AT	122	125	134	133	138	20	20	21	12	14
DE	84	88	98	104	111	35	35	36	19	13
PT	60	59	26	25	32	22	21	22	22	23
HU	39	35	39	54	59	58	62	66	69	70
PL	117	113	126	124	116	85	81	87	37	37
SI	26	28	28	33	38	40	38	39	41	41
SK	66	68	76	80	108	39	33	35	38	38

Note: Country rankings for the conditions for starting and closing a business. Starting a business: number of procedures, time (days), cost and minimum capital requirements in % of income per capita. Closing a business: time (years), cost in % of total assets and recovery rate in cents on the dollar. The rankings for 2009–2011 are according to the Doing Business methodology valid until 2012. The figures for 2012 and 2013 were recalculated to reflect data changes and revisions. More information can be found at http://www.doingbusiness.org/methodology/methodology-note.

Source: World Bank (2013).

2.3.2 Tax burden on businesses

The tax burden on businesses significantly affects product market flexibility, since, given the high international mobility of capital, the taxation rate can be one of the deciding factors for investment allocation. The corporate tax rate is assessed by means of the statutory corporate income tax rate and the implicit corporate tax rate.

The Czech Republic has been applying a **corporate income tax rate** of 19% since 2010. Together with Slovenia and Poland, this is the lowest figure among the countries under comparison (see Table 32). Except for Hungary, which already had the lowest tax burden at the beginning of the period under review and where the tax rate was roughly flat afterwards, corporate income tax rates declined sharply in the countries under comparison between 2002 and 2009. The tax burden on businesses in the countries under comparison has been unchanged over the last three years, with the exception of Portugal, which since 2012 has been applying a 2.5 p.p. higher rate than in 2011, Slovakia, which raised its flat corporate income tax to 23% this year, and Slovenia, where conversely the tax declined to the lowest level of 17%.

Table 32: Highest statutory corporate income tax rate (%)

	2003	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**Change (p.p.)**
CZ	31.0	24.0	21.0	20.0	19.0	19.0	19.0	19.0	-12.0
AT	34.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	-9.0
DE	39.6	38.7	29.8	29.8	29.8	29.8	29.8	29.8	-9.8
PT	33.0	26.5	26.5	26.5	29.0	29.0	31.5	31.5	-1.5
HU	19.6	21.3	21.3	21.3	20.6	20.6	20.6	20.6	1.0
PL	27.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	-8.0
SI	25.0	23.0	22.0	21.0	20.0	20.0	18.0	17.0	-8.0
SK	25.0	19.0	19.0	19.0	19.0	19.0	19.0	23.0	-2.0

Note: Changes in p.p. for 2003–2013.

Source: Eurostat.

The level of tax rates is a simple indicator of the taxation rate. However, the tax burden is also determined by the tax base, which is affected by depreciation, amortisation and tax

exemptions. The **implicit tax rates**, defined as aggregate corporate income tax revenues as percentage of the potential tax base, are a complementary indicator of the tax rate (see Table 33). Following a decrease in the implicit tax rate in the Czech Republic in 2008 and 2009, its downward trend came to a halt in 2013. Implicit taxation in the Czech Republic is the second highest among the countries under review. This shows that a low tax rate does not mean a low tax burden. Relatively high taxation and higher administrative costs can hamper a flexible reaction of the product market and potential absorption of asymmetric shocks in the event of euro adoption.

Table 33: Implicit corporate income taxation rate (%)

	2003	2007	2008	2009	2010	2011	Change (p.p.)
CZ	29.0	23.7	22.0	20.5	20.1	20.1	-8.4
AT	26.7	24.0	25.3	24.0	21.4	22.0	-6.1
PT	20.6	27.4	36.1	-	-	-	-
HU	19.6	18.7	19.0	21.0	9.5	7.7	-13.0
PL	21.9	20.3	20.3	15.0	12.5	12.7	-24.3
SI	21.3	30.5	27.0	22.3	22.8	19.7	-5.6
SK	34.8	19.8	21.8	21.8	18.8	17.5	-16.9

Note: The implicit taxation rate expresses aggregate corporate tax revenues as a percentage of the potential tax base. Changes in p.p. for 2003–2011. Data on the implicit taxation of corporate income are not available for Germany.

Source: Eurostat.

2.4   THE BANKING SECTOR AND ITS SHOCK-ABSORBING CAPACITY

The banking sector is the largest segment of the financial sector in the Czech Republic (accounting for almost 80% of the total assets of financial institutions excluding the CNB) and continues to report favourable levels of standard macroprudential indicators. The stability of the banking sector therefore significantly increases the probability of it performing its adjustment and stabilisation mechanism function well in the event of euro adoption. On the other hand, experience from the euro area shows that the stabilisation function of the banking sectors of some countries weakened rapidly following euro adoption. In this respect, the risks linked with the banking union project, which the Czech Republic would enter upon euro adoption, may also be significant for countries like the Czech Republic.[80] The banking sector displays very good profitability, capitalisation and liquidity, and its independence of financing from abroad is also a favourable factor. The good capitalisation of the domestic banking sector provides enough room for absorbing loan impairment losses. In 2012, moreover, banks' capital adequacy increased further and stable client deposits with banks rose as well. The Czech banking sector is therefore not a source of shocks and should be able to absorb fluctuations emanating from the domestic economy or from abroad.[81]

The **domestic banking sector maintained high profitability** during the crisis, and although it is expected to decrease in the period ahead because of lower net interest income, it can be expected to continue exceeding the figures for the euro area countries (see Chart 44). The profit of the Czech banking sector consists mainly of net interest income and fee and profit from fees and commissions. The Slovak and Polish banking sectors are also showing good profitability.

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[80] See section D.2 and Financial Stability Report 2012/2013, Boxes 1 and 2.
[81] Data presenting international comparisons are only indicative, as the methods for calculating individual indicators and consolidating can differ across countries (with the exception of non-performing loans, the IMF FSI data for the Czech Republic are always consolidated); moreover, data revisions occur in some cases.

Chart 44: Return on equity and return on assets (RoE and RoA, %)
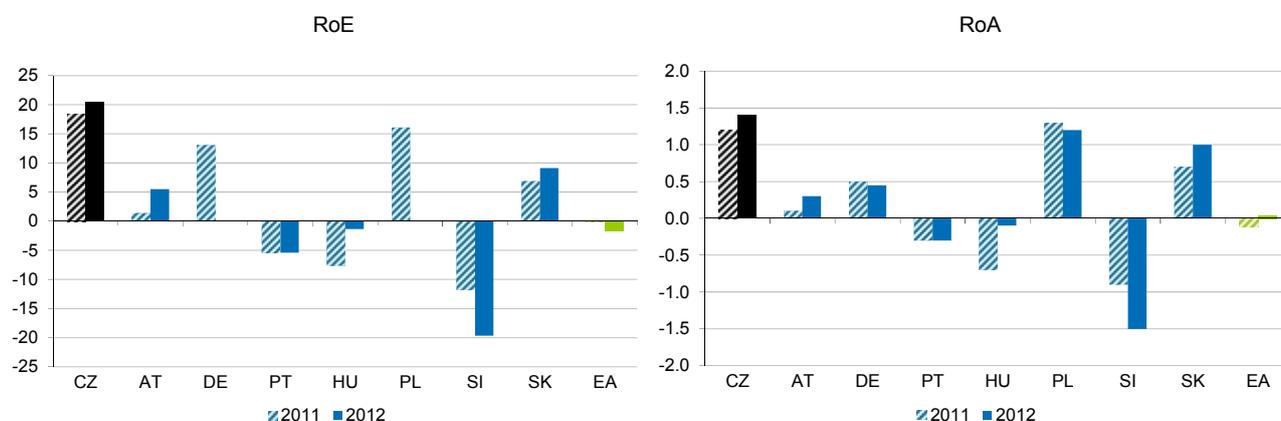
RoE

RoA

Note: EA represents the GDP-weighted average of the euro area member countries.

Source: IMF FSI.

The **quality of the loan portfolio** of banks in the Czech Republic, as expressed by the ratio of non-performing loans (NPLs), remained in 2012 on similar level as in previous years (see Table 34). Despite the fall in economic activity in 2012, there was no major increase in credit risk in bank balance sheets, although the risks remain tilted upwards in the Czech Republic as well as in many euro area countries. The evolution of credit quality is still heterogeneous across the countries under review; some countries are now recording stabilisation in the area of NPLs, while in others (Portugal, Hungary, Slovenia) the NPL ratio is still rising relatively quickly.

Table 34: Non-performing loans, NPLs (% of total bank loans)

	2010	2011	2012
CZ	6.2	6.0	6.0
AT	2.8	2.7	2.8
DE	3.2	3.0	-
PT	5.2	7.5	9.8
HU	9.8	13.4	15.8
PL	4.9	4.7	5.2
SI	8.2	11.8	15.2
SK	5.8	5.6	5.2
EA	4.9	5.6	6.5

Note: The table does not contain figures for Germany in 2012 owing to data unavailability. EA represents the GDP-weighted average of the euro area member countries. The 2011 value was used for Germany.

Source: IMF FSI, CNB.

Chart 45: Capital adequacy ratio (%)
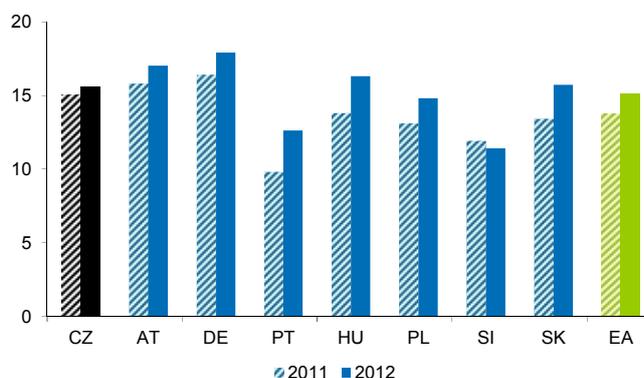
Note: EA represents the GDP-weighted average of the euro area member countries.

Source: IMF FSI.

The stability and shock-absorbing capacity of the Czech banking sector is aided by a relatively strong **capital buffer**, consisting mainly of retained earnings. The capital adequacy ratio of the domestic banking sector continued to rise in 2012 and fluctuated around 16%. This is also a good result in comparison with the countries under review (see Chart 45). Thanks to their sufficient capitalisation and operating profits, domestic banks should be able to withstand potential large credit losses, as also evidenced by the latest banking sector stress tests performed by the CNB.

Domestic banks focus largely on a conservative banking business model that involves **accepting deposits and providing loans**. Deposits of residents exceed loans to residents by more than 40% (see Chart 46), the largest figure in the countries under review, while almost 90% of deposits and 80% of loans are vis-à-vis residents in the domestic currency. The Czech banking sector is not dependent on funds from abroad and its net external position increased compared to 2011, reaching 7.6% of GDP (see Chart 47). Of the other countries under review, only Austria, Germany and Slovakia have a positive net external position of their banking sectors. Czech banks' exposure to highly indebted euro area countries (not only to governments, but also to private sectors) is low, and the stress test results therefore indicate that even a drop in its value would not have a significant effect on the banking sector as a whole.[82]

Chart 46: Ratio of deposits to loans in selected EU countries (%)

Note: Data as at the end of 2012; deposits/loans to residents. EA represents the euro area.

