MNB BULLETIN
October 2011

MAGYAR NEMZETI BANK

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The aim of the Magyar Nemzeti Bank with this publication is to inform professionals and the wider public in an easy-tounderstand form about basic processes taking place in the Hungarian economy and the effect of these developments on economic players and households. This publication is recommended to members of the business community, university lecturers and students, analysts and, last but not least, to the staff of other central banks and international institutions.

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Summary

DEAR READER,

The Magyar Nemzeti Bank attaches great importance to making central bank analyses on various current economic and financial trends of general interest available to the wider public. The October 2011 issue of the MNB Bulletin contains six topical articles, in which the authors present the indebtedness of local governments, the impacts of changes in tax laws on the labour market and the government budget, the consumption behaviour of the public, the information content of CDS spreads, the role of special purpose entities, and the pricing practices of banks.

The article of Ákos Aczél and Dániel Homolya discusses the risks stemming from the indebtedness of local governments. In the local government sector, by the middle of 2011 the repayment of bonds issued during the bond boom in 2007–2008 had only just begun for roughly one-third of the portfolio; by the end of the year nearly 50 per cent and by the end of 2013 some 90 per cent of the total stock will have reached the stage of principal repayment. Due to the substantial foreign currency exposure of the entire loan and bond portfolio, the declining revenues of local authorities and the deteriorating economic outlook, it is doubtful whether local authorities will be able to repay their outstanding debts to the banking sector at the original maturities. The authors find that risks relating to the debt of the local government sector have increased significantly recently, but that the banking system is also prepared and able to manage these risks. The overhaul of the local government sector and further restructuring of debt settlement procedures may be decisive factors from the perspective of the financial position of local governments. If, in parallel with the reallocation of tasks, the central budget were to take over a part of local government debt, this may result in a clearer view of the situation.

The study authored by Péter Benczúr, Gábor Kátay, Áron Kiss, Balázs Reizer and Mihály Szoboszlai uses a new micro-simulation model to estimate the long-term impacts of the changes in the tax and benefit system, which were enacted in 2010 and which are currently planned to be implemented, on the labour market and the budget. The authors find that if the measures already adopted and those still planned are fully implemented, labour supply is likely to rise by only 1.5 per cent along with a 5 per cent increase in long-term GDP, due exclusively to the tightening in transfers. While the PIT changes may lead to a significant increase in the number of hours worked and the taxable income of higher-income people, giving a boost to the economy, the aggregate effect of the removal of tax credits will be negative in terms of the number of employees. If, as a side effect of some measures, perceptions of the risks associated with Hungary increase, it may significantly influence the results: in this case, the increase in risks might well fully offset the stimulating effect of tax and transfer changes or even turn it to a negative direction through the expected return on investments in Hungary. Nevertheless, the measures have a considerable redistributive impact. It is mostly the low-income households that are hardest hit by the changes in social benefits, as also by the tax reforms, while the beneficiaries of these actions are mainly households with a higher level of income.

Zsuzsanna Hosszú's article studies household consumption behaviour and its heterogeneity in terms of income, based on micro-statistics from the pre-crisis period. In 2011, real incomes rose significantly, but there has recently been a slight decline in consumption. Despite more cautious consumption behaviour, laying more emphasis on cost-efficiency and loan repayment, in the above mentioned period the ratio of loan defaults still increased within the retail loan portfolio of banks. The reason for this phenomenon is that households had accumulated a considerable amount of debt before the crisis. As a result, the prolonged ongoing process of balance sheet adjustment may hinder growth in consumption. These processes are apparent in the macro-statistics as well, although the rate of indebtedness may be rather varied in the different income groups of the population. Revealing this heterogeneity may enable us to gain a better understanding of consumers' behaviour and to delineate the indebtedness ratio by income group more accurately. The author analysed this using the Household Budget Survey conducted by the Central Statistical Office as the database, and reviewed how real incomes had been changing in the various income deciles before the crisis, what the typical consumption

structure had been, and what borrowing behaviour had been characteristic as a consequence. According to this database, prior to the recession it was primarily the low and middle-income social groups where households showed an atypical consumption path relative to their financial status, despite decreasing real incomes. For low-income groups, even a small degree of strengthening of the Swiss franc exchange rate led to repayment problems due to the high repayment instalments compared to incomes, while for the middle-income groups it was mainly the loss of jobs that caused an increase in the rate of loan defaults, which was further aggravated by the depreciation of the forint against the Swiss franc.

The analysis of Zalán Kocsis and Dénes Nagy studies the information content of correlations between the daily changes in CDS spreads. Using the method of factor analysis, the authors break down the risk indicators into global, regional and country-specific factors. The results confirm the findings of other studies that there is a strong global factor behind movements in risk premia. The comparison of subsamples shows that during and since the financial crisis the global co-movement of spreads has become stronger, and at present the global factor affects emerging and developed countries more universally than before. In addition to the global factor, correlations of CDS spreads form well distinguishable and geographically interpretable regional country groups. The Hungarian CDS spread primarily moves together with the global factor, and the crisis in the euro area periphery in recent years also affected Hungary mainly through this factor. From the summer of 2010 to the end of the year country-specific events caused a deterioration in Hungary's risk spreads, but the shift in the government's fiscal policy stance at the beginning of 2011 largely restored investor confidence.

The work of Péter Koroknai and Rita Lénárt-Odorán provides a review of the role of special purpose entities in the national economy and in the statistics. Taking the data of the so-called special purpose entities (SPEs) into account distorts external debt and liability indicators, which are significant from the aspect of the external assessment of the Hungarian economy. In fact, the gross external debt of SPEs amounts to 100 per cent of GDP, and in this respect Hungary's external debt exceeds 300 per cent. Therefore, if SPEs are included in the calculations, the external vulnerability of the country shows a much more unfavourable picture. It is evident that in order to carry out economically rational analyses, the data of SPEs should be ignored, as these companies do not perform any economic activities in real terms, but most typically fulfil financial intermediary functions. They transmit funds from abroad to foreign companies, achieving substantial tax savings for the company group (by taking advantage of Hungarian tax regulations). In an international comparison, taking the data of SPEs into consideration exaggerates indicators showing the direct capital inflow of Hungarian companies and developments in intercompany loans to a substantial degree. At the same time, there have been several events recently which may reduce SPE-related risks. On the one hand, as a result of the MNB's efforts, from 2011 several organisations have started to regard data exclusive of SPEs as authoritative. On the other hand, several measures have been introduced recently to reduce the tax advantages available to SPEs. The shrinking presence of SPEs in Hungary has obvious advantages from the aspect of our external vulnerability, since it results in a decrease in Hungary's external debt and an improvement in its risk rating.

The high dependence of the domestic banking sector on foreign funds, as well as its open foreign exchange position within its balance sheet and the significant increase in credit risk premia have made it justified and topical to study the pricing principles of foreign (mainly parent bank) funding and their costs in more detail. To this end, authors Judit Páles and Dániel Homolya have carried out a survey at the level of individual Hungarian banks on their pricing practices and the changes in the costs of foreign funds experienced in the past few years. Both the personal interviews and the historical data underpinned the fact that since 2010 the country risk of subsidiary banks has been increasingly priced into spreads above inter-bank benchmark rates, especially in the long term. As a result, the price of funds raised from abroad has undergone considerable changes, because during the crisis the significance of risk-based pricing has become stronger. The historical data also show that this phenomenon emerged gradually at the sector level. After the subprime crisis erupted in 2007, sector-level average premia approached the default risk premia of foreign parent banks. As a matter of fact, from the crisis of October 2008 to the autumn of 2009 parent banks passed their own premia on to their domestic subsidiaries at the sector level. Since 2010, pricing based on the sovereign CDS of subsidiary banks' home country has been given more and more emphasis. Characteristically, longer-term currency swap spreads used to hedge open foreign exchange positions within the balance sheet have remained below the premia on foreign funds: the enforcement of partner and liquidity risks in prices began only later, and to the maximum level of the parent banks' CDS spreads on average. All in all, these factors are driving Hungarian banks towards short-term financing and swap-based foreign exchange financing.

The Editorial Board

Ákos Aczél and Dániel Homolya: Risks of the indebtedness of the local government sector from the point of view of financial stability[1]

This article explores the risks that arise as local governments become indebted. The article is based on interviews conducted with the heads of the local government business branches of the most important credit institutions in terms of local government financing, as well as related data, such as data from the Hungarian State Treasury on the financial management of local governments and data from banks. Until 2011, of the outstanding bonds issued during the boom in the local government sector in 2007–2008, payment began on only one third. By the end of the year, however, nearly 50 per cent (and by the end of 2013, 90 per cent) of total bonds outstanding will enter the principal repayment period. Due to the considerable foreign exchange exposure of total loans and bonds outstanding (60 per cent, with 80 per cent of those having Swiss franc exposure), as well as the declining revenues of local governments and deteriorating economic prospects, it is doubtful that local governments will be able to repay their debts to the banking sector in line with the original maturities. Our analysis establishes that local government debt-related risks have increased significantly in the recent period, but the banking sector is willing and able to manage these risks. Future comprehensive restructuring of the local government system and a change in debt settlement procedures by the Government may determine the financial position of the local government system. In parallel with a reorganisation of responsibilities, the possible transfer of a portion of local government debt (primarily from local county governments) to the central budget may result in a clearer picture.