Source: ECB.

Chart 47: Net external position of banking sector (net external assets in % of GDP, 2012)

Note: Data for AT as at the end of 2011.

Source: IMF IFS, central banks.

The above information suggests that Czech banks are affected mainly by the real economy and have only limited **links to foreign financial markets**. Moreover, the relatively high excess of funds over loans preserves room for banks to further expand their lending while maintaining sufficiently high liquid assets without being forced to seek funding on interbank markets or abroad. Thus, the link of domestic banks to the European banking sector is due mainly to the fact that 95.4% of the banking sector's assets was directly or indirectly controlled by foreign owners at the end of 2012.

To sum up, the Czech banking sector is displaying very good levels of traditional macroprudential indicators. It should therefore continue to be able to absorb adverse economic shocks and dampen their impacts so that the domestic real economy is affected as little as possible.

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[82] See the latest stress tests using data as of 30 September 2013 published on the CNB website.

3 SUMMARY OF RESULTS OF ANALYSES

Analysis Method / Category	Section	Indicator value available as of 31 July 2013							Commentary
		2003	2007	2008	2009	2010	2011	2012	

Economic (mis)alignment of euro area countries

Convergence of real and nominal variables in the euro area									
GDP	D 1.1	divergence		convergence		stability			Convergence of GDP level during crisis due to sharper decline in more advanced countries.
GDP growth	D 1.1	stability			divergence			stab.	Crisis-related misalignment of GDP growth rates stabilised again.
Unemployment	D 1.1	convergence			divergence				Continuing increase in misalignment of unemployment rates in euro area.
Inflation rate	D 1.1	mis.	mis.	gradual convergence					Temporarily higher misalignment in inflation rates decreasing again since 2011.
Long-term interest rates	D 1.1	convergence			strong divg.			stab.	Strong rise in divergence of long-term interest rates halted in 2012.

Fiscal position of euro area countries									
Number of countries not compliant with SGP deficit criterion	D 1.2	6	2	6	14	14	11	11	Sizeable crisis-related increase; decrease in number of countries in recent years.

Cyclical and Structural Alignment

Direct alignment indicators

Real economic convergence									
GDP per capita, PPP, EA=100	1.1.1	69.7	76.1	74.3	76.1	73.6	73.9	73.5	Czech convergence process not yet resumed. Indicator above levels of PT, HU, SK and PL, but slightly lower than SI, where it is falling.
Price level of GDP, EA=100	1.1.1	50.5	60.9	70.8	66.0	70.0	70.5	69.3	Czech convergence process not yet resumed. Czech Republic lagging well behind AT and DE, but also PT and SI.
Real exchange rate against euro, 1998=100; from 2012: 2002=100	1.1.1	95	109	125	118	123	126	124	Real rate of appreciation 3.1% a year on average so far. Real appreciation of koruna against euro at average rate of 1.7–2.3% a year can be expected over next five years.
3M real interest rates	1.1.1	2.3	0.1	-2.1	1.6	0.1	-0.9	-2.4	Relatively low real rates mean lower need for adjustment.
3M real rate outlook for following five years given no change in exchange rate and risk premium (min/max)	1.1.1	-	0.5	0.5	-0.2	0.0	0.2	0.1	After euro adoption, real rates would probably be negative.
			-0.6	-1.7	-1.6	-0.6	-0.3	-0.5	

Analysis Method / Category		Section	Indicator value available as of 31 July 2013							Commentary
			2003	2007	2008	2009	2010	2011	2012	
Correlation coefficients of real economic activity										
GDP	t	1.1.2	0.23			**0.96****				Correlation of economic activity shows marked rise in intensity and speed of transfer of shocks from euro area economy to Czech Republic. Result may have been affected by significant extraordinary external shocks during crisis.
	t-1	1.1.2	**0.61****			0.53**				
	t-2	1.1.2	0.51			0.12				
IPI	t	1.1.2	0.26**			**0.40****				Increase and acceleration is also visible in monthly industrial production data.
	t-1	1.1.2	0.07			0.26**				
	t-2	1.1.2	**0.36****			0.35**				
	t-3	1.1.2	0.07			0.13				
Czech exports to EA vs. EA GDP	t	1.1.2	0.40*			**0.91****				Higher and faster correlation is visible mainly between euro area GDP (proxy for external demand) and Czech exports to member countries.
	t-1	1.1.2	0.39*			0,47*				
	t-2	1.1.2	**0.45****			0.10				
Structural similarity of Czech economy and EA-16 economy (EA-12 until 2008)										
Landesmann index		1.1.3	0.09	0.13	0.13	0.14	0.13	0.14	0.15	Czech Republic has highest structural dissimilarity among countries compared, owing to higher share of industry and lower share of services (financial intermediation among others).
Interest rate convergence										
Difference in three-month and ten-year interest rates		1.1.4	convergence			slight divg.	stabilisation		very slight divg.	Sustained low interest rate differentials. Very slight increase in 2012 is now correcting. Lower than in HU and PL.
Alignment of exchange rates to euro										
Bivariate GARCH		1.1.5	high correlation			slight fall in corr.	high correlation			Correlation of exchange rates of koruna and euro against dollar is high at 0.85–0.95, higher than for other countries under comparison.
Exchange rate volatility (exchange rate to euro, annualised, in %)										
Historical volatility (daily returns for period of six months)		1.1.6	4-8	4	5-8	13-16	6-7	4	7-8	Volatility rose in early 2012 owing to euro area debt crisis but has been falling since then and is still lower than in PL and HU.
Implied volatility (options)		1.1.6	6-8	4	5-7	9-19	6-10	6-7	8-10	

Analysis Method / Category	Section	Indicator value available as of 31 July 2013							Commentary
		2003	2007	2008	2009	2010	2011	2012	
Integration of the economy with the euro area									
Exports, %	1.1.7	71.5	66.1	65.9	67.2	66.3	65.7	63.3	Relatively high level of trade links. Falling trend in exports reflects search for sales opportunities in emerging markets.
Imports, %	1.1.7	60.4	65.5	62.6	63.6	60.6	60.0	59.9	
Inflow of direct investment, % of GDP (stock)	1.1.7	36.7	47.0	50.0	51.6	53.0	48.5	-	High level of ownership links, particularly on FDI inflow side.
Outflow of direct investment, % of GDP (stock)	1.1.7	1.6	3.1	5.0	5.1	5.8	5.1	-	
Intra-industry trade, Grubel-Lloyd index	1.1.7	-	-	-	0.4	0.4	0.46	0.45	High share of intra-industry trade (only DE has higher share; AT has identical share) remains broadly unchanged.

Similarity of monetary policy transmission

		2003	2007	2008	2009	2010	2011	2012	
Financial sector									
Financial system assets (% of GDP)	1.2.1	-	136	142	148	151	157	166	Ratios of financial system assets to GDP and private sector debt to GDP are substantially lower than in AT, DE and PT, slightly lower than in SI and slightly higher than in HU, PL and SK.
Private sector debt (% of GDP)	1.2.1	29	46	50	52	53	56	57	
Structure of financial assets and liabilities, transmission of policy rates to client rates									
Structure of financial assets and liabilities of corporations and households	1.2.2	-	-	differences apparent					Difference apparent mainly in relatively high share of trade liabilities in corporate balance sheets and in household asset structure.
Effect of monetary policy on client interest rates	1.2.3	-	-	-	similarity				Effect of money and financial market rates on client rates is similar in Czech Republic as in euro area.
Inflation persistence									
Method 1 (non-parametric)	1.2.4	-	0.79	0.79	0.81	0.81	0.81	0.86	
Method 2 (sum of AR coefficients, constant mean)	1.2.4	-	0.83	0.82	0.91	0.81	0.84	0.85	Inflation persistence in Czech Republic is average compared to other countries under review.
Method 3 (sum of AR coefficients, time-varying mean)	1.2.4	-	0.32	0.32	0.38	0.38	0.43	0.42	

Analysis Method / Category	Section	Indicator value available as of 31 July 2013							Commentary
		2003	2007	2008	2009	2010	2011	2012	

Financial market integration

Analysis Method / Category	Section	2003	2007	2008	2009	2010	2011	2012	Commentary
Money market	1.2.5	-	-0.6	-0.39	-0.38	-0.37	-0.38	-0.39	Financial and economic crisis and subsequent euro area debt crisis led to decline in speed of adjustment on some markets analysed, but this has picked up again in recent years.
Foreign exchange market	1.2.5	-	-0.8	-0.89	-0.90	-0.88	-0.89	-0.88	
Bond market	1.2.5	-	-0.8	-0.73	-0.69	-0.73	-0.73	-0.74	
Stock market	1.2.5	-	-0.9	-0.84	-0.77	-0.79	-0.80	-0.80	

Spontaneous euroisation

Analysis Method / Category	Section	2003	2007						Commentary
Degree of euroisation	1.2.6	-	-			low			Use of euro by Czech corporations is consistent with openness of Czech economy. Czech households make minimal use of euro.

Adjustment Mechanisms

Fiscal policy

Analysis Method / Category	Section	2003	2007	2008	2009	2010	2011	2012	Commentary
Overall general government balance % of GDP, ESA 95 (outturns until 2012, CNB forecast from 2013)	2.1.2	-6.7	-	-4.8 (2010)	-3.3 (2011)	-4.4 (2012)	-2.9 (2013)	-3.0 (2014)	Latest developments reflect fiscal consolidation measures. According to forecast, deficit will meet Maastricht convergence criterion in 2013.
General government structural balance % of GDP, ESA 95, EC methodology (outturns until 2012, CNB forecast from 2013)	2.1.2	-	-	-4.5 (2010)	-3.0 (2011)	-1.7 (2012)	-1.6 (2013)	-2.1 (2014)	Fiscal consolidation led to decline in structural balance, but at cost of procyclical restrictive effect on economy.
Government debt % of GDP, ESA 95 (outturns until 2012, CNB forecast from 2013)	2.1.2	28.6	34.2 (2009)	37.8 (2010)	40.8 (2011)	45.8 (2012)	48.3 (2013)	50.1 (2014)	Total government debt is rising. Ratio of government debt to GDP remains below Maastricht convergence criterion, but risk to its sustainability remains.

Analysis Method / Category	Section	Indicator value available as of 31 July 2013							Commentary
		2003	2007	2008	2009	2010	2011	2012	

Labour market flexibility

Unemployment and internal labour market flexibility									
Long-term unemployment rate, %	2.2.1	3.8	2.8	2.2	2.0	3.0	2.7	3.0	Long-running economic downturn visible in evolution of long-term unemployment. However, its rate is one of lowest among countries under review.
Regional coefficient of variation in unemployment rate (at regional level, NUTS III)	2.2.1	44	43	46	35	32	29	-	Decrease in regional differences in unemployment rate in recent years. However, slight rebound was recorded in 2012 in NUTS II breakdown.
Internal migration – per 1,000 inhabitants	2.2.1	21	25	24	22	23	22	22	Internal migration lower than in AT, DE and SI.