INDEBTEDNESS OF LOCAL GOVERNMENTS

During 2007 and 2008, the liabilities of local governments to the banking sector approximately doubled. Total exposures of the banking sector have not increased significantly since the end of 2008. At end-June 2011, total bonds and total loans outstanding amounted to HUF 550 billion and HUF 450 billion, respectively. Foreign exchange exposure within the accumulated total loans and bonds outstanding is significant (approximately 60%), 80% of which is Swiss franc denominated. The increase in total liabilities outstanding was driven by both supply and demand factors. It is important to emphasise that this article basically analyses the risks to the banking sector, and therefore, it does not contain a thorough examination of the risks related to other debts (mainly commercial credit) of local governments, which have been fluctuating around HUF 200 billion for years.

In addition to cross-selling opportunities (EU applications, counselling, payment services, etc.), the banks' increasing **supply** experienced in the local government segment may have been driven by their attitude, typical among creditors, towards the continuous operation of local governments: due to their responsibilities being required by law, local governments may not become completely insolvent; nor may total dissolution occur, as they are obliged to ensure the performance of certain basic duties, and related revenues may cover repayments as well. There is a concentration on the supply side, as the seven banks that are the most active in local government financing have a market share of approximately 97 per cent.

The demand of local governments **strengthened** due to three main factors. First, the support programmes announced by the European Union basically require own funds; many of these provide the awarded funding only after the completion of the given project. Therefore, it may

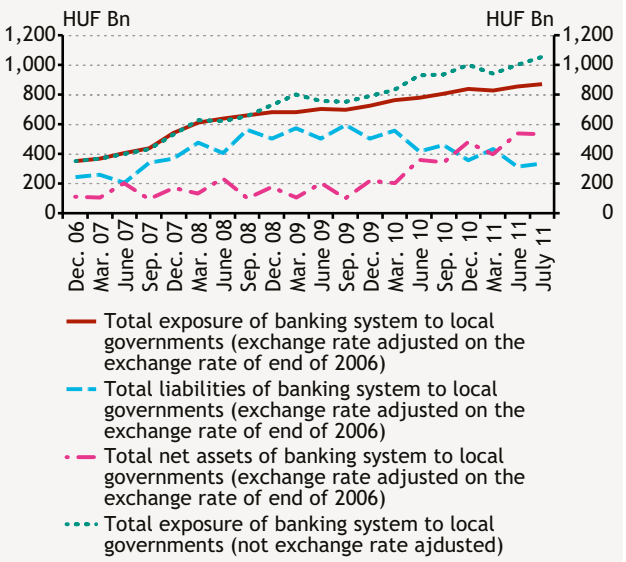
[1] We would like to thank Zoltán Komócsin for his participation in the background calculations, as well as Gabriella Grosz and Gábor P. Kiss for their assistance and advice. We also thank the senior loan officers who participated in the interviews at banks, as well as the Hungarian State Treasury for data provided and the chance to consult. Responsibility for any mistakes lies with the authors alone. Many news items have arisen in connection with the restructuring of the local government system since mid-2011; this article is based on information known before end-August 2011.

have become necessary for applicants to advance funds. Secondly, precautionary considerations stemming from regulatory uncertainty may also have played a role in the considerable magnitude of indebtedness. As a result of bills[2] outlining restrictions in lending to local governments, local governments took this last opportunity – presumably in order to accumulate reserves – to expand resources, even in economic situations where concrete investment objectives were not yet specified. The hypothesis that governments prepared applications and accumulated reserves in advance is confirmed by the fact that, at a system level, the amount of deposits accumulated following the issuing of bonds did not change for years, and the operating costs and accumulated expenditures of local governments did not increase until the end of 2009 (i.e. the resources were not used for several years). Moreover, foreign exchange funds were available at a favourable price, which may have provided an interest advantage over the entire maturity, allowing until disbursement of funds the realisation of the difference between the interest to be paid on foreign exchange loans and the interest received on forint deposits.

As the funds – mostly originating from bond issues – were placed as (forint-based) bank deposits, the position of the sector vis-à-vis the banking sector only slightly deteriorated until end-2009 (i.e. until local governments began reducing their deposits). However, in the period between early 2010 and the publication of this article, net accounts receivable of the banking sector vis-à-vis the local government sector increased by HUF 444 billion (Chart 1). This worsening of the position is attributable to three main processes. The withdrawal of deposits was typical on the asset side of local governments. The decline in total deposits by around HUF 220 billion occurred in parallel with an increase in expenditures with an accumulation purpose (accumulated expenditures presumably related to EU applications increased from HUF 574 billion in 2009 to HUF 721 billion in 2010). In addition, operating costs in 2010 also exceeded the 2009 level by approximately HUF 84 billion.

On the liability side of local governments – in parallel with the stagnation of long-term loans – the surge in overdraft credit impaired the position of the local government sector vis-à-vis the banking sector. Since January 2010, the total overdraft credit to local governments has nearly doubled, increasing from HUF 62 billion to HUF 116 billion. Local governments may have been encouraged to increase the amount of overdraft credit by the fact that – as is the case with bond issues – using this form of loan, available as part of the payment service, does not require a public procurement procedure. On the other hand, the increase in short-term loans outstanding also indicates strengthening liquidity problems, which may stem from the stretched financial management of local governments. Changes in depositing and borrowing are also reflected in the fact that in 2010, in parallel with a slight increase in outstanding debt, the cash-flow based deficit of local governments grew considerably.

Chart 1
Position of the local government sector vis-à-vis the domestic banking sector



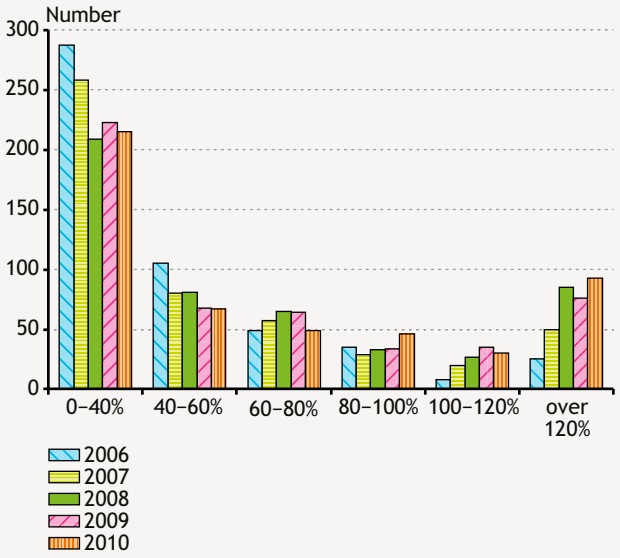
Source: MNB.

The weakening of the forint against the Swiss franc also resulted in the worsening of the net position. Due to the change in the exchange rate, accounts payable of the local government sector to the banking sector increased by some HUF 110 billion since 2010 Q1, which underlines the significant exchange rate risk surrounding the outstanding debt.

In addition to the aforementioned exchange rate risk, other default risks are also related to the accumulated debt stock. It is uncertain whether local governments will be able to cover the costs of their investment implemented (i.e. their own funds for the application and the cost of interest to be paid in the case of subsequent financing). There is indication of a slight development of efficiency, in that the sector spent nearly three quarters of its investment on real estate purchases and barely one fifth on real property renewal (i.e. operating costs may presumably decline to a lesser extent).

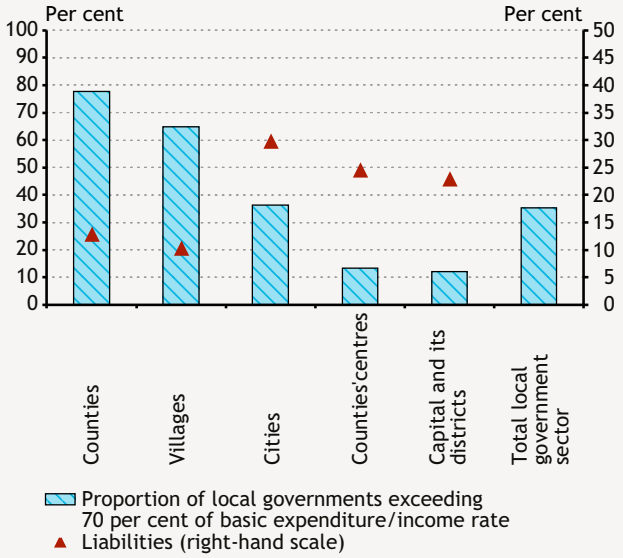
[2] In November 2007, the Ministry of Finance prepared a proposal to amend the Act on Local Governments. Inter alia, this aimed at changing the existing borrowing limit. (The content of the proposal is outlined in Vígvári, 2007).

Chart 2
Changes in liabilities to own revenues of the five hundred largest local governments that have revenues of their own between 2006 and 2010



Sources: Hungarian State Treasury, authors' own calculations.

Chart 3
Liabilities of local governments and the proportion of those with a high basic expenditure/revenue ratio according to types of settlements



Note: Basic expenditures mean operating costs, including the value of instalments coming due, whereas revenues contain all revenues except for those related to securities and loans.
Sources: Hungarian State Treasury and authors' own calculations.

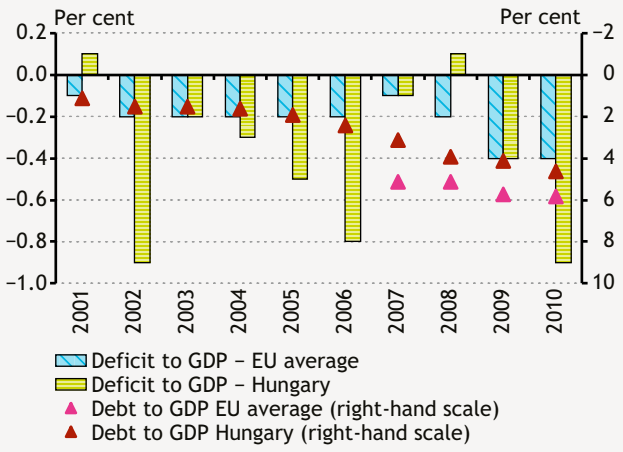
On the other hand, it is questionable whether the budgets of local governments were well-founded and based on forward-looking financial planning for the long-term. As repayment of the principal of bonds usually only begins three or four years following their issue, short-term objectives may have overshadowed prudent financial planning. An indication of this can be seen by the following: while in 2006 liabilities exceeded revenues for only thirty-three of the largest five hundred local governments that have their own revenues, the number increased to one hundred and twenty-three in 2010 (Chart 2). This increase in liabilities played an even more dominant role in the worsening of the liabilities-to-own-revenues indicator observed in recent years than the decline in own revenues.

For the sake of complete analysis, on the basis of data from the Hungarian State Treasury we also reviewed profit and loss accounts, balance sheet statements and other reports from local governments. Examinations at an individual level reveal that indebtedness is strongly concentrated among larger local governments. The breakdown according to types of settlements shows 23 per cent of the total debt is concentrated in the municipality of the capital and its surrounding districts. Their financial situation may be considered relatively stable. Based on our data, these local governments have sufficient flexibility to afford the instalments coming due. An examination of revenues (apart from revenues related to securities and borrowing) and basic expenditures (operating costs, including the repayment burden coming due) of local governments reveals that basic expenditures exceed 70 per cent of revenues only in the case of one tenth of the capital and district municipalities.[3] Local governments of counties and small settlements are the most overextended: for both of these, the ratio of local governments (value weighted with expenditures) where basic expenditures exceed 70 per cent of revenues is significant at 60–80 per cent (Chart 3). Moreover, among villages, around 23 per cent of settlements (value weighted with expenditures) exceed the 100 per cent basic expenditure/revenue ratio. Within own revenues that determine repayment ability, business tax plays an important role. If the revenues originating from business taxes were deducted from total revenues, the amount of basic expenditures would exceed 70 per cent of revenues in the case of nearly three quarters of the two hundred local governments (typically larger settlements), where 90 per cent of the sector-level business tax revenue is realised. As a result, risks related to solvency would dramatically increase. Accordingly, any redistribution of revenues originating from the business tax would result in a decline in the solvency of local governments previously considered creditworthy.

Although the system of tasks and financing of local governments varies across countries, it is worth also looking

[3] Value weighted with expenditures means five or six municipalities.

Chart 4
Debt-to-GDP ratio of the local government sector compared to the EU average



Note: In countries where Eurostat differentiates between separate local government and federal levels (Germany, Austria, Spain and Belgium), the federal level was not taken into account in our data.
Source: Eurostat.

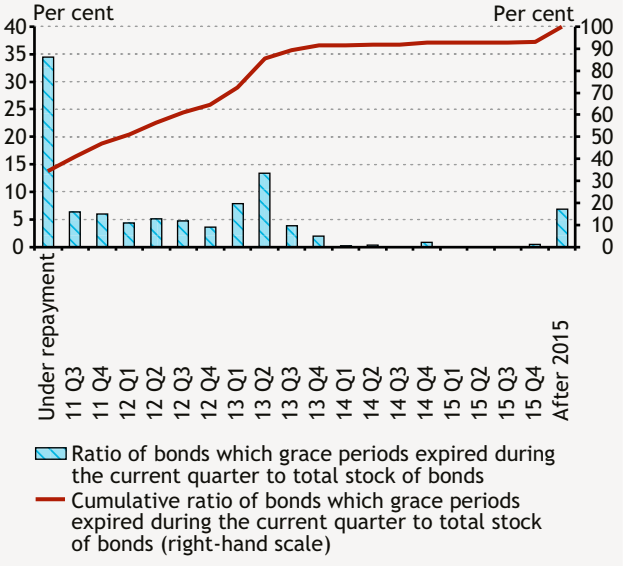
at the indebtedness of the Hungarian local government sector from an international perspective. A comparison of local government sectors in other European Union countries shows that the domestic local government sector is clearly susceptible to the accumulation of high deficits, although, for the time being, debt as a proportion of GDP cannot be considered extreme. Nevertheless, it may be a reason for concern that, as a result of high deficits, debt as a proportion of GDP increased from the 1.1 per cent level typical at the beginning of the millennium to 4.6 per cent by 2010. This also shows that stricter regulation of the financial management of local governments and ensuring adequate financing are necessary.

RISKS FROM THE ASPECT OF THE BANKING SECTOR

Bonds outstanding, which exceed half of the total exposure of local governments, were typically issued between 2006 and 2008. As a result of intense competition among banks, the premium levels that evolved were advantageous for local governments. Approximately 90 per cent of the Swiss franc-based bonds, which account for the greater part of bonds outstanding, were issued with a premium between 0 and 150 basis points above CHF LIBOR. It is worth mentioning that these premium levels are even below the premia of the bonds issued by Swiss local governments, in spite of the fact that in their case the risk stemming from the uncovered foreign exchange position does not exist. As deposit and lending rate statistics for the local government segment are not available to us, we can rely only on the 'general opinion' reinforced during multiple interviews with banks, according to which income appears in the local government segment through cross-selling opportunities. In addition to credit and bond products, banks offer a wide range of products to local governments, from maintaining accounts to options transactions, which may generate commission income for banks. The typically three- to five-year principal repayment grace periods of bonds issued (totalling approximately HUF 550 billion) started to expire at the end of 2010. Based on our estimates, by end-2011 nearly half of all the bonds outstanding will reach the repayment period, and this ratio may even amount to 90 per cent by end-2013 (Chart 5). Thus, although until now interest rates have been low, and the fact that they are tied to a variable rate (between mid-2008 and August 2011, the 3-month CHF LIBOR interest rate declined by approximately 2.5 percentage points to a level of 0–0.2 percentage points) has offset the effect of the strengthening of the Swiss franc on the repayment burden, the commencement of principal repayments imposes an increasing burden on local governments.

Calculated in terms of the end-2010 exchange rate, with the commencement of principal repayment periods in 2011 the repayment burden related to total long-term liabilities may exceed HUF 60 billion. The increase of HUF 8 billion to the bond repayment burden plays a determining role in the HUF 10 billion increase in the repayment burden, compared to 2010. According to our estimate, based on forward-looking reports of local governments, by 2012–2013 the total

Chart 5
Timing of the start of principal repayment within local government bonds outstanding



Source: MNB.

repayment obligation may grow to HUF 80 billion. Accordingly, the repayment burden related to long-term debt will increase from 0.2 per cent in 2010 to 0.3 per cent as a proportion of GDP.

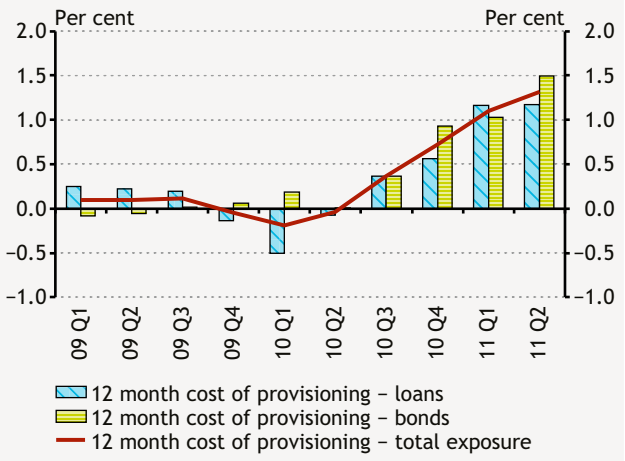
Based on portfolio indicators at the end of the second quarter of 2011, the exposure of banks to local governments cannot be considered problematic, although observable changes project an increase in risks. Risks related to bonds outstanding have especially increased. At the end of the second quarter of 2011, the proportion of non-performing loans was 1.2 per cent in the case of *loans to local governments*. According to our estimates, at end-June 2011 the 90+ day delinquency rate within *total bonds outstanding* was nearly 3 per cent, reflecting a gradual increase compared to the level of 2.1 per cent at end-March 2011. Accordingly, within total local government exposures the ratio of non-performing loans reached 2.1 per cent, while the loan loss provision coverage of this stock grew to 14 per cent, which is below the approximately 40 per cent coverage of the total non-performing bank loan portfolio.

The increase in the ratio of the amount of new loan loss provisioning to exposure points also to portfolio deterioration. The cost of provisioning as a proportion of total loans outstanding increased from the level of around 0 observed until mid-2010 to 1.3 per cent by mid-2011 (Chart 6), while other data show that the banking sector practically started provisioning for the exposure to local governments only from mid-2010 on. The 1.5 per cent level of loan loss provisioning as a proportion of total loans outstanding at end-June 2011 is far below the approximately 5 per cent exposure-proportionate amount of provisioning for all credit type (loan-based and debt security-based) receivables in the banking sector. Looking ahead, however, we consider it important that banks should apply prudent loan loss provisioning methods for the local government exposure, and that they should keep adequate records of restructured transactions, reflecting the risks related to such exposures.