Structural unemployment									
NAIRU structural unemployment rate, %	2.2.2	6.6	5.7	5.7	6.0	6.2	6.1	6.3	Structural unemployment rate among lowest of countries compared (behind DE).

International migration									
Share of foreign nationals in population (%)	2.2.3	1.8	2.9	3.3	3.9	4.0	4.0	4.0	Growth in foreign employment halted in 2009.

Institutional environment									
Trade unions and collective bargaining Coverage of employees by collective agreements, %	2.2.4	minor impact	48	46	47	48	38	38	Coverage of employees by collective agreements fell in 2011. Practice of extending coverage of higher collective agreements is not very common in Czech Republic.
Minimum wage as % of average wage in industry and services	2.2.4	-	38.1	35.2	34.0	33.3	32.5	-	Falling since 2007. Level in Czech Republic is lowest among countries compared.

Analysis Method / Category	Section	Indicator value available as of 31 July 2013							Commentary
		2003	2007	2008	2009	2010	2011	2012	
Overall labour taxation (persons on average wage, %)	2.2.4	43.2			41.9	41.9	42.5	42.4	Overall labour taxation in Czech Republic is higher than in PT, PL and SK and lower than in DE, AT and HU.
Overall labour taxation (persons on two-thirds of average wage, %)	2.2.4	41.7			38.6	38.9	39.5	39.3	Overall labour taxation in Czech Republic is higher than in PT, PL and SK and lower than in DE, AT and HU.
Ratio of net household income when breadwinner is unemployed / employed, %	2.2.4	57			75	77	77	-	Financial incentive to work in case of short-term and long-term unemployment in Czech Republic is lower than in other countries.

Rate of adjustment of real wage growth to unemployment rate			
Correlation of cyclical components of output, unemployment and wages.	2.2.5	Output and unemployment	-0.94***	Low real wage flexibility. Fluctuations in economic activity reflected more in unemployment. Analysis performed for first time in this issue, so historical comparison not possible.
	2.2.5	Output and wages	-0.11	
	2.2.5	Unemployment and wages	-0.34*	

Product market flexibility

Administrative conditions for business									
Conditions for starting a business (ranking, WB)	2.3.1	-	-	91	113	130	136	140	Conditions in Czech Republic are worst among countries compared.
Conditions for closing a business (ranking, WB)	2.3.1	-	-	115	116	32	34	34	Conditions worse than in DE, AT and PT, better than in other new Member States.

Taxation rate									
Implicit corporate taxation rate	2.3.2	29.0	23.7	22.0	20.5	20.1	20.1	-	Implicit tax rates higher than in HU, PL, SK and SI, lower than in AT.

Flexibility and shock-absorbing capacity of banking sector

Non-performing loans/total loans, %	2.4	-	2.6	3.2	5.2	6.2	6.0	6.0	Increase due to economic recession. Ratios have stabilised in recent years.
Capital adequacy of banks, %	2.4	-	11.0	11.6	14.0	15.3	15.0	15.6	Capital adequacy shows good results compared to countries under review.
Deposit-to-loan ratio, %	2.4	-	137	128	134	134	134	141	Sufficient deposit financing sources ensure relative independence of Czech banks on both Czech interbank market and foreign financial markets.

F   METHODOLOGICAL PART

D   *Economic alignment of euro area countries*

The economic alignment of the euro area countries was analysed using simple descriptive statistics of macroeconomic fundamentals – GDP per capita, real GDP growth, unemployment, the inflation rate and long-term interest rates. The individual descriptive statistics were calculated across countries, i.e. with no weight adjustment for the size of the given economy or the population of the given country. In addition to unweighted values, the charts show values for the euro area as a whole.

In the charts, therefore, the standard deviation at time t is calculated using the formula

$\sigma_t = \sqrt{\dfrac{\sum\limits_{i=1}^{n}(x_{i,t}-\overline{x_t})^2}{(n-1)}}$, where $x_{i,t}$ is the value of the macroeconomic variable for country i,

$\overline{x_t} = \dfrac{\sum\limits_{i=1}^{n} x_{i,t}}{n}$ is the arithmetic (unweighted) mean of the variable across countries at time t and

n is the number of countries under review. In addition to the standard deviation and the mean, the median is analysed. It indicates the value of the variable lying in the middle of the set sorted by magnitude. This means that one-half of the countries have values above the median.

The relative alignment of the variables in the euro area (see Chart 7) is depicted using their normalised standard deviations. The standard deviations were normalised by subtracting the mean and dividing the difference by the standard deviation of the series of standard deviations. The y-axis therefore shows the relative deviation from the long-term mean, where the standard deviation of the series is the unit. A negative value means that alignment is above the long-term mean.

E   *Analyses of the Czech Republic's Alignment with the Euro Area*

1   CYCLICAL AND STRUCTURAL ALIGNMENT

1.1   DIRECT ALIGNMENT INDICATORS

1.1.1   Real economic convergence

The comparison of GDP per capita at purchasing power parity (PPS – Purchasing Power Standard) and the average price level of GDP is based on Eurostat data. The real exchange rate against the euro is based on the Harmonised Index of Consumer Prices. The average annual rate of real appreciation is calculated as the geometric mean of the appreciation since 2003.

The outlook for future real appreciation for the next five years is based on a panel estimate which links the price level of final consumption of households with GDP at purchasing power parity per capita for 36 European countries between 1995 and 2012 (see also Čihák and Holub,

2003 and 2005). The following relationship was estimated using a two-stage least-squares panel method with no fixed or random effects:

$$P_{C,t} = 22.43 + 0.80\ GDP_{PPS,t} + 0.88\ AR(1)_t,$$

where $P_{C,t}$ is the price level of final consumption of households in year t, $GDP_{PPS,t}$ is gross domestic product at purchasing power parity per capita in year t (in both cases EA-17 = 100) and $AR(1)_t$ is the first-order autoregressive term. The simulations of the future pace of equilibrium real exchange rate appreciation take as their starting point the estimates of GDP and the price level for 2013 based on European Commission and Eurostat forecasts for real GDP growth, nominal exchange rates and inflation in the individual countries in 2011. They also assume beta-convergence of GDP towards the level of the EA-17 at a rate of 2.5% a year. A range around the mean appreciation estimate is obtained by increasing or decreasing the autoregression coefficient by one standard error of its estimate (i.e. the coefficient is within a range of roughly 0.84–0.92 in the simulations).

Real interest rates are derived from three-month money market interest rates. Three-month interest rates were selected for reasons of data availability in the Eurostat database for all the monitored countries over the whole period under review. The average annual level of interest rates is deflated by the annual inflation rate for the country concerned, using the Harmonised Index of Consumer Prices. The estimate of real "equilibrium" rates going forward is based on the assumptions of full elimination of the money market risk premium thanks to euro adoption and an equilibrium three-month real rate in the euro area of 1.8%. From this figure, the range of the estimates of future equilibrium real exchange rate appreciation for each of the countries (see above) is subtracted, corresponding to the future expected inflation differential vis-à-vis the euro area average.

The wage level data are calculated from Eurostat data as the ratio of the annual volume of wages and salaries in euro or PPS to the number of employees (without conversion into full-time equivalents, for which not enough data are available). The PPS data for 2012 are approximate, as accurate data on the volume of wages and salaries for the EA-17 and some other countries under comparison were not available as at the closing date for data for these analyses.

1.1.2   Correlation of economic activity

The alignment of economic activity in the selected countries with the euro area is analysed using correlation analysis. Mutual relationships between individual countries and the euro area are assessed using the pairwise correlation coefficients applied to real GDP time series, industrial production indices (IPIs) and export indices, taking into account the different lags of the time series in the different countries relative to the euro area series.

The **simple (Pearson) correlation coefficient** is used to assess the strength of the linear relationship:

$$r_{xy} = \frac{s_{xy}}{\sqrt{\sigma_x^2 \sigma_y^2}},$$

where s_{xy} is the estimate of covariance and σ_x and σ_y are estimates of the standard deviation of time series x and y.

Simple correlations are calculated over a moving time window to obtain the **rolling correlation**. The corresponding time window for a given quarter is defined as the last 20 observations (5 years). The rolling correlation should help to reveal trends in alignment.

When examining the alignment of cyclical behaviour between selected economies in order to assess the impact of economic policy, it is appropriate to monitor the correlation only within a certain band. Cycles between one and a half and eight years long are considered most frequently. **Dynamic correlation,**[83] which allows this requirement to be met, was therefore used as a third method. Dynamic correlation is based on spectral analysis of time series, takes values in the range [-1, 1] and, analogously to the static correlation coefficient, is defined by the relationship:

$$\rho_{xy}(\lambda) = \frac{C_{xy}(\lambda)}{\sqrt{S_x(\lambda)S_y(\lambda)}},$$

where $S_x(\lambda)$ and $S_y(\lambda)$ are spectral density functions and $C_{xy}(\lambda)$ is a co-spectrum, while λ takes values in the range [-π, π]. The simple static correlation is then a function (approximately the average) of the dynamic correlations across the entire observed spectrum.

The analysis uses quarterly real GDP time series at 2000 constant prices (expressed in national currencies), monthly time series of the Industrial Production Index adjusted for working days, and quarterly time series of exports to the euro area expressed in the national currency. The source of the GDP and IPI data is Eurostat; the export data are obtained from the IMF database.

Data on exports to the euro area are available only in USD in the IMF database, so they were converted into national currencies using average quarterly exchange rates according to the IMF.

Time series are expressed in logs, seasonally adjusted and detrended. For detrending we used the method of quarter-on-quarter or month-on-month differences in the seasonally adjusted time series (ln $y_{sa,t}$):

ln $y_{sa,t}$ – ln $y_{sa,t-1}$, where y_{sa} is seasonally adjusted using the TRAMO/SEATS method.

In most cases, it is possible – based on the resulting time series – to conclude that the above method succeeds in detrending. As regards GDP in the Czech Republic, Hungary and Portugal, the results are not entirely clear. However, the shortness of the time series makes it impossible to check reliably whether the resulting series are stationary.

Given the requirement to assess the alignment of the business cycles of individual countries vis-à-vis the euro area, correlation coefficients (both static and dynamic) with respect to the quarterly real GDP time series are calculated separately for two time periods: 2003 Q1–2008 Q3 and 2008 Q4–2013 Q1. An analysis using rolling correlations was prepared as an alternative to the breakdown into two periods.

1.1.3   Structural similarity of the economies

The structural similarity of the economies is compared using the Landesmann structural coefficient. The coefficient is calculated by comparing the shares of individual sectors, e.g. industry or construction, in total value added in country A (in our case, the Czech Republic, Germany, Austria, Portugal, Hungary, Poland, Slovenia and Slovakia) vis-à-vis country B (i.e. the EA-17). The difference between the shares is weighted by the share of the sector in country A in the total, and the weighted shares are then summed.

The calculation of the coefficient can be expressed formally as follows:

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[83] Croux, Forni and Reichlin (2001).

$$SL = \sum_{i=1}^{n} \sqrt{\left(sh_A^i - sh_B^i\right)^2 \cdot \left(\frac{sh_A^i}{100}\right)}\,,$$

where sh_A^i is the percentage share of the *i*-th sector in value added as a whole in country A and sh_B^i is the percentage share of the *i*-th sector in value added as a whole in country B. The calculation is performed separately for each selected period. In our case, it is based on annual data. The source of the data is Eurostat. The structure of the coefficient is described in detail in Landesmann (1995) and also in Flek et al. (2001).