The start of restructurings related to the local government segment during 2011 also foreshadows a worsening in risk indicators. At end-June 2011, restructured exposure fluctuated around the level of a mere 1 per cent. However, demand for restructuring from the borrowers' side was already appearing, in relation to 3-4 per cent of the portfolio. Based on data from the Senior Loan Officer Survey on Bank Lending Practices[4] conducted by the MNB in July 2011, banks expect approximately 10 per cent restructuring as a proportion of total loans outstanding by end-2011 (Chart 7). According to a survey conducted among banks by the central bank, from the demand side (i.e. local government side), restructuring is mainly driven by declines in revenues, expenditure structure problems, unsuccessful investments and exchange rate changes. Meanwhile, the management of solvency problems and the smoothing of loan losses are determining factors for banks.

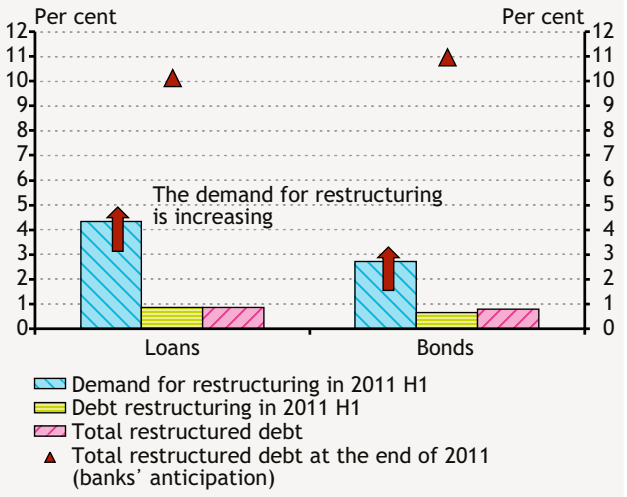
Banks usually apply maturity extensions and temporary moratoriums on complete or partial principal repayment as means of restructuring. Restructurings allow the payment burdens of local governments and the scheduling of

Chart 6
Cost of provisioning in the local government portfolio



Source: MNB.

Chart 7
Restructuring expectations in the local government portfolio



Source: MNB.

[4] http://english.mnb.hu/Root/Dokumentumtar/ENMNB/Penzugyi_stabilitas/hitelezesi_felmeres/mnben-hitelezesi-felmeres-20110825/Senior_loan_officer_survey_on_bank_lending_practice_2011_Q2.pdf.

payment to be adjusted in relation to an environment, different from the previously expected. At the same time, restructuring allows banks to apply pricing that better reflects risk costs and costs of funds. Recently, some local government organisations proposed a further general principal repayment moratorium of one or three years for all bonds. However, in our opinion, due to the uniqueness of local government transactions, the optimum solution may be to individually treat the cases of local governments with payment difficulties.

Restructurings indicate that the banking sector is willing to manage the risks related to the local government portfolio. However, aside from this willingness, another important issue is whether the banking sector is able to manage payment difficulties that may arise. Examining the local government bonds outstanding that are considered to be the riskiest, the ratio of total local government bonds outstanding to the capital buffer (until end-June 2011) does not significantly exceed 50 per cent. In the event that – in addition to the already existing loan loss provisions – a significant 10 per cent aggregate loss[5] appeared on the total bonds outstanding, only 7 per cent of the capital buffer of the banks active in the local government segment would be used up. In this scenario, there would not be a single bank where the potential loss would exceed half of the available buffer. In line with concentration of exposure, risks also affect the participants of the banking sector in a concentrated manner. A database of relationships with banks is available for total bonds outstanding. Based on this, it can be established that the various settlement segments basically reflect a share that is typical of total local government exposure. The related risks may be increased by the approximately HUF 200 billion exposure to local government companies, as seen in our survey conducted during the summer of 2011, as well as the financing of PPP projects. Manageability may be limited by the addition of other possible risks.

It may occur that risks related to the local government sector will be further increased by derivative transactions that they conclude. We assume that customer payments vis-à-vis the non-financial sector, concluded with others than non-financial corporations and private persons, may provide a rough estimate of derivative positions taken against local governments. Based on end-June 2011 data, the market value of these positions was around minus HUF 6 billion. This does not entail an effect on the profits of the banking sector, due to its covered position (commission revenue related to transactions is counted as income), but it may mean a potential profit for the local government segment. Information that allows the analysis of these derivatives has been available since early 2010. It can be established that, compared to 2010 Q1, there has not been any material change in the market value of these positions. There has been a decline in the contract value of transactions, however, which indicates some kind of adjustment. The number of partners has remained between 60–70.

REGULATORY ISSUES

In addition to the risks that already exist with the debt of local governments, the future situation may significantly be influenced by a restructuring of the whole system of local governments. Together with a narrowing of the basic responsibilities and the assignment of important institutions to the central government, it may be the case that, together with the reorganising of the duties of certain local government segments (local county governments), their debts would also be assumed by the state, resulting in a clearer picture. It is important to emphasise that this would not an entail an increase in government debt, as the debt of local governments is also presently included as a part of government debt.

The proposed change in government concept published in May 2011 raises several possibilities, including central management of local government debt, reorganisation of responsibilities and a possible transfer of the current accounts of local governments to the Hungarian State Treasury. According to prevailing regulations and practice, the current accounts of local governments are held at credit institutions, and they are allowed to change account-holding credit institutions only as of the first day of each month. Moreover, the Hungarian State Treasury has to be notified of any changes in writing 30 days in advance.[6] The transfer of accounts to the Hungarian State Treasury would result in lost revenues for banks. At the same time, it would lead to an increase in credit risk, which may be reflected in an increase in financing costs. However, in the case of such a change like this, recent information regarding the financial situation of the local government sector as a whole would be available in a more up-to-date manner, and the increased possibility of controlling financial management would entail an important advantage from the national economy aspect.

[5] This assumption means that 20 per cent of the local governments involved in the total bonds outstanding would get into trouble, and a 50 per cent loss would develop for each of them.

[6] It is worth mentioning that the Heves County Local Government, which is under debt settlement proceedings, transferred its current account to the Hungarian State Treasury, which reduces the chances of intervention by the credit institutions concerned (mainly those of the OTP Bank). The prompt timing of this step taken by the Heves County Local Government raises the issue of conflict with prevailing Hungarian legislation.

From the perspective of financial stability, it is important that repayment by local governments should remain an acknowledged obligation and, looking ahead, local government borrowing constraints move in the direction of 'effectiveness'. The latter is especially important, given that current debt constraints are too loose and thus not effective at a system level. According to our estimates, 8 per cent of the approximately 3,200 local governments may hit the statutory borrowing limit, whereas this ratio is a mere 3 per cent as a proportion of total own income in the sector. In terms of significant foreign exchange-based exposure, it may be worth considering an imposition of limits on foreign exchange-based indebtedness in order to prevent the development of future risks. It is a positive shift that pursuant to the change in legislation effective as of early 2011, if a local government borrows with a maturity of over one year or issues bonds, the body of representatives is obliged to entrust an auditor in advance. The auditor is obliged to let the body of representatives know about his professional opinion on the planned assumption of an obligation. The body of representatives is obliged to inform the financial institution providing the financial service about the opinion of the accountant.

The amendment to the Constitution also created a possibility of strengthening central control over borrowing: 'An Act may define conditions for, or the Government's consent to, any borrowing to a statutory extent or to any other commitment of local governments with the aim of preserving their budget balance.' (The Constitution of Hungary, effective as of 1 January 2012). The intention to impose stronger control over borrowing also appears in connection with the local government concept, discussed by the Government in August 2011 but not disclosed in full.

From the perspective of credit risk, procedures that help resolve situations related to insolvency are of key importance. It is important to emphasise that there is no state guarantee on local government debt, and in the event of any payment problems, liabilities may be settled in a debt settlement procedure. Nevertheless, in the current turbulent environment, uncertainties related to the ability and willingness of local governments to pay may also add to the sensitivity of risk related to the Hungarian sovereign.

The settlement of local government debt is regulated in Act XXV of 1996, which sets up a clear framework for cases of insolvency and can be considered a good statutory regulation, even internationally speaking. The purpose of the Act is for bankruptcy proceedings to provide for the restoration of the solvency of local governments, in addition to performing their mandatory duties and satisfying creditor claims in proportion to disposable assets. The debt settlement procedure of local governments is different from corporate bankruptcy law procedure in two main ways: first, because local governments have to also provide basic public services during the debt settlement procedure; and secondly, because the available collateral is special. Prior to 2010, debt settlement procedures were usually initiated in the case of smaller local governments. In 2010, they began in the case of larger local governments as well (Szigetvár, Esztergom, and Heves County in 2011).

In the summer of 2011, somewhat independently of the restructuring of the local government system as a whole, local government debt settlement procedures were changed. In view of that, while the definition of assets that may be involved in the debt settlement remained unchanged, but the legislation provided a more precise definition of elements that cannot be included in the debt settlement (Table 1). Accordingly, the scope of collateral that can be involved in the debt settlement is practically narrowed to assets that do not serve the purpose of public duties or ones not yet secured for the purpose of another institution.

Table 1
Change in the scope of assets that cannot be involved in local government debt procedures

Assets excluded from debt settlement (before the change in July 2011)	Assets excluded from debt settlement (after the change in July 2011)
Residential real estates and other real estates that were transferred from state ownership to local government ownership	Residential real estates and other real estates that were transferred from state ownership to local government ownership
	Assets for which the state provides support and contribution
	Assets of local government partnerships and local minority self-government(s) appearing in the budget of the local government
	The own fund and support parts of development and operating resources won by the local government or its budgetary body through an application exclusively for a given purpose, related to the performance of a mandatory task stipulated by law
	Separately managed sum allocated to the local government in order to settle the ownership situation of church-owned real estate

At the same time, the amendment to the law also defined what revenue can be involved in debt settlement (the amount of own revenues collected in a given year or outstanding as receivables, as well as revenue from assigned central taxes, from the commencement of the debt settlement procedure until the recovery of the declared creditor claims). A so-called reorganisation loan was defined, which may help in the repayment of earlier outstanding debt with an interest subsidy that can be imposed by ministerial decision. In addition, the scope of mandatory duties that have to be performed during debt settlement was narrowed by certain social benefits and expanded with certain responsibilities.

Based on the amendment, the power of the mayor is narrowed during the whole process. The power of the bodies of representatives has been increased, which may facilitate the adoption of measures related to debt settlements. This amendment to the law also allows the restructuring of budgetary bodies and public education institutions belonging to local governments during the debt settlement, even the immediate effect is contrary to regulations regarding their normal operation.[7]

Overall, from the perspective of the banks, the inclusion of the experience of earlier debt settlement procedures in the regulation is a favourable development. The narrowing of the scope of collateral that may be involved in debt settlement could pose a problem, but the use of significant real estate collateral for local government exposures was not typical before the amendment (only a mere 4 per cent of total debt outstanding was covered by real estate); the amount of other collateral (mainly guarantees) is nearly 11 per cent of total debt outstanding. The practice of requesting collateral is in line with the aforementioned assumption, presented in the article by Homolya and Szigel (2008), that banks base their financing decisions on the continuous operation of local governments. Namely, in spite of the uncertainties explored here, credit institutions are not afraid of suffering significant losses on local government portfolios because local governments cannot be liquidated, even in the case of a bankruptcy, and their sources of revenue may not be completely exhausted. Also, credit institutions expect insolvent institutions to meet their obligations sooner or later, even without state intervention, by rescheduling loans and limiting expenditures, using their own revenues. Looking ahead, however, increasing risks in the local government segment signal continued strict lending conditions.

SUMMARY

Until 2011, of the outstanding bonds issued during the boom in the local government sector in 2007–2008, payment began on only one third. By the end of the year, however, nearly 50 per cent (and by end of 2013, 90 per cent) of total bonds outstanding will enter the repayment period. As a result of significant exchange rate exposure, the declining revenues of local governments and deteriorating economic prospects, solvency problems may arise. In order to prevent disturbances in the operation of the financial system, appropriate management of risks related to the portfolio is important; at the same time, opinions formed abroad about the Hungarian state may also be negatively influenced by risks related to the local government sector. Our analysis suggests that the banking sector is willing and able to manage these risks. Looking ahead, however, from this point of view the Government's future comprehensive restructuring of the local government sector as a whole may be essential.

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[7] For example, it must normally be decided before the end of May whether a school's operating rights will be transferred to another organisation.

Péter Benczúr, Gábor Kátay, Áron Kiss, Balázs Reizer and Mihály Szoboszlai: Analysis of changes in the tax and transfer system with a behavioural microsimulation model

In this study, using a new microsimulation model, we estimate the long-term fiscal and labour market effects of the changes to the tax and transfer system which were passed into law in 2010 and which are currently planned. According to our results, if all of the currently planned measures are fully implemented, the level of GDP will be increased by over 5% over the long run, while employment will increase by about 1.5% (approx. 60,000 individuals). The estimated increase in employment is due exclusively to planned cuts in transfers. While changes to personal income tax may improve the incentives of high-income earners and thus have a stimulating effect on the economy, their effect on employment is negative due to the phasing out of the wage tax credit. These projections may change significantly if market perception of Hungary's economic risk deteriorates. In such a case, an increase in the required return on capital may completely offset the stimulating effect of tax and transfer changes. The measures analysed also produce a substantial distributional effect. Changes to welfare benefits, as well as tax modifications, impose a burden primarily on low income households, while households with higher income generally benefit from the changes. Overall, income concentration rises from a level similar to that of Denmark or Austria to the level of Germany or Estonia, approximating the EU average.

INTRODUCTION

In this study we estimate, with the help of a new microsimulation model, the long-term fiscal and labour market effects of changes to the tax and transfer system which were passed into law in 2010 and which are currently planned.

Microsimulation models assess the individual effects of tax and transfer changes, and then calculate the estimated macroeconomic effects by adding up these individual effects. The advantage of microsimulation over macroeconomic methods is its capability to take differences between individual households into account: different groups are affected differently by tax and transfer changes, while the reaction of households to changes may also vary across groups.

Prior to this study, microsimulation methods have been applied in Hungary at the Ministry of Finance (Benedek and Lelkes, 2005; Benedek, Elek and Szabó, 2009), the research institute Ecostat (Cserháti et al., 2007, 2009; Belyó, 2009) and the Office of the Fiscal Council (Benedek and Kiss, 2011). Earlier studies predominantly followed a static approach, i.e. they did not take into account changes in the behaviour of economic agents[1] or general-equilibrium effects that may result from them. Building on new empirical estimations (Kiss and Mosberger, 2011; Benczúr, Kátay, Kiss and Rácz, 2011), the microsimulation model described here takes these effects into account.

According to our results, the implemented and planned changes to the personal income tax (PIT) system improve the incentives of high-income earners to increase their work intensity or hours worked, and thus have a stimulating effect on the economy; however, they negatively affect employment if the wage tax credit is phased out completely. Looking at the planned PIT-related measures separately, the complete phase-out of the "super gross" calculation of taxable income (equivalent to a decrease in the effective

[1] The tax simulation model described by Benedek and Kiss (2010) applied adjustment along the intensive margin, but not along the extensive margin.

tax rate from around 21% to 16%) is estimated to cause an increase in long-term employment by 0.8%, while the planned increase in the health insurance contribution is estimated to decrease employment by another 0.3% approximately. Planned cuts in unemployment and disability benefits may increase employment by one percent each.

Overall, the results confirm that dynamic effects reduce the fiscal cost of stimulative measures over the long-term. However, we note that prudent fiscal planning must always be based on a conservative estimate of dynamic effects.[2] In our model simulations, we found that a cut in capital taxes significantly increases domestic capital stock, output and the disposable income of taxpayers, but fails to substantially affect employment. The significant adjustment in capital stock is a natural consequence of our focus on long-term effects in a small, open economy. The flexible adjustment of capital, however, also means that a possible increase of policy uncertainty perceived by economic agents may diminish the performance of the economy, due to an increase in the required returns on capital investments in Hungary.

With respect to distributional effects, the implemented and planned changes to the tax system (planned changes include the complete abolishment of super-grossing and the wage tax credit, as well as an increase in contributions) increase the disposable income of households overall, with most of the gains accruing in the highest quintile of households. At the same time, the planned abolishment of the wage tax credit results in major losses for lower- and middle-income households. Many lower income households will incur substantial losses from the cuts in disability and unemployment benefits.

Our analysis does not take into account the effects of possible compensation measures. If policy makers choose to provide compensation *within* the tax system to those who will be negatively affected by the tax changes, the resulting tax system will differ from the tax system analysed in this study. Alternatively, if policy makers choose to provide compensation by means of an increased minimum wage or by quasi-mandated wage increases in the private sector, these measures may have an adverse effect on employment in a way that our analysis could not take into account.

The rest of this study first describes the principles of the model, then the results. The description of the results begins with the redistribution effects, and then turns to the labour market and fiscal effects that constitute the primary focus of the study. A brief summary concludes the paper.

THE MODEL

Analysis was conducted using the microsimulation model of Benczúr, Kátay and Kiss (2011), which is based on the 2008 Household Budget Survey (HBS) of the CSO (Central Statistical Office).[3] The HBS contains detailed information on the composition of households (number of wage-earners, pensioners, dependent children, etc.) and the income of individuals, enabling us to examine the effect of a wide variety of changes in the tax and transfer system on the incomes of individuals and households.

The HBS is based on a representative sample of Hungarian households, but due to its objectives and methodology, it does not provide a completely accurate picture of income distribution (particularly of households from the lowest and highest income groups). For this reason, our calculations begin with an income adjustment to the upper segment of the distribution, in order to ensure that the income distribution in our database is as close as possible to the administrative data of the tax authority.[4]

The model focuses on changes in labour supply (i.e. on the question of how individuals adjust labour supply decisions following a change in economic policy). This individual behavioural response has two possibilities: response along the *intensive margin* and response along the extensive margin. A response along the intensive margin occurs when an individual works more or with greater intensity in reaction to a tax cut, and therefore generates more income

[2] In one respect our calculations almost surely overestimate the indirect fiscal effect. Since our model concentrates on the labour market decisions of individuals, and does not model their consumption-savings decision, it equates disposable income and consumption. This is reasonable in the "very long run", and it is a good approximation of the behaviour of lower income households even in the short run, but it certainly overestimates the consumption effect of the increase of net incomes at the top of the income distribution. Therefore, for a prudent short and medium-term fiscal estimation it is advisable not to calculate with the full VAT effect in the tables presented below.

[3] This was the most recent available data set at the time of the analysis. The advantage of the 2008 data over the subsequently accessible 2009 data set is that they show the Hungarian economy in an almost equilibrium position, as opposed to a severe crisis. This is in accordance with the methodology of the analysis, as the estimated effects reflect an "equilibrium-to-equilibrium" effect of the measures.

[4] Income adjustment observed in household data has a result similar to the multiple matching of tax return data to survey data (this procedure is applied, for example, by Benedek and Kiss, 2011). Income adjustment is an adequate method to improve the accuracy of simulation results, but it is an incorrect procedure if the researcher uses household data to estimate economic correlations. Thus, in the same publication, Hosszú (2011) does not apply income adjustment to HBS data.