For the purposes of the analysis the coefficient was modified to SL/100.[84] The modified coefficient takes values in the range [0, 1]. The closer the coefficient is to zero, the more similar in structure are the economies.

1.1.4 Interest rate convergence

The simple method of a chart showing the interest rate differential vis-à-vis the euro area is used to analyse the convergence of interest rates in the Czech Republic, Hungary, Poland, Slovenia and Slovakia.[85] Datastream data based on central bank data (three-month interbank market rates) and Eurostat data (ten-year government bonds) were used to measure the interest rate differentials between three-month and ten-year rates in the euro area and these countries.

The time series start in January 2003 and end in June 2013 for both three-month rates and ten-year rates. The time series "EMU convergence criterion bond yields" from the Eurostat database, compiled for the purposes of assessment of the Maastricht convergence criterion on long-term interest rates, were used to compare 10Y government bond yields. These time series are based on the gross yield on government bonds on the secondary market with approximately ten years to maturity.

1.1.5 Alignment of the exchange rate

Aguilar and Hördahl (1998) express the probability of adoption of the euro by eleven EMU candidate countries using the correlation of the exchange rates of their currencies and the Deutsche Mark (as a substitute for the euro) vis-à-vis the US dollar.[86] The exchange rates of the two currencies are thus expressed in terms of the currency of a third country which is not an EMU member. The correlation between the movements of two currencies in a monetary union should by definition equal 1; therefore, a higher correlation means higher probability of participation in the EMU.

The analysis in this document uses the same method to assess how close the Czech Republic, Hungary, Poland, Slovakia and Slovenia are to adopting the euro.

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[84] $$SL = \sum_{i=1}^{n} \sqrt{\left(I_{sh_A^i} \cdot 100 - I_{sh_B^i} \cdot 100\right)^2 \cdot \left(\frac{I_{sh_A^i} \cdot 100}{100}\right)} = 100 \sum_{i=1}^{n} \sqrt{\left(I_{sh_A^i} - I_{sh_B^i}\right)^2 \cdot I_{sh_A^i}} = 100 \cdot I_{SL}$$

In this case, indices are used rather than the percentage shares of individual sectors in the total.

[85] Interest rate convergence can be examined using the unit root test (see, for example, Lee and Wu, 2004, and Kočenda, 2001). However, the analyses must take into account the relatively short length of the available time series, as well as breaks in the time series.

[86] The same method is used in Castrén and Mazzotta (2005).

The correlation coefficient is based on a GARCH estimate and is calculated according to the following formula:

$$corr_t = \frac{\text{cov}(X/USD, EUR/USD)_t}{\sqrt{\text{var}(X/USD)_t * \text{var}(EUR/USD)_t}}$$, where X represents the national currencies.

This method returns a correlation coefficient which changes over time and therefore provides more information than a simple correlation coefficient of the exchange rate of the national currency against the euro. Moreover, the use of the GARCH technique allows all the information in the data to be utilised. A higher GARCH correlation means similar developments in exchange rate volatility, which can be interpreted as synchronisation of exchange rate shocks in the countries under review.

The analysis covers the period from 1 January 2003 to 1 March 2013 and uses daily data from Thomson Datastream and Eurostat.

1.1.6   Analysis of exchange rate volatility

The historical exchange rate volatility is calculated as the standard deviation of logarithmic daily returns for a period of six months:

$$\sigma = \sqrt{\frac{1}{T-1}\sum_{t=1}^{T}(r_t - \bar{r})^2} ,$$

where σ is the standard deviation, r_t is the daily return and T is the number of working days in the period of six months (126 for a year with 252 working days). We use the following relationship to translate the standard deviation of logarithmic daily returns to an annualised form:

$$\sigma_{ann} = \sigma\sqrt{N}$$, where N = 252 represents the approximate number of business days in the year.

The historical volatility of the exchange rates of the countries under comparison against the euro is calculated using exchange rates announced by the CNB.

The implied volatility is derived from market prices of options using the given valuation model. This volatility is directly quoted in the trading system. The source of the data is Datastream.

1.1.7   Integration of the economy with the euro area

International trade with the euro area

The Grubel-Lloyd (GL) index was used to analyse intra-industry trade:

$$GL_t = 1 - \frac{\sum_k \sum_i |X_{it}^k - M_{it}^k|}{\sum_k \sum_i |X_{it}^k + M_{it}^k|}$$

GL_t is the ratio of the absolute value of net intra-industry trade to foreign trade turnover. X_{it}^k and M_{it}^k denote exports to and imports from the k-th country of the i-th commodity at time t. The index takes values ranging from 0 to 1. A value of 0 means that all trade is inter-industry trade and that there is specialisation in different commodities. By contrast, a value of 1 indicates that all trade is intra-industry trade (Flek et al., 2001).

The GL index is calculated using data on total exports and imports to and from the euro area in the countries under review.[87] To calculate the index, foreign trade is broken down on the basis of the SITC classification (the commodities *i* are thus given by SITC groups at the one- to five-digit level). The data source is the Eurostat COMEXT database.

The value of the GL index depends, among other things, on the level of detail of the branch breakdown. The breakdown according to the one- or two-digit SITC is a rather broader sector breakdown which may put together in one category branches whose output is not closely related,[88] resulting as expected in a higher value of this indicator for all countries. Although the qualitative message of the analysis is relatively independent of the degree of aggregation selected, the cross-country differences are largest when using the five-digit (most detailed) breakdown.[89]

Foreign direct investment

The data for the calculation of the shares of exports to and imports from the euro area in total exports and imports are taken from Eurostat (2000–first seven months of 2013, monthly data).

The source of data for the analysis of the euro area's share in direct investment is the Eurostat database, for the Czech Republic the CNB, for Austria the OeNB, for Germany the Bundesbank and for Slovakia the NBS. Stock data on foreign direct investment (FDI) from euro area countries and on direct investment (DI) to euro area countries were used. The GDP statistics are from the Eurostat database.

1.2 SIMILARITY OF MONETARY POLICY TRANSMISSION

1.2.1 Financial system

Depth of financial intermediation (the ratio of net book value of financial sector assets to GDP at current prices) expresses the asset strength of intermediation by banks and non-bank financial institutions: insurance corporations, pension funds, credit unions, management companies and investment funds (unit trusts), financial leasing corporations and other financial corporations (forfaiting and factoring companies, investment firms, bureaux de change, etc.). Generally speaking, the more advanced the market, the larger the assets and the deeper the financial intermediation relative to GDP.

Indebtedness of the private sector (ratio of gross book value of loans to non-bank clients, corporations and households to GDP at current prices) expresses the level of lending by banks. Usually, the more advanced the market, the larger this ratio, but an excessively high value may reflect overleveraging of the private sector.

1.2.2 Structure of financial assets and liabilities of corporations and households

Quarterly financial accounts data published by national central banks and the ECB are used as the input data for the analysis of the alignment of the structure of the financial assets and liabilities of non-financial corporations and households. The quarterly financial accounts are

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[87] As the trade balances of euro area countries can take either positive or negative values, it is recommended to calculate the aggregated Grubel-Lloyd index using bilateral export and import flows.
[88] This is particularly so in SITC 7 (Machinery and transport equipment).
[89] The simplest calculation of the Gruber-Lloyd index, using SITC 1, is based on 10 categories.

compiled according to ESA 95 methodology. In line with national accounting, a unified classification of **institutional units** and **financial instruments** is being promoted. As regards institutional units, the analysis provides a detailed examination of real sectors, i.e. non-financial corporations (S.11) and the merged sector of households (S.14) and non-profit institutions serving households (S.15). The analysis distinguishes five main types of financial instruments: currency and deposits, securities other than shares, loans, shares and other equity, and other accounts receivable/payable including insurance technical reserves and financial derivatives.

The analysis works with **outstanding amounts of financial assets and liabilities** as at the end of the period (quarter) under review. Consequently, the effect of transactions, revaluation and other changes in the volume of assets/liabilities on the change between the initial and final balance in each quarter is not explicitly taken into account. The analysis discusses the net positions of the aforementioned sectors in detail. The net position, expressed as **net financial assets**, is obtained as the balance of financial assets and liabilities and indicates the sector's financing ability or financing needs.

A detailed look at the structure of financial assets and liabilities is provided by **balance sheet indicators**, which capture the degree of risk arising from any mismatch between individual items of the financial balance sheet. The main indicators are:

Liquidity = *(currency + deposits[90] + short-term securities + short-term loans provided) / (short-term debt securities issued + short-term loans accepted)*

...measures the maturity mismatch by the ratio of short-term assets to short-term liabilities; an entity is able to pay its short-term liabilities if this indicator exceeds 100%.

Solvency = *total financial assets / liabilities excluding equity*

...measures the risk of overall insolvency

Share of short-term liabilities = *(short-term debt securities issued + short-term loans accepted) / total liabilities*

...the share of short-term liabilities in total liabilities

Debt/equity = *(bonds issued + loans accepted + other liabilities) / equity issued*

...measures the risk of mismatch between capital structure and excessive debt

For non-financial corporations, liquidity and the share of short-term liabilities may be affected by omission of the short-term component of other liabilities. In the case of the liquidity indicator, this omission is less problematic, as it is reasonable to assume that the shares of short-term other assets and liabilities (trade credits etc.) are approximately equal.

The debt/equity ratio cannot be used for the household sector. Given its insufficient information content with regard to the objective of the analysis, the liquidity indicator for the household sector was also excluded.

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[90] Strictly speaking, only transferable deposits (excluding other deposits) should be included. However, this breakdown is not available for most countries or for the euro area.

1.2.3 Effect of monetary policy on client interest rates

The **interest rate sensitivity of loans to non-financial corporations and loans for house purchase** is expressed by the breakdown of new loans by initial interest rate fixation. Subsequently, the degrees of similarity between the breakdown of loans in the Czech Republic and in the other countries under review are compared with that for the euro area as a whole. For the single monetary policy to operate effectively, it is important that the interest rate sensitivity of these loan types to changes in market and client interest rates is similar, thereby eliminating some asymmetry in the event of economic shocks.

Average weighted interest rates on new business, which reflect the rates agreed for all new business during the month, and three-month money market interest rates were used in the graphical comparison of interest rate spreads between client and market rates.

The strength of the relationship between client and market rates in the countries under review and in the euro area is assessed using correlation analysis. The simple (Pearson) correlation coefficient is used to assess the strength of the linear relationship (see the *Methodological Part*, section 1.1.2 Correlation of economic activity). The maximum value of the coefficients of correlation between interest rates on client loans and the relevant market interest rate is also determined for several possible lags.

1.2.4 Inflation persistence

Inflation persistence is measured by three different methods. Quarterly data on HICP inflation (annual HICP changes) from 2003 Q1 to 2013 Q2 are used for the calculation. The source of the data is OECD MEI.