(or vice versa, generates less income in reaction to a tax increase).[5] A response along the *extensive margin* occurs when an individual decides to enter the labour market or, on the contrary, leaves the labour market following a change in incentives. The latter type of adjustment is more relevant for low-income groups, while adjustment along the intensive margin is more relevant for the higher-income segment. We simulate these behavioural responses based on available estimates of individual Hungarian data: the intensive margin is based on the estimations of Bakos, Benczúr and Benedek (2008) and Kiss and Mosberger (2011), while the estimation of Benczúr, Kátay, Kiss and Rácz (2011) is used for the extensive margin.

Importantly, the model also takes into account the general-equilibrium macroeconomic effects of tax and transfer changes. This is achieved by embedding the microsimulation model within a parsimonious macroeconomic model. By summarising the behavioural effects of individuals calculated in microsimulation, we first calculate the aggregate change in effective labour supply, then use this labour supply shock as an input to the macro model in order to evaluate how wages, capital stock and output are adjusted. Based on the results of the macroeconomic model, we recalculate the labour market adjustment of individuals and its aggregate macroeconomic effect. This procedure is repeated until all indirect effects are integrated in the results (that is, until the system results in equilibrium).

The macroeconomic model is a parsimonious model of a small, open economy: capital adjusts elastically on the international capital market, where the equilibrium interest rate reflects the international rate of return on capital and equilibrium wages (per productivity unit) reflect the marginal product of labour. This means that the dynamic results of the model measure long-term effects, where "long-term" means sufficient time for adjustment of capital stock to have taken place. This time frame may range between five to ten years, depending on the size of the shock and the general economic environment.

How does the macro-economy adjust to an increase in labour supply (as the result of adjustment on the intensive or the extensive margin)? With unchanged labour demand, the wage level initially decreases. This increases the marginal product of capital, resulting in capital inflow. In a small, open economy, capital supply reacts quite elastically to changes in yields in the long term. The rise in capital stock increases the marginal product of labour and helps wages return near to their original level, while the return on capital falls back to near its original level (i.e. to the yield determined and required on the international market, adjusted for country-specific economic risk).

Embedding the microsimulation model into a macro model makes it possible to analyse the effects of economic policy changes that do not directly affect the tax burden of labour. A corporate tax cut, for example, increases the return on capital employed in Hungary, resulting in a capital inflow through the elastic international capital supply. In turn, this increases labour productivity and thereby wages. The increase in wages, however, leads to a rise in labour supply. Capital and labour supply continue to adjust until wages and return on capital reach a new equilibrium near the original levels.

When interpreting results, one must keep in mind the inherent simplifications of the macro model. In particular, it is assumed that an increased labour supply can be completely absorbed by labour demand in the long term – irrespective of the skill composition and level of productivity. In other words, an increased rate of activity translates into increased employment. This may be an overly optimistic premise for two reasons. First, as a result of labour market frictions and skill mismatches, demand might not exist for job-seekers with certain skills and qualifications. Secondly, certain government measures (e.g. an increase in minimum wage, mandatory wage increases) might hinder the decline in wages needed to drive labour demand to absorb a growing labour supply.

STATIC DISTRIBUTIONAL EFFECTS

Before we turn to the analysis of long-term fiscal and labour supply effects, we briefly describe the distributional effect of the analysed policy packages. The distributional effects shown in this section are static in the sense that they do not take into account the behavioural responses of economic agents, only the direct effect of tax and transfer changes on net income. Our aim is to objectively show distributional effects and not to make value judgements. In a democracy, the legislative branch has the power and responsibility to choose the values that guide tax and transfer policy (specifically, to strike a balance between the competing values of economic policy: efficiency and equity). Besides informing the policy-making process, the analysis of distributional effects offers a good point of departure for the discussion of labour market effects, as it shows which specific changes are causing responses in individuals' labour supply decisions.

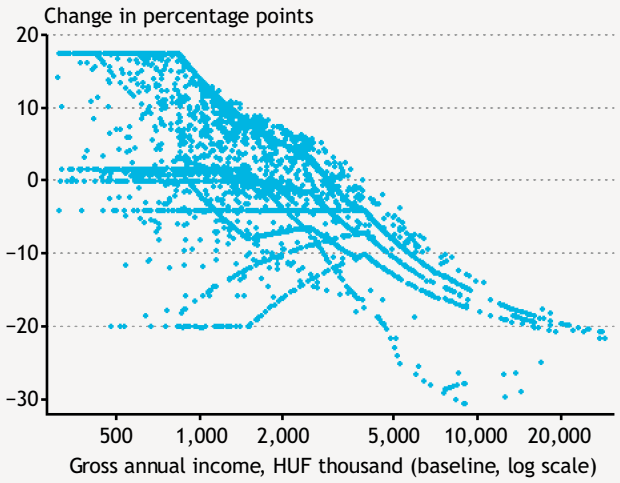
[5] Adjustment along the intensive margin may partially contain the legalization of some activities formerly conducted in the shadow economy (or, as it is referred to in Hungarian, the "whitening" of the economy). This legalization process also improves the position of the budget, but it does not constitute a real growth of the economy.

Chart 1 shows how taxpayers' average effective tax rate (AETR is defined as the sum of total deductions divided by gross wage income) changes as a result of the changes to the PIT and social security contributions (SSC) (a complete phase-out of the super gross calculation of the tax base and the wage tax credit, and a one percentage point increase in employee contributions, above and beyond the one-half percentage point increase which entered into effect in 2011). Here, as in most exercises below, the benchmark is 2010. Each point in the Chart corresponds to a taxpayer in the database. The logarithm of individual gross yearly income, prior to the tax changes, is shown on the horizontal axis (thus, the table is biased in a way that the distance between an individual earning HUF 500 thousand annually from an individual earning HUF 5 million is equal to the distance between the latter and an individual earning HUF 50 million.). The change of AETR (which also takes into account SSC) is shown in percentage points on the vertical axis.

Groups of "typical" taxpayers (those with wage income only or entrepreneurial income only, etc.), create almost connected lines; parallel lines of taxpayers differ in the number of children. "Non-typical" taxpayers (those who earn multiple types of income) create point clouds between the lines of "typical" taxpayers.

The right side of the chart shows that abolishing the upper tax rate in 2011 results in a dramatic decrease of 10-20 percentage points in the AETR of individuals earning over HUF 4 million annually. There is significant heterogeneity among taxpayers below that income level. Taxpayers who were tax-exempt due to the wage tax credit until 2010 (with earned income of about HUF 1 million or less) see their average tax rate increase by 17.5% (the new statutory tax rate of 16% and a 1.5% increase in SSC). Between HUF 1 million and HUF 4 million, taxpayers with only wage income who benefitted from the wage tax credit form a continuous curve. Since the effect of tax credits diminished with income, their loss also declines with income, and turns into a gain where the upper tax rate was applicable in 2010 at a gross income of about HUF 4 million (or HUF 5 million in super-grossing).

Chart 1
Changes in the effective average tax rate resulting from the PIT and contribution changes



Note: In addition to the PIT changes entering into force in 2011, this Chart shows the effect of the complete phase-out of "super-grossing" and the wage tax credit, as well as minor contribution increases, on the average effective tax rate of individual taxpayers.

The effective tax burden of many lower income taxpayers grows only by the rate of the contribution increase. They were exempted from the PIT by the wage tax credit until 2010 and they are exempted by the increased child tax credit after 2012. The taxpayers whose tax burden does not change are ones that received only pension income or income from child care aid (gyes) in 2010. Between those who lose the maximal amount of the wage tax credit and those who see no changes in their tax rate are taxpayers who were, before the change, eligible for a partial wage tax credit; these taxpayers have both wage-type income and independent income.

At the same time, the average tax rate of a considerable number of taxpayers earning between HUF 1 million and HUF 4 million decreases by approximately four percentage points. These taxpayers were not entitled to tax credits in the past, as their income originates from entrepreneurial (independent) income and not wages. They benefit from the cut in the statutory tax rate, losing only part of the gain in increased contributions. Finally, even with income of about HUF 1 million, the average tax rate substantially decreases for those who are entitled to the expanded family tax benefit, but were not entitled to the wage tax credit in the past.

Table 1 analyses changes in the tax system in a different way (the effects on household income are shown, rather than the individual income shown in Chart 1). The set of measures analysed is the same: in addition to the PIT rules coming into force in 2011, it contains the complete phase-out of super-grossing and the wage tax credit as well as the one and one-half percentage point increase in contributions. The table shows distribution effects in a breakdown of five income groups, or quintiles. Households are divided into five groups of equal number, based on

Table 1
Changes in the income of households, only tax changes

		Worse off	Neutral	Better off
Quintile 1	Individuals affected (thousand)	1,464	561	542
	Change in annual hhold income (HUF thousand)	−65	–	99
	Change in annual hhold income (%)	−3.9%	–	4.8%
Quintile 2	Individuals affected (thousand)	1,020	492	578
	Change in annual hhold income (HUF thousand)	−132	–	166
	Change in annual hhold income (%)	−5.6%	–	5.2%
Quintile 3	Individuals affected (thousand)	795	526	484
	Change in annual hhold income (HUF thousand)	−173	–	223
	Change in annual hhold income (%)	−6.1%	–	6.0%
Quintile 4	Individuals affected (thousand)	762	414	607
	Change in annual hhold income (HUF thousand)	−161	–	352
	Change in annual hhold income (%)	−5.0%	–	7.5%
Quintile 5	Individuals affected (thousand)	424	202	1,021
	Change in annual hhold income (HUF thousand)	−132	–	976
	Change in annual hhold income (%)	−3.5%	–	12.4%
Total	Individuals affected (thousand)	4,464	2,195	3,232
	Change in annual hhold income (HUF thousand)	−122	–	454
	Change in annual hhold income (%)	−4.8%	–	8.0%

equivalent income[6] (as households are divided into equal groups, the distribution of *individuals* is not entirely uniform). The table reveals the number, by quintile, of individuals living in households that benefit or suffer from the tax changes, or do not experience an effect (the majority of these are pensioner households). The average benefit or loss of households is expressed in 2010 forints and as a percentage of household income, by quintile. The effects in Table 1 are static effects.

It is clear that over three million people live in households that benefit from the tax changes. These households will pay an average of HUF 450,000 less in taxes than in 2010 (this is equivalent to 8% of their household income). At the same time, almost four and a half million people live in households which will suffer because of the tax changes. Their tax burden increases by approximately HUF 120,000 per household, corresponding to roughly 5% of their household income. Although the PIT and contribution changes overall lead to a tax cut in the aggregate, more people are worse off than better off as a result of the measures.

The table also shows that the higher the income quintile, the more (as a percentage of household income) that people benefit. This is attributable to the fact that taxpayers with high incomes can fully take advantage of the reduced PIT rates and the expanded family tax benefit. Of the households that are negatively affected, the lowest quintile and the highest quintile suffer the smallest losses as a percentage of their household income. The former are probably households with several children, whose losses are reduced by the expansion of the family benefit, while the latter are presumably families with several employed members, who were only partly eligible for the wage tax credit.

Finally, it is noteworthy that the top quintile benefits the most; this segment gains the most from the abolishment of the upper PIT rate and the tax cut instituted by the phase-out of super-grossing. Approximately one million people live in households that belong to the top income quintile and benefit from the tax changes. Their annual household income increases by approximately HUF 1 million annually. This means that although the entire PIT and contribution package costs roughly HUF 200 billion, the winners in the upper income quintile gain approximately HUF 400 billion.

In the next section, we analyse two measures affecting transfers: cuts in unemployment and disability benefits. In this section, we touch only briefly on how these measures affect the distributional effects shown in Table 1. The two measures add approximately 220,000 people to the group who are made worse off. Two thirds come from the group of people affected neutrally by the tax measures, while over two-thirds of them belong to the two lowest income quintiles. As an additional consequence of benefit cuts, the net income of those made worse off by the package

[6] Equivalent income is the income of a household per consumption unit. We apply the equivalence scale of the Ministry of National Resources for the calculation of the consumption units, where the weight of the first adult is 1, 0.9 for the second adult, 0.8 for the first two supported children and 0.7 for any other supported children.

decreases by an average of 7.5% (in contrast to an average loss of 5%, if only tax changes are considered). Some households, however, may lose as much as half of their annual income (not accounting for behavioural effects).

During our calculations, we simulated the GINI index that is frequently used to summarise income inequality. The GINI index equals 0 in case of total income equality and 1 if a single individual disposes of the total national income. According to our calculations, the GINI index of Hungary increases from 0.264 to 0.304 as a result of the entire package of tax and transfer measures (this calculation takes dynamic effects into account). The first Chart is approximately equal to the 2008 statistic published on the Eurostat website (Eurostat 2011), showing that Hungary had approximately the 6th most equal income distribution among the 27 EU member states (the Czech Republic, Denmark, Austria and Finland had similar GINI indices). The 0.304 value is close to the EU average, corresponding to roughly the 14th most equal distribution among the EU 27 states (Ireland, Germany, Estonia and Italy had similar GINI indices).

LABOUR MARKET AND FISCAL EFFECTS

The microsimulation model helps expose how government measures implemented and planned since 2010 contribute to the long-term development of the labour force and the budget. The results below contain static and dynamic estimates. Static effects quantify the immediate fiscal effects of the measures, before adjustment in the behaviour of economic agents (e.g. changes in the labour supply). By contrast, dynamic effects can be interpreted as a long-term effect, after labour supply, wages and the stock of capital have fully adjusted to the changes.

In the following, we compare each set of measures to the 2010 policy prior to the change. In Tables 2–5, changes in macroeconomic variables represent changes in levels. For example, the PIT changes coming into effect in 2011 increase the level of long-term GDP by 2.4% compared to the baseline scenario (i.e. 2010 policy prior to the change [see the second column in Table 3]). The fiscal effects shown in the tables are in HUF billion at 2010 prices, where positive Charts indicate a balance improvement and negative Charts indicate a declining balance. As the model focuses on the labour market behaviour of individuals, it does not explicitly model consumption-saving decisions. Thus, with respect to VAT revenue, we applied a simplifying assumption that households spend all of their surplus income. This assumption is reasonable over the very long term, but it clearly overestimates consumption and hence VAT revenues in the short and medium term.

Table 2 shows the static and dynamic effects of four planned measures. The first two columns show the effects of the complete phase-out of super-grossing. The second two columns show the effects of the complete phase-out of the wage tax credit. The next two columns analyse changes in contributions announced in September 2011 (employee contribution increases by one percentage point, while employer health insurance contributions are paid at least one and a half times the minimum wage). Finally, the last two columns show the effects of the two percentage point increase in VAT. Effects in this table are relative to regulations in force in 2011.

The phase-out of super-grossing increases effective labour supply by approximately 1.5% (weighted for productivity), predominantly through encouraged entry into employment, as it reduces burdens on labour across all income brackets. We estimate the direct annual cost of the measure at about HUF 250 billion (which is probably a lower-limit estimate in the short run, due to unrealised VAT revenues). The behavioural effects reduce the long-term annual cost to about HUF 150 billion.

The complete phase-out of the wage tax credit affects labour supply through the behaviour of two groups. The average tax burden on wage income increases for lower income groups. Since employees with lower productivity are less motivated to enter into employment, employment may decline by about 2% in the long term. Since unemployment benefits and Phase 1 of the child care benefit (gyed), among others, are taxed as wage income, the tax burden on these also increases through the phase-out of tax credits; this increases the incentive to work for individuals who receive these benefits. If we neutralise this latter effect, the phase-out of the wage tax credit reduces long-term employment by an even higher rate (by approximately 2.7%). Thus, our calculations suggest that the wage tax credit increases employment by decreasing the tax burden on wages around and slightly above the minimum wage.

The phase-out of the wage tax credit, on the other hand, has a stimulative effect on higher-income individuals (i.e. taxpayers who receive a reduced wage tax credit). Their marginal effective tax rate (METR) is increased by the phase-out of the wage tax credit (if their super-grossed income increases by HUF 100, they are entitled to about HUF 12 less in wage tax credit, thus their METR is higher by $12 * 1{,}27 = 15.24$ than for others). With the abolishment of the wage tax credit, these taxpayers will lose some tax credit, yet their marginal tax rate will decrease; both changes encourage them to increase their labour intensity. According to our estimates, this second effect may increase

Table 2
Effect of personal income tax in the past and its hypothetical changes

	Phase-out of super-grossing		Complete phase-out of the wage tax credit		Increase in contributions		VAT increase	
	static	dynamic	static	dynamic	static	dynamic	static	dynamic
Effective labour supply		1.3%		−0.3%		−0.3%		−0.1%
Employment		0.8%		−1.9%		−0.3%		0.1%
Capital stock		1.0%		−0.3%		−0.5%		−0.1%
GDP		1.2%		−0.3%		−0.4%		−0.1%
Average gross wage		−0.1%		0.0%		−0.2%		0.0%
Disposable income		3.9%		−4.3%		−1.3%		−2.2%
Personal income tax	−310	−301	440	436	0	−9	0	−2
Employee contributions	0	20	0	−4	101	94	0	−1
Employer contributions	0	28	0	−7	20	8	0	−2
VAT	61	79	−87	−86	−20	−27	168	170
Taxes on capital	0	8	0	−2	0	−3	0	−1
Local business tax	0	5	0	−1	0	−2	0	0
Transfers	0	11	0	−19	0	−4	0	1
Total	−248	−150	353	317	101	58	168	164

Note: Values indicated in the rows of macroeconomic variables show changes in levels. Fiscal effects are indicated in HUF billion, at a 2010 price level, where positive Charts indicate a balance improvement and negative Charts indicate a declining balance. The VAT estimate is based on a simplifying assumption.

the aggregate effective labour supply by over one percentage point. Thus, the measure hardly affects the long-term wage sum overall.

With regard to fiscal effects, the complete phase-out of the wage tax credit produces annual savings of HUF 350 billion as a static effect and a saving of HUF 320 billion with regard to long-term dynamic effects.

The rise in contributions moderately increases the effective tax burden on labour. Therefore, it has a moderately negative effect on employment. As a static effect, it is estimated to produce about HUF 100 billion in savings for the budget; the dynamic effect is smaller, of course. The VAT increase has relatively little effect on labour supply; although the value of consumption possible through work declines, the value of income that can be realised from work (benefits, pensions, etc.) also declines. Therefore, this source of revenue has only a limited negative effect on the aggregate economy.[7]

Table 3 arranges the analysed measures into larger units: the first two columns analyse the measures coming into effect in 2011 (introduction of the flat tax, reduction of the wage tax credit, expansion of child tax benefit, increase of employee contributions by one-half of a percentage point). The next two columns add to this package the four measures analysed in the previous table, the phase-out of the wage tax credit and super-grossing, increased VAT and contributions. Finally, the last two columns add the effect of the corporate tax cuts of 2010 on the other measures.