Method 1

Method 1 uses the non-parametric technique proposed by Marques (2004) to estimate inflation persistence. This approach defines inflation persistence, γ, as $\gamma = 1 - n/T$, where n is the number of times actual inflation crosses the medium-term inflation value and T is the number of observations. Medium-term inflation is approximated using the Hodrick-Prescott (HP) filter with the parameter $\lambda = 1,600$. As the HP filter gives a biased trend estimate at the beginning and the end of the time series, the data for 2004 Q1 to 2012 Q4 were used for the actual calculation of inflation persistence.

Method 2

Inflation persistence is measured as the sum of autoregressive coefficients. For the purposes of the calculation, inflation is modelled as an autoregressive process and the coefficients of the autoregressive terms are estimated. The modelled process used in Method 2 is described as

$$\pi_t = \mu + \sum_{i=1}^{4} \alpha_i \pi_{t-i} + \varepsilon_t,$$

where π_t is inflation observed at time t. The sum of autoregression coefficients is defined as

$$\rho_K = \sum_{i=1}^{4} \alpha_i$$

and estimated using the method proposed by Hansen (1999), which provides an unbiased estimate and asymptotically correct confidence intervals.

Method 3

Inflation persistence is again measured as the sum of autoregressive coefficients. The following model is considered:

$$\pi_{t+1}^T = \pi_t^T + \eta_{1t}$$

$$\pi_{t+1}^P = (1-\delta)\pi_t^P + \delta\pi_{t+1}^T, 0 < \delta < 1,$$

$$\pi_t = \left(1 - \sum_{i=1}^{4}\varphi_i\right)\pi_t^P + \sum_{i=1}^{4}\varphi_i L^i \pi_t + \varepsilon_{1t}, \sum_{i=1}^{4}\varphi_i < 1,$$

where π_t^T is medium-term inflation (or the central bank's implicit inflation target), π_t^P is the inflation target perceived by the public, η_{1t} and ε_{1t} represent independent white noises, L^i is the lag operator and $\sum_{i=1}^{4}\varphi_i$ is the sum of autoregressive coefficients. Inflation π_t is the observed variable and medium-term inflation π_t^T is approximated with the inflation time series smoothed using the HP filter. The Kalman filter and Bayesian estimation are used to estimate the model parameters. The methodology draws on the article by Franta, Saxa and Šmídková (2007), where it is applied to data from a different source and period.

1.2.5 Financial market integration

Price-based measures

These measures use the concepts of beta-convergence and sigma-convergence (Adam et al., 2002).[91] The concept of beta-convergence enables identification of the speed at which differences in yields are eliminated on individual financial markets (selected against the benchmark). A negative beta coefficient signals the existence of convergence. The closer the value of the beta coefficient is to -1, the higher is the speed of convergence. To quantify beta-convergence, common regression analysis or the panel estimation method is applied (as in Babetskii et. al., 2007), 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 $R_{i,t} = Y_{i,t} - Y_{i,t}^B$ is the difference between the asset yields of country i[92] and a selected reference territory (a benchmark, B) at time t, Δ is the difference operator, a_i is a dummy variable for the respective country, L is the maximum lag considered (four weeks) and $\varepsilon_{i,t}$ is a random term. The size of coefficient β may be interpreted as a direct measure of the convergence speed. A negative beta coefficient indicates the occurrence of convergence. The β coefficient can take values ranging from -2 to 0. The closer the value of the β coefficient to 1, the higher the speed of convergence. If $\beta = 0$ or $\beta = -2$, no convergence is observed. β values

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[91] The terms beta-convergence and sigma-convergence originate from the literature on economic growth and its dynamics; see, for example, Barro and Sala-i-Martin (1992, 1995).
[92] $Y_{i,t} = [\ln(A_{i,t}) - \ln(A_{i,t-1})]$ where Y denotes the yield on the relevant asset, A the price index of the relevant asset (expressed as a basic index) and i the individual country.

from -1 to 0 indicate monotonous convergence, while oscillating convergence occurs for values from -2 to -1.

The concept of sigma-convergence focuses on the dispersion of the yields on identical asset types in different countries at a given moment in time and thus identifies the degree of integration vis-à-vis the benchmark country achieved at that moment in the individual selected financial market segments. Sigma-convergence increases as the sigma parameter falls to zero. To quantify sigma-convergence, a calculation is used of the (cross-section) standard deviation (σ), according to the formula:

$$\sigma_t = \sqrt{\left(\frac{1}{N}\right)\sum_{i=1}^{N}\left[\log(Y_{i,t}) - \log(\overline{Y}_t)\right]^2}$$

where Y is the asset yield, $\overline{Y}_t$ is the mean value of the yield over time t and i stands for the individual countries ($i = 1, 2, …, N$). For the purposes of this analysis, we use $N = 2$, i.e. we explore the evolution of sigma-convergence over time between the euro area and one of the countries under review.[93] In theory, σ takes only positive values. The lower is σ, the higher is the level of convergence. In theory, full integration is achieved when the standard deviation is zero,[94] while high (several digit) values of σ reflect a very low degree of integration. For graphical illustration, the results were normalised over the whole time period and filtered using the Hodrick-Prescott filter with the recommended weekly time series coefficient λ = 270,400.

News-based measures

This method (Baele et al., 2004) assumes that potential local shocks, which get more alike with increasing integration, can be diversified in an integrated region by investment in other comparable assets. In line with these assumptions, the price movements of a benchmark asset should reflect all relevant common (global) news. So, in a fully integrated market, the price changes of an asset in a single country should not be systematically higher or lower than the price changes of the benchmark asset. Quantification of the degree of shock integration can be estimated (as in Baele et al., 2004) for the money, foreign exchange and government bond markets using the following regression:

$$\Delta Y_{i,t} = \alpha_{i,t} + \gamma_{i,t}\Delta Y_{b,t} + \varphi_{i,t}$$

where $Y_{i,t}$ represents individual asset yields in country i at time t, and b denotes the benchmark country (Germany for the government bond market, otherwise the euro area). $\alpha_{i,t}$ is a specific constant for each country, Δ denotes the difference operator and $\varphi_{i,t}$ is a random term. An increase in this type of integration requires α to converge to zero, γ to converge to one and the proportion of the variance of coefficients γ (for benchmark and national assets) to be close to one. The time-varying parameters γ were estimated using recursive estimation.

To quantify the degree of stock market shock integration between the countries under review and the euro area, the above equation must be adjusted for the impact of the US stock market on the monitored markets and the euro area market. This is due to the lower comparability of the individual national stock indices relative to the other monitored assets (exchange rates,

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[93] For pairs of countries, the calculated values in each period are essentially equal to half the square of the yield differential.
[94] This occurs on the money and foreign exchange markets for countries entering the euro area on a given date.

money market rates and government bonds). The modified equation for the stock market has the following form:

$$\Delta Y_{i,t} = c_{i,t} + \gamma_{i,t}^{b} \Delta Y_{b,t} + \gamma_{i,t}^{US} \Delta Y_{us,t} + \upsilon_{i,t}$$

The magnitude of parameters γ expresses the degree of identical response of an asset of a selected country and a comparable benchmark asset to certain news.

Data

The calculations for both measures of financial integration were carried out using weekly data (daily data averages) from Thomson Datastream, covering the period January 2003 to July 2013. Three-month interbank rates were used for the money market, national currencies quoted against the US dollar for the foreign exchange market, five-year government bonds for the bond market and national stock indices for the stock market. The relevant time series were adjusted for exchange rate effects.

Thomson Datastream codes for the data sources used:

	Money market	Forex market	Bond market	Stock market
CZ	PRIBK3M	PRUSDSP	BMCZ05Y-(RY)	CZPXIDX
AT	-	-	BMOE05Y-(RY)	ATXINDX
DE	-	-	BMBD05Y-(RY)[B]	DAXINDX
PT	-	-	BMPT05Y-(RY)	POPSI20
HU	HNIBK3M	HNUSDNB	BMHN05Y-(RY)	BUXINDX
PL	POIBK3M	POUSDSP	BMPO05Y-(RY)	POLWIGI
SI	-	SJUSDSP	-	SLOESBI
SK	SXIBK3M	SXUSDSP	SXGOVT1-(RY)	SXSAX16
EA	BBEUR3M[B]	USECBSP[B]	-	DJES50I[B, a]

Note: [B] benchmark; [a] DJES50I consists of stocks from euro area member countries with the following weights: France 34.6%, Germany 28.0%, Spain 16.7%, Italy 11.0%, the Netherlands 5.6%, Finland 2.5% and Luxembourg 1.7%.

1.2.6   Spontaneous euroisation

Euroisation is the process of substitution of a domestic currency with a foreign one (the euro) to ensure the necessary functions of money as a medium of exchange and a store of value. Generally, official and unofficial (spontaneous) euroisation can be distinguished. This analysis is concerned with spontaneous euroisation, which is important for assessing the efficiency and effectiveness of independent monetary policy. A comparison of the level of euroisation in the Czech Republic and selected Central European countries, namely Poland, Hungary and Slovakia, and an assessment of the effects of the debt crisis on households' trust in the euro area were performed using a survey conducted by Oesterreichische Nationalbank and published in 2013 Q2.

2   ADJUSTMENT MECHANISMS

1.2   FISCAL POLICY

2.1.1   Stabilising function of public budgets

There are two main approaches to determining the cyclical component of the budget balance. The first is based on the methodology used by the European Commission and other

international institutions (OECD, IMF), which assumes a direct relationship between the output gap and revenue/expenditure budgetary items which are subject to cyclicality. The second approach, used by the ECB and central banks within the ESCB, is based on the relationship between individual revenue and expenditure budgetary items and their macroeconomic bases.

Of key importance in the computation of the cyclically adjusted balance using the output gap approach are the estimation of potential product, i.e. the identification of the phase of the economy, and the determination of the sensitivity of budgetary items to change in the output gap. In this approach, the cyclical changes in economic activity in a given year are fully reflected in the computation of the cyclical component of the budget balance.

By contrast, the ECB's approach works not with potential output, but with the trends in relevant macroeconomic variables linked to the revenue and expenditure components of the budget ("macroeconomic bases"). Specifically, these bases comprise compensation of employees, employment, household consumption and operating surplus in the corporate sector. The first step in the computation of the cyclically adjusted balance by this method involves determining the cyclical positions of the individual macroeconomic bases on the basis of the difference between the actual value and the trend value obtained using the Hodrick-Prescott filter. The second step involves quantifying the effect of the cyclical position on the relevant budget variable by means of the tax/expenditure elasticity estimated in advance and then summing the individual cyclical components. Three of the five macroeconomic bases used are labour market variables, and economic shocks affect the labour market with a time lag and hence do not reflect changes in GDP immediately. In this approach, therefore, changes in economic activity – especially when they are sharp fluctuations – show up in the cyclical component of the budget balance only partially or with a lag.

The two approaches naturally provide somewhat different results. When interpreted correctly, however, they are sufficient to identify the basic characteristics of fiscal policy and the main trends in public budgets.

2.1.2 Government deficit and debt and the scope for stabilising fiscal policy

All the debt and deficit figures are based on the ESA 95 methodology, which is the key methodology with regard to considerations of euro area accession, except for the part of the table covering mandatory expenditures in the Czech Republic, which also includes figures from the state budget, which is monitored on a cash (non-accrual) basis.

The description of mandatory expenditures is based on the definition used by the Ministry of Finance. These include mandatory expenditures arising from statutory requirements and other mandatory expenditures (namely expenditure arising under international treaties or due to judicial and extra-judicial decisions on disputes that are binding upon the Czech Republic). Included in particular are pension insurance benefits, government payments for health insurance, government social assistance, sickness insurance benefits, debt service expenditure, state contributions related to the support of building savings schemes and private pension schemes, allocations to state funds, expenditure on contributions to political parties, payments to the EU budget and unsuccessful arbitrations.

In addition to the aforementioned mandatory expenditures, there are so-called *quasi-mandatory* expenditures, which include, for example, wages to public sector employees, defence expenditures and international humanitarian assistance, investment incentives and active employment policy. Such quasi-mandatory expenditures are not considered here, as it is within the government's powers to adjust them quite significantly through its own actions.

Macroeconomic interpretation of mandatory (and quasi-mandatory) expenditure is, however, not entirely trivial. In the short run, these expenditures limit the government's reactive ability

to execute an active discretionary policy (in cases of unforeseen economic shocks). On the other hand, thanks to their inertia, they stabilise the business cycle to a certain extent. The key problem related to an increase in mandatory expenditures is that their expected growth is not compensated by any corresponding reductions in other expenditures and/or by increased taxation, which results in an increased fiscal imbalance.

2.1.3 Sustainability of public finance

The extrapolation of sustainability was taken from the publication "The 2012 Ageing Report: Economic and Budgetary Projections for the EU-27 Member States (2010–2060)" (European Commission, 2012c).

2.2 LABOUR MARKET FLEXIBILITY

2.2.1 Unemployment and internal labour market flexibility

Long-term unemployment is analysed by comparing the long-term unemployment rate (the share of those unemployed for twelve months or more under ILO methodology in the labour force). The source of the data is Eurostat.

The **Beveridge curve** is an instrument frequently used to differentiate between cyclical and structural unemployment. It expresses the dependence between vacancies and the number of unemployed persons. A decreasing (increasing) number of unemployed persons amid a rising (falling) number of vacancies is associated with cyclical changes, whereas simultaneous movements of the two variables in the same direction signal structural changes. Data on the number of unemployed persons and vacancies are from the Ministry of Labour and Social Affairs (MLSA).

Regional differences in unemployment are measured by the coefficient of variation. The coefficient of variation in the regional unemployment rate is the ratio of the standard deviation weighted by the district size to the average unemployment rate. The size of the coefficient of variation depends on the degree of disaggregation. Data for similar region sizes (e.g. NUTS II or NUTS III) and the evolution of the coefficient of variation over time can be used for comparison. The source of the data is Eurostat.

The CZSO publishes the volume of **internal migration** (movement between municipalities). Data on registered internal migration in other countries are published in statistical yearbooks. In the Czech Republic, migration of foreigners with long-term residence (over 1 year) is included in the statistics.

2.2.2 Structural unemployment

The NAIRU analysis presented in the main part of the text focuses on the medium-term NAIRU concept,[95] which defines the NAIRU as the equilibrium rate towards which unemployment converges in the absence of temporary supply shocks once the dynamic adjustment of inflation

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[95] The OECD distinguishes three different NAIRU concepts according to their time frame. Short-term and long-term NAIRU concepts exist in addition to the medium-term NAIRU. The short-term NAIRU is the rate of unemployment consistent with stabilising the inflation rate at its current level in the next period. The long-term NAIRU is the equilibrium rate of unemployment corresponding to a long-term steady state, once the NAIRU has fully adjusted to long-term and short-term supply shocks and economic policy influences.

to previous shocks is completed. A semi-structural approach using the Kalman filter is applied (Richardson et al., 2000; Szeto and Guy, 2004).

The estimate of the NAIRU as an unobserved variable is based on the assumption that stable inflation (i.e. inflation equal to inflation expectations) means, *ceteris paribus*, a rate of unemployment equal to the NAIRU. However, rising (falling) inflation indicates a shift in the unemployment rate below (above) the NAIRU. The basic model equation captures the relationship determined by the Phillips curve, modelling inflation as a function of lagged inflation, the deviation of unemployment from the NAIRU and two variables helping to explain short-term supply shocks. The next equation specifies the process generating the NAIRU time series, which is assumed to follow a random walk process. Inflation expectations are not modelled endogenously. Lagged inflation was used to proxy for inflation expectations. Short-term supply shocks are captured using import prices and oil prices. These two variables help explain short-term movements in inflation, which allows us to estimate the NAIRU compatible with non-rising inflation in the absence of such temporary supply shocks. The unemployment gap, i.e. the difference between the unemployment rate and the NAIRU, can be regarded as representing demand pressures in the equation.

$$(\pi_t - \pi_t^e) = \alpha(\pi_{t-1} - \pi_{t-1}^e) + \beta(u_t - u_t^*) + \gamma \Delta x_t + \varepsilon_t, \qquad \varepsilon_t \sim N(0, \sigma_\varepsilon^2),$$

$$u_t^* = u_{t-1}^* + v_t, \qquad v_t \sim N(0, \sigma_v^2).$$

In these equations π_t is inflation, π_t^e is expected inflation, u_t^* is the NAIRU, $(u_t - u_t^*)$ is the unemployment gap and x_t represents short-term supply shocks.

Determining the volatility of the NAIRU is an important part of the estimation. The smoothness of the estimated NAIRU series is determined by the variances of the residuals in the two equations above (Phillips curve, random walk) and the relationship between those two variances. The larger is the ratio of the NAIRU variance to the inflation variance, the more volatile is the estimated NAIRU series, i.e. the unemployment gap explains almost the entire variance in inflation. By contrast, a low ratio of the variances means that the estimated NAIRU changes very little over time. The ratio of the estimated standard deviations is roughly 1:5.

2.2.3 International labour mobility

International mobility is assessed using foreign migration and the proportion of foreigners in the population. The source of the data on registered international mobility for individual countries (immigration and emigration) and on the proportion of foreigners in the population is Eurostat.

2.2.4 Institutional environment

Trade unions and collective bargaining

The relevant indicators in the area of institutional arrangements for collective bargaining include the degree of coverage by collective agreements. Working with Trexima, the CZSO publishes the shares of employees covered by collective agreements.

Minimum wage

The relationship of the minimum wage to the average wage and to the wage in the first decile of the wage distribution. The data used are from Eurostat and the Average Earnings Information System (MLSA).

Labour taxation

Overall labour taxation (the tax wedge) is defined as social security contributions paid by employees and employers and income taxes relative to overall labour costs. This indicator is calculated in line with the applicable tax legislation for model types of households. The data are from OECD.

The average effective tax burden is described by **implicit tax rates**, which are calculated as ratios, with the numerator containing the sum of aggregate revenue from direct taxes (in some countries also indirect taxes paid by the employer) and social contributions paid by both employees and employers, while the denominator comprises total compensation of employees (data under ESA 95 methodology). The disadvantage of this indicator is that it is dependent on the business cycle. Inflation and real income growth increase the tax component of implicit tax rates where the income tax is progressive. Social contributions, which are usually degressive with rising income, can have the opposite effect. The overall effect of the cycle on implicit rates depends on which of the two factors is dominant. The data on implicit tax rates are taken from Eurostat.

The **components of labour taxation** give the decomposition of labour costs into income tax and the contributions paid by employees and employers. The source of the data is the OECD.

Work-incentive indicators

Net replacement rates (NRRs) measure the extent to which the combination of taxes and benefits affects the financial gain from work and thereby the incentive for unemployed or inactive persons to enter employment. The NRR is defined as the ratio of net household income when the person under consideration is jobless to that when the same person has a job. Gross incomes of the other members of the household are supposed to be unchanged in both cases. NRRs only identify financial entitlements to social benefits. Provided that there is sufficient monitoring of the job-seeking activity of the unemployed, even high NRRs may be associated with sufficient job-seeking incentives.

The data on net replacement rates (NRRs) are taken from OECD tax and benefit models for individual types of households, persons in the initial phase of unemployment who are entitled to unemployment benefits and persons not entitled to unemployment benefits (inactive or long-term unemployed).

More detailed data for the Czech Republic analysing the incentive to work on the basis of a comparison of total household income for families claiming unemployment benefits, parental allowances or caregiver allowances and for families with economically active members are calculated from individual household budget data for 2011 and 2012.

2.2.5 Rate of adjustment of wage growth to the business cycle

The rate of adjustment of real wage growth to the unemployment rate is analysed using the cyclical components of the relevant variables. For the purposes of this section, cycles are measured using the Hodrick-Prescott filter. The standard smoothness parameter value for quarterly data, i.e. $\lambda = 1,600$, was chosen.

The correlations in the table take into account a potential phase shift, which may be up to six quarters. If we denote the cyclical component of output by Y_t and the cyclical component of unemployment by U_t, then the absolute value of the highest correlation is $\text{corr}(Y_t, U_{t+k})$, where $k \in \{0,\ldots,6\}$. Analogously, the highest absolute value is also given for the correlation between the cyclical components of output and wages.

2.3 PRODUCT MARKET FLEXIBILITY

2.3.1 Administrative barriers to entrepreneurship

Administrative barriers to entrepreneurship. The index of barriers to entrepreneurship is taken from the OECD Product Market Regulation Database, where it is a part of a broader OECD indicator assessing the degree of regulation on product markets. The index consists of individual items aggregated in three areas: administrative burdens on start-ups (administrative burdens for corporations, administrative burdens for sole proprietors, and sector-specific administrative burdens), regulatory and administrative opacity (licences and permits system, and government communication and simplification of rules and procedures) and barriers to competition (legal barriers to entry into the industry – limitations on the number of entities, antitrust exemptions for public enterprises, barriers in network sectors, and barriers in services).

The **rankings of countries in the area of starting or closing a business** are taken from the World Bank's Doing Business database. As regards starting a business, number of procedures, time (days), cost and minimum capital requirements in % of income per capita are taken into account. The area of closing a business includes data on time in years, cost in % of total assets and recovery rate in cents on the dollar.

2.3.2 Tax burden on businesses

The highest **statutory tax rates** are taken from Eurostat. **Implicit tax rates on corporate income**, defined as the ratio of total tax revenues to the potential tax base (national accounts data under ESA 95 methodology), are an additional indicator. The potential tax base is approximated using national accounts output and income statistics. In contrast to statutory rates, implicit tax rates take into account depreciation, amortisation and tax exemptions, hence they express the actual average effective tax burden on corporate income. Their disadvantage is that they depend on the business cycle. For example, a decrease in the statutory tax rate does not affect the implicit rates if it is offset by a broadening of the tax base. The data are taken from Eurostat.

2.4 THE BANKING SECTOR AND ITS SHOCK-ABSORBING CAPACITY

The **ratio of deposits to loans provided** (deposits/loans to residents) expresses the extent to which loans provided are financed by deposits of private sector residents. Values of this indicator above 100% indicate that banks have a sufficient volume of deposits relative to the volume of loans provided and their long-term financing is thus less dependent on other sources.

The **external position of the banking sector** (net external assets in % of GDP) represents the difference between the external assets and liabilities of the domestic banking sector, indicating its degree of dependence on foreign sources.

Return on equity (RoE, %) and return on assets (RoA, %) can be regarded as measures of profitability of the banking business, assessing its economic efficiency. They aggregate the results of the extent and diversification of banks' activities and the business risks undertaken.

Non-performing loans (NPLs)/total loans (%) – NPLs ("loans in default" in Czech accounting terminology) in gross book value as a percentage of total loans in gross book value express how large or how concentrated is the credit risk faced by the country's banking sector. NPLs are loans that are classed as substandard, doubtful or loss loans.

Capital adequacy (%) – expressed as the ratio of a bank's capital to the corresponding coverage of unexpected losses from the risks it undertakes – assesses the outlook for the bank's financial situation and indicates its ability to cover potential future losses with capital. Capital adequacy is an aggregate indicator reflecting all activities of a bank (both balance sheet and off-balance sheet) as well as the potential losses (reducing profit) which a bank may incur from the risks it undertakes and the depreciation of assets.

REFERENCES

Adam, K., Japelli, T., Menichini, A., Padula, M., Pagano, M. (2002): "Study to Analyze, Compare, and Apply Alternative Indicators and Monitoring Methodologies to Measure the Evolution of Capital Market Integration in the European Union", *European Commission*, pp. 1–5.

Agenor, P. R., Aizenman, J. (2011): "Capital Market Imperfections and the Theory of Optimum Currency Areas", *Journal of International Money and Finance*, 30(8), pp. 1659–1675.

Aguilar, J., Hördahl, P. (1998): "Exchange Rates and Currency Options as EMU Indicators", *Sveriges Riksbank Quarterly Review*, 2, pp. 58–81.

Ahrend, R., Cournède, B., Price, R. (2008): "Monetary Policy, Market Excesses and Financial Turmoil", OECD, Economics Department Working Paper No. 597.

Allen, M., Rosenberg, C., Keller, C., Setser, B., Roubini, N. (2002): "Balance Sheet Approach to Financial Crisis", IMF Working Paper No. WP/02/210.

Ambriško, R., Augusta, V., Hájková, D., Král, P., Netušilová, P., Říkovský, M., Soukup, P. (2012): "Fiscal Discretion in the Czech Republic in 2001–2011: Has It Been Stabilizing?", CNB Research and Policy Note No. 1/2012.

Angeloni, I., Ehrmann, M. (2004): "Euro Area Inflation Differentials", ECB Working Paper No. 388.

Aristei, D., Gallo, M. (2012): "Interest Rate Pass-Through in the Euro Area during the Financial Crisis: A Multivariate Regime-Switching Approach", Quaderni Del Dipartimento Di Economia, Finanza E Statistica No. 107, University of Perugia.

Babecká, O., Franta, M., Hájková, D., Král, P., Kubicová, I., Podpiera, A., Saxa, B. (2013): "What We Know About Monetary Policy Transmission in the Czech Republic: Collection of Empirical Results", CNB Research and Policy Note, forthcoming in 2013.

Babecký, J., Campos, N. F. (2011): "Does Reform Work? An Econometric Survey of the Reform-Growth Puzzle", *Journal of Comparative Economics*, 39(2), pp. 140–158.

Babecký, J., Dybczak, K. (2012): "Real Wage Flexibility in the European Union: New Evidence from the Labour Cost Data", CNB Working Paper No. 1/2012.

Babecký, J., Havránek, T. (2013): "Structural Reforms and Economic Growth: A Meta-Analysis", CNB Working Paper No. 8/2013.

Babetskii, I. (2005): "Trade Integration and Synchronization of Shocks: Implications for EU Enlargement", *Economics of Transition*, 13(1), pp. 105–138.

Babetskii, I., Komárek, L., Komárková, Z. (2007): "Financial Integration of Stock Markets among New EU Member States and the Euro Area", CNB Working Paper No. 7/2007.

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

Baldwin, R. (2006): "In or Out: Does It Matter? An Evidence-Based Analysis of the Euro's Trade Effects", Centre for Economic Policy Research.

Barro, R. J., Sala-I-Martin, X. (1992): "Convergence", *Journal of Political Economy*, 100, pp. 223–251.

Barro, R. J., Sala-I-Martin, X. (1995): "Technological Diffusion, Convergence, and Growth", NBER Working Papers 5151, National Bureau of Economic Research.

Bassanini, A., Duval, R. (2006): "Employment Patterns in OECD Countries: Reassessing the Role of Policies", OECD Economics Department Working Paper No. 486.

Baxa, J., Plašil, M., Vašíček, B. (2012): "Changes in Inflation Dynamics under Inflation Targeting? Evidence from Central European Countries", CNB Working Paper No. 4/2012.

Beckmann, J., Belke, A., Verheyen, F. (2013): "Interest Rate Pass-Through in the EMU: New Evidence from Nonlinear Cointegration Techniques for Fully Harmonized Data", *Journal of Internatioal Money and Finance*, forthcoming.

Beckmann, E., Dvorsky, S., Scheiber, T. (2013): "Trust in the EU in CESEE: Did the Crisis and EU Integration Have an Impact? Evidence from the OeNB Euro Survey", *Focus on European Economic Integration*, 2, pp. 77–90.

Blanchard, O. J., Perotti, R. (2002): "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output", *Quarterly Journal of Economics*, 117(4), pp. 1329–1368.

Boone, L., Maurel, M. (1999): "An Optimal Currency Area Perspective of the EU Enlargement to the CEECs", CEPR Discussion Paper No. 2119.

Brandt, N., Burniaux, J. M., Duval, R. (2005): "Assessing the OECD Jobs Strategy: Past Developments and Reforms", OECD Economics Department Working Paper No. 429.

Brunnermeier, M. K. (2010): "Optimizing the Currency Area", The Great Financial Crisis: Lessons for Financial Stability and Monetary Policy, Frankfurt, pp. 14–22.

Bubák, V., Kočenda, E., Žikeš, F. (2011): "Volatility Transmission in Emerging European Foreign Exchange Markets", *Journal of Banking & Finance*, 35(11), pp. 2829–2841.

Calmfors, L., Driffill, J. (1988): "Bargaining Structure, Corporatism and Macroeconomic Performance", *Economic Policy*, 6, pp. 13–61.

Caporale, G. M., De Santis, R., Girardi, A. (2013): "Trade Intensity and Output Synchronisation: On the Endogeneity Properties of EMU", CESifo Working Paper Series 4172, CESifo Group Munich.

Castrén, O., Mazzotta, S. (2005): "Foreign Exchange Rate Option and Returns Based Correlation Forecasts: Evaluation and Two Applications", ECB Working Paper No. 447.

Cecchetti, S. G., Debelle, G. (2006): "Has the Inflation Process Changed?", *Economic Policy*, 21(46), pp. 311–352.

Čihák, M., Holub, T. (2003): "Price Convergence to the EU: What Do the 1999 ICP Data Tell Us?", CNB Working Paper No. 2/2003.

Čihák, M., Holub, T. (2005): "Price Convergence in EU-Accession Countries: Evidence from the International Comparison", *Économie Internationale*, 102, pp. 61–84.

Claeys, P., Vašíček, B. (2012): "Measuring Sovereign Bond Spillover in Europe and the Impact of Rating News", CNB Working Paper No. 7/2012.

Coricelli, F., Horváth, R. (2010): "Price Setting and Market Structure: An Empirical Analysis of Micro Data in Slovakia", *Managerial and Decision Economics*, 31(2–3), pp. 209–233.

Crespo-Cuaresma, J., Fernández-Amador, O. (2013): "Business Cycle Convergence in EMU: A Second Look at the Second Moment", *Journal of International Money and Finance*, 37, pp. 239–259.

Croux, C., Forni, M., Reichlin, L. (2001): "A Measurement of Comovement for Economic Variables: Theory and Empirics", *Review of Economics and Statistics*, 83(2), pp. 232–241.

Czech National Bank (2008): *Analyses of the Czech Republic's Current Economic Alignment with the Euro Area*, December 2008.

Czech National Bank (2009): *Analyses of the Czech Republic's Current Economic Alignment with the Euro Area*, December 2009.

Czech National Bank (2010): *Analyses of the Czech Republic's Current Economic Alignment with the Euro Area*, December 2010.

Czech National Bank (2012): *Analyses of the Czech Republic's Current Economic Alignment with the Euro Area*, December 2012.

Czech National Bank (2013a): *Inflation Report* III/2013.

Czech National Bank (2013b): *Financial Stability Report* 2012/2013.

De Grauwe, P. (2003): *Economics of Monetary Union*, Fifth Edition, Oxford University Press, New York.

De Grauwe, P. (2010a): "Crisis in the Eurozone and How To Deal With It", CEPS Policy Brief No. 204, Centre for European Policy Studies, Brussels.

De Grauwe, P. (2010b): "The Financial Crisis and the Future of the Eurozone", Bruges European Economic Policy Briefings, No. 21.

De Grauwe, P., Mongelli, P. F. (2005): "Endogeneities of Optimum Currency Areas: What Brings Countries Sharing a Single Currency Closer Together?", European Central Bank Working Paper No. 468.

Dellas, H., Tavlas, G. S. (2009): "An Optimum-Currency-Area Odyssey", *Journal of International Money and Finance*, 28(7), pp. 1117–1137.

EEAG (2011): "The EEAG Report on the European Economy", CESifo, Munich 2011.

Eichengreen, B. (2008): "Sui Generis EMU", European Economy – Economic Papers 303, Directorate General Economic and Monetary Affairs, European Commisssion.

Eichengreen, B. (2009): "The Crisis and the Euro", Working Paper 23/2009, Elcano Royal Institute, Madrid.

Eickmeier, S. (2007): "Business Cycle Transmission from the US to Germany – A Structural Factor Approach", *European Economic Review*, 51, pp. 521–551.

Eickmeier, S., Ng, T. (2011): "How Do Credit Supply Shocks Propagate Internationally? A GVAR Approach", CEPR Discussion Paper No. 8720.

Engel, C., Rogers, J. (2004): "European Product Market Integration After the Euro", *Economic Policy*, 19(39), pp. 347–384.

European Commission (2005): "Public Finances in EMU 2005", *European Economy* 3/2005.

European Commission (2006): *The European Economy: 2006 Review - Adjustment Dynamics in the Euro Area*, http://ec.europa.eu/economy_finance/publications/publication425_en.pdf.

European Commission (2008): *EMU@10: Successes and Challenges after 10 Years of Economic and Monetary Union*, http://ec.europa.eu/economy_finance/publications/publication12682_en.pdf.

European Commission (2012): "The 2012 Ageing Report: Economic and Budgetary Projections for the EU-27 Member States (2010–2060)", European Economy 2/2012.

European Commission (2013a): "Public Finances in EMU 2013", *European Economy* 4/2013.

European Commission (2013b): "Statistical Annex to European Economy", Spring 2013.

Eurostat (2012): *Taxation Trends in the European Union*, 2012 Edition.

Feldstein, M. (2002): "The Role for Discretionary Fiscal Policy in a Low Interest Rate Environment", NBER Working Paper No. 9203.

Ferreira-Lopes, A. (2013): "The Welfare Costs of the EMU for Transition Countries", forthcoming in *Prague Economic Papers*.

Flanagan, R. J. (1999): "Macroeconomic Performance and Collective Bargaining: An International Perspective", *Journal of Economic Literature*, 37(3), pp. 1150–1175.

Flek, V., Hájek, M., Hurník, J., Prokop, L., Racková, L., Soukupová, E. (2001): "Výkonnost a struktura nabídkové strany" (Supply Side Performance and Structure), CNB Research Paper No. 27.

Frankel, J. (2008): "Should Eastern European Countries Join the Euro? A Review and Update of Trade Estimates and Consideration of Endogenous OCA Criteria", Working Paper Series 08-059, Harvard University.

Frankel, J. A., Rose, A. K. (1997): "Is EMU More Justifiable Ex Post Than Ex Ante?", *European Economic Review*, 41, pp. 753–760.

Frankel, J. A., Rose, A. K. (1998): "The Endogeneity of the Optimum Currency Area Criteria", *The Economic Journal*, 108(449), pp. 1009–1025.

Franta, M., Saxa, B., Šmídková, K. (2007): "Inflation Persistence: Euro Area and New EU Member States", ECB Working Paper No. 810.

Geršl, A., Seidler, J. (2011): "Credit Growth and Capital Buffers: Empirical Evidence from Central and Eastern European Countries", CNB Research and Policy Note No. 2/2011.

Giannone, D., Lenza M., Reichlin L. (2009): "Business Cycles in the Euro Area", ECB Working Paper No. 1010.

Giannone, D., Reichlin, L. (2006): "Trends and Cycles in the Euro Area: How Much Heterogeneity and Should We Worry About It?", ECB Working Paper No. 595.

Gregg, P. (2000): "The Use of Wage Floors as Policy Tools", OECD Economic Studies No. 31.

Gros, D., Alcidi, C. (2010): "Fiscal Policy Coordination and Competitiveness Surveillance: What Solutions to What Problems?" CEPS Policy Briefs, No. 213 (7 September).

Hampl, M., Skořepa, M. (2011): "Long-run Equilibrium Exchange Rate Notions in Monetary Policy Strategies: The Case of the Czech National Bank", in *The Influence of External Factors on Monetary Policy Frameworks and Operations*, BIS Paper 57, pp. 155–162, Bank for International Settlements.

Hansen, B. E. (1999): "The Grid Bootstrap and the Autoregressive Model", *Review of Economics and Statistics*, 81(4), pp. 594–607.

Havránek, T. (2010): "Rose Effect and the Euro: Is the Magic Gone?", *Review of World Economics*, 146(2), pp. 241–261.

Havránek, T., Iršová, Z. (2010): "Which Foreigners Are Worth Wooing? A Meta-Analysis of Vertical Spillovers from FDI", CNB Working Paper No. 3/2010.

Havránek, T., Rusnák, M. (2012): "Transmission Lags of Monetary Policy: A Meta-Analysis", CNB Working Paper No. 10/2012.

Hoekman, B., Djankov, S. (1996): "Intra-industry Trade, Foreign Direct Investment and Reorientation of East European Exports", CEPR Discussion Paper No. 1377.

Horváth, J. (2003): "Optimum Currency Area Theory: A Selective Review", BOFIT Discussion Paper No. 15.

Horváth, R. (2005): "Exchange Rate Variability, Pressures and Optimum Currency Area Criteria: Implications for the Central and Eastern European Countries", CNB Working Paper No. 8/2005.

Horváth, R., Podpiera A. M. (2009): "Heterogeneity in Bank Pricing Policies: The Czech Evidence", CNB Working Paper No. 8/2009.

Hughes-Hallet, A., Piscitelli, L. (2002): "Does Trade Integration Cause Convergence?", *Economic Letters*, 75(2), pp. 165–170.

Hurník, J., Tůma, Z., Vávra, D. (2010): "The Euro Adoption Debate Revisited: The Czech Case", *Czech Journal of Economics and Finance*, 60(3), pp. 194–212.

Jackman, R., Pissarides, C., Savouri, S. (1990): "Labour Market Policies and Unemployment in the OECD", *Economic Policy*, 5(11), pp. 449–490.

Jackman, R., Roper, S. (1987): "Structural Unemployment", *Oxford Bulletin of Economics and Statistics*, 49(1), pp. 9–36.

Jarocinski, M. (2010): "Responses to Monetary Policy Shocks in the East and the West of Europe: A Comparison", *Journal of Applied Econometrics*, 25(5), pp. 833–868.

Javorcik, B. S. (2004): "Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers Through Backward Linkages", *American Economic Review*, 94(3), pp. 605–627.

Kalemli-Ozcan, S., Papaioannou, E., Perri, F. (2013): "Global Banks and Crisis Transmission", *Journal of International Economics*, 89(2), pp. 495–510.

Kalemli-Ozcan, S., Sorensen, B. E., Yosha, O. (2003): "Risk Sharing and Industrial Specialization: Regional and International Evidence", *American Economic Review*, 93(3), pp. 903–918.

Kalous, M. (2009): "Pohled na sektorové rozvahy (tzv. Balance Sheet Approach) jako nástroj analýzy finanční stability makroekonomických sektorů" (The Balance Sheet Approach as an Instrument of Analysis of the Financial Stability of Macroeconomic Sectors), CNB Internal Discussion Paper No. 7/2009.

Kenen, P. B. (1969): "The Theory of Optimum Currency Areas: An Eclectic View", in Mundell and Swoboda (eds.), *Monetary Problems in the International Economy*, University of Chicago Press.

Kenen, P. B. (2000): "Currency Areas, Policy Domains, and the Institutionalization of Fixed Exchange Rates", CEP Discussion Papers dp0467.

Kočenda, E. (2001): "Macroeconomic Convergence in Transition Countries", *Journal of Comparative Economics*, 29, pp. 1–23.

Krugman, P. (1981): "Intraindustry Specialization and the Gains from Trade", *Journal of Political Economy*, 89(5), pp. 959–973.

Krugman, P. (1993): "Lessons of Massachusetts for EMU", in Torres, F., Giavazzi, F. (eds.), *Adjustment and Growth in the European Monetary Union*, Cambridge University Press, pp. 241–261.

Kubicová, I., Komárek, L., Plašil, M. (2012): "Analýza makrofinančních rizik a jejich přenosů v kontextu zranitelnosti české ekonomiky" (An Analysis of Macrofinancial Risks and their Transfers in the Context of Vulnerability of the Czech Economy), Study of the Economic Institute of Josef Hlávka 6/2012.

Landesmann, S. (1995): *Industrial Restructuring and Trade Reorientation in Eastern Europe*, Cambridge, Cambridge University Press.

Lane, P. R. (2006): "The Real Effects of EMU", CEPR Discussion Paper No. 5536.

Lee, H. Y., Wu, J. L. (2004): "Convergence of Interest Rates Around the Pacific Rim", *Applied Economics*, 36, pp. 1281–1288.

Mackowiak, B., Mongelli, F. P., Noblet, G., Smets, F. (eds) (2009): *The Euro at Ten – Lessons and Challenges*, European Central Bank.

Marques, C. R. (2004): "Inflation Persistence: Facts or Artefacts?", ECB Working Paper No. 371.

Martin, R. (2010): "Boom and Bust in the Baltic Countries — Lessons to be Learnt", *Review of European Economic Policy*, 45(4), pp. 220–226.

Matějů, J. (2013): "Explaining the Strength and Efficiency of Monetary Policy Transmission: A Panel of Impulse Responses from a TVP-VAR", IES FSV UK Working Papers 18/2013.

McKinnon, R. I. (1963): "Optimum Currency Areas", *American Economic Review*, 53(4), pp. 717–725.

Micco, A., Stein E., Ordonez G. (2003): "The Currency Union Effect on Trade: Early Evidence from EMU", *Economic Policy*, 18, pp. 315–343.

Ministry of Finance of the Czech Republic (2012): *The Convergence Programme of the Czech Republic*, April 2012.

Ministry of Finance of the Czech Republic (2013a): *The Convergence Programme of the Czech Republic*, April 2013.

Ministry of Finance of the Czech Republic (2013b): *Návrh zákona o státním rozpočtu České republiky na rok 2014 včetně rozpočtové dokumentace* (Draft Act on the State Budget of the Czech Republic for 2002 including Budget Documentation), August 2013.

Mongelli, P. F. (2002): "'New' Views on the Optimum Currency Area Theory: What is EMU Telling Us?", ECB Working Paper No. 138.

Mundell, R. A. (1961): "A Theory of Optimum Currency Areas", *American Economic Review*, 51(4), pp. 657–665.

Nicoletti, G., Scarpetta, S. (2004): "Do Regulatory Reforms in Product and Labor Markets Promote Employment? Evidence from OECD Countries", paper presented at the ECB/CEPR Conference on "What Helps or Hinders Labour Market Adjustments in Europe," Frankfurt, 28–29 June.

OECD (1998, 2004, 2010): *Employment Outlook*, Paris, OECD.

OECD (2012): *Economic Policy Reforms: Going for Growth*, Paris, OECD.

OECD (2013): *Taxing wages 2011–2012*, OECD.

Petrongolo, B., Pissarides, C. (2001): "Looking into the Black Box: A Survey of the Matching Function", *Journal of Economic Literature*, 39, pp. 392–431.

Razin, A., Rosefielde, S. (2012): "A Tale of Politically-Failing Single-Currency Area", NBER Working Paper No. 18352, National Bureau of Economic Research, Inc.

Richardson, P., Boone, L., Giorno, C., Macci, M., Rae, D., Turner, D. (2000): "The Concept, Policy Use and Measurement of Structural Unemployment: Estimating a Time Varying NAIRU Across 21 OECD Countries", OECD Economic Department Working Paper No. 250.

Rose, A. (2000): "One Money, One Market: Estimating the Effect of Common Currencies on Trade", *Economic Policy*, 15, pp. 7–45.

Sánchez, A. C., Andrews, D. (2011): "To Move or Not To Move: What Drives Residential Mobility Rates in the OECD", OECD Economics Department Working Papers No. 846.

Šmídková, K. (ed.) (2008): *Evaluation of the Fulfilment of the CNB's Inflation Targets 1998–2007*, CNB, http://www.cnb.cz/en/research/research_publications/evaluation_infl_targets/index.html.

Stavrev, E. (2008): "What Explains Growth and Inflation Dispersion in EMU?", *Czech Journal of Economics and Finance*, 58(1–2), pp. 57–67.

Szeto, K. L., Guy, M., (2004): "Estimating a New Zealand NAIRU", New Zealand Treasury Working Paper No. 04/10.

Taylor, J. B. (2009): *Getting Off Track: How Government Actions and Interventions Caused, Prolonged, and Worsened the Financial Crisis*, Stanford University, Hoover Institution Press.

Tkalec, M. (2012): "The Dynamics of Deposit Euroization in European Post-transition Countries: Evidence from Threshold VAR", *Czech Journal of Economics and Finance*, 62(3), pp. 278–296.

World Bank (2013): *Doing Business 2014*.

Wyplosz, C. (2010a): "The Eurozone in the Current Crisis", ADBI Working Paper Series, No. 207 (March).

Wyplosz, C. (2010b): "Multilateral Surveillance", European Parliament, Policy Department Economic and Scientific Policies, http://www.wyplosz.eu/fichier/econ_310.pdf.