According to our calculations, the measures coming into effect in 2011 increase long-term labour supply by 2.6%, primarily by improving the incentives of higher-income individuals to increase their work intensity or hours (labour market adjustment along the intensive margin). Change in employment, however, is negligible (extensive margin). The total behavioural response (intensive and extensive) may still be substantial: according to our estimates, the long-term annual fiscal effect of the tax changes may lower the direct annual cost by two-thirds (from roughly HUF 300 billion annually to roughly HUF 100 billion annually, with the optimistic VAT effect).

With the four measures planned for 2011, the package is close to fiscal neutrality in static terms, but it produces a negative impact on employment as the phase-out of the wage tax credit has a detrimental effect on employment. The added incentives provide further improvement, due to the phase-out of super-grossing. Thus, the stimulating effect of the entire package on GDP is half a percentage

[7] Taxation of income and consumption over the "very long term", that is, over the entire lifecycle, has an identical incentive effect, as the result of both is that less consumption is possible with the same amount of work.

Table 3
Effect of combined tax packages

	2010–2011 PIT changes		In addition: phase-out of the wage tax credit and super-grossing, VAT and contribution increase		In addition: reduction of corporate tax in 2010	
	static	dynamic	static	dynamic	static	dynamic
Effective labour supply		2.6%		3.2%		3.4%
Employment		0.1%		−0.8%		−0.5%
Capital stock		2.1%		2.3%		5.8%
GDP		2.4%		2.9%		4.2%
Average gross wage		−0.3%		−0.5%		1.1%
Disposable income		5.3%		2.4%		3.7%
Personal income tax	−422	−376	−397	−356	−397	−328
Employee contributions	50	87	151	197	151	230
Employer contributions	0	62	20	89	20	139
VAT	74	106	216	259	216	289
Taxes on capital	0	16	0	18	−104	−69
Local business tax	0	11	0	13	0	19
Transfers	0	2	0	−7	0	−3
Total	−297	−93	−10	212	−114	277

Note: Values indicated in the rows of macroeconomic variables show changes in levels. Fiscal effects are indicated in HUF billion, at a 2010 price level, where positive Charts indicate a balance improvement and negative Charts indicate a declining balance. The VAT estimate is based on a simplifying assumption.

point higher (2.9%) than that of measures coming into force in 2011.

In addition to all of these measures, the last two columns in the table show the easing of the tax burden on businesses implemented in 2010 and 2011 (that is, the phase-out of the extraordinary tax, the setting of the main corporate income tax (CIT) rate at 19% and the extension of the lower CIT rate of 10%). We also took into account two measures that are still in the planning phase in 2011: modification of the loss carry-forward rules and the corporate car tax. We included in the calculations that part of the sectoral taxes enacted in 2010 that can be assumed to be made permanent (i.e. one part of the present extra tax on the financial sector). Since we did not model the heterogeneity of the corporate sector, we integrated these changes as an approximately 15% cut of the effective tax rate levied on the profit of the corporate sector. An increase in the return on capital in a small, open economy results in substantial capital inflows: in our estimation, the long-term increase of capital stock amounts to about 3.5%, causing a quarter-percent increase in employment. The static cost of measures affecting the burden on capital is about HUF 100 billion, but dynamic effects (primarily the increasing corporate tax base resulting from capital inflows) turn the fiscal effect into savings.

Table 4 shows the measures of the so-called "Széll Kálmán Plan" and the government's Convergence Program which affect transfers: cuts in unemployment and disability benefits. Our model is unable to quantify the effect of various other measures transforming the institutional framework of the labour market (e.g. Labour Code, community service program).

The first two columns of the table show the effect of changes in unemployment benefits (e.g. a shortening of the maximum benefit period from nine months to three months, tightening the eligibility criteria, a cut in the maximum amount of the benefit to the minimum wage, and the phase-out of the job-seeking benefits extended to active job-seeking individuals). The measures are estimated to increase employment by approximately 1% over the long term, primarily among lower income groups. We regard this estimate to be an upper limit, as it only takes into account the direct incentive effect of the measures: that job-seekers will have an incentive to search harder for employment. We might underestimate the frictional imperfections of the labour market (i.e. whether it is possible to find a job in three months). Also, we do not take into account that a shorter job-search period may impair the quality of employee-employer matches. The model takes into account only the incentive effect that losing the

Table 4
Effect of the planned change of transfers

	Unemployment benefits		Disability benefits		Total	
	static	dynamic	static	dynamic	static	dynamic
Effective labour supply		0.7%		0.8%		1.4%
Employment		1.1%		1.1%		2.2%
Capital stock		0.6%		0.6%		1.1%
GDP		0.6%		0.7%		1.3%
Average gross wage		−0.1%		−0.1%		−0.1%
Disposable income		−0.2%		−0.3%		−0.5%
Personal income tax	0	4	0	9	0	12
Employee contributions	−14	−5	0	13	−13	7
Employer contributions	0	16	0	17	0	31
VAT	−12	−3	−17	−6	−28	−9
Taxes on capital	0	4	0	5	0	8
Local business tax	0	3	0	3	0	6
Transfers	72	81	83	85	153	163
Total	47	100	67	126	112	219

Note: Values indicated in the rows of macroeconomic variables show changes in levels. Fiscal effects are indicated in HUF billion, at a 2010 price level, where positive Charts indicate a balance improvement and negative Charts indicate a declining balance. The VAT estimate is based on a simplifying assumption.

benefit earlier makes the individual want to find a job earlier. The estimated direct fiscal effect is about HUF 50 billion annually, while the dynamic, long-term effect is about HUF 100 billion annually.[8] For our calculations, we took into account that individuals losing unemployment benefits may become eligible for other benefits (e.g. wage supplement benefits); this effect, however, did not exceed HUF 5 billion.

The second two columns of Table 4 show the effects of the planned cuts in disability benefits. These cuts have been planned in the Széll Kálmán Plan and the Convergence Program upon review of the disability status of a great number of individuals: according to the plan, about 100,000 beneficiaries of disability pension under the age of 57 and 84,000 beneficiaries of the so-called reduced-ability benefit are expected to lose their benefits. These account for approximately 30% of current beneficiaries. According to our calculations, the measure will cause an increase in employment by 1% (approximately 40,000 people). In this case, the effect is not relevant for the "very long term", as the number of long-term beneficiaries depends solely on how many new people are added. A one-time review of the disability status of individuals has only a transitory effect; those losing their benefits would, in the "long run" reach the pension age anyway. We nevertheless quantified the effect of the measure, given that part of its effect is expected to be present after ten years; we considered this to be a "long-term" effect. As was the case with cuts in unemployment benefits, we cannot quantify if, and to what extent, frictional imperfections or mismatched skills affect this group differently than other workers. It is quite possible that former recipients of disability benefits are less likely to find jobs than other workers of similar age and qualification. The static fiscal saving from the measure is estimated to be HUF 70 billion annually (taking into account that some of those who lose benefits may be eligible for other transfers), while the long-term fiscal effect is estimated to be HUF 130 billion. The last two columns of the table indicate the combined effect of the two sets of measures. We note that the effects roughly correspond to the sum of the effect of the two sets.

Table 5 shows the analysis of the entire 2010–2011 economic policy package; that is, it takes into account the 2011 PIT and corporate tax changes, measures of the Széll Kálmán Plan that affect unemployment and disability benefits, as well as SSC, VAT and PIT changes planned for the next two years (phase-out of super-grossing and the wage tax credit). The middle three columns of the table examine how the results change if the risk premium of Hungarian capital investments increases. Finally, the last two columns do not involve an increased risk premium, but analyse a scenario in which sectoral taxes that are now considered temporary become permanent (their effect was not taken into account in the calculations of Table 3).

[8] For the calculation we took into account the fact that the state pays employer contributions for the recipients of unemployment benefits, thus a decrease in benefits affects the budget on both the revenue and expenditure side.

Table 5
Hypothetical increase of risk premia and effect of sectoral taxes

	Changes in the tax and transfer system				
Hypothetical shock affecting the risk premium		0	0.5	1	"current status"
	static	dynamic	dynamic	dynamic	dynamic
Effective labour supply		4.7%	4.0%	3.1%	2.8%
Employment		1.5%	0.6%	−0.5%	−0.2%
Capital stock		6.8%	−4.6%	−16.6%	−2.5%
GDP		5.5%	1.0%	−3.8%	0.9%
Average gross wage		1.0%	−4.3%	−9.9%	−2.7%
Disposable income		3.2%	−1.2%	−5.8%	−0.8%
Personal income tax	−405	−318	−413	−511	−313
Employee contributions	136	236	128	13	136
Employer contributions	20	168	0	−174	17
VAT	188	278	181	79	188
Taxes on capital	−104	−61	−120	−181	135
Local business tax	0	24	4	−17	4
Transfers	152	157	147	139	64
Total	−13	484	−72	−652	230

Note: Values indicated in the rows of macroeconomic variables show changes in levels. Fiscal effects are indicated in HUF billion, at a 2010 price level, where positive Charts indicate a balance improvement and negative Charts indicate a declining balance. The VAT estimate is based on a simplifying assumption.

The first two columns of the table show the combined effect of all previously analysed government measures.[9] This entire economic policy package increases employment by 1.5% (approximately 60,000 people) in the long term, entirely as a result of the cuts in benefits (the effect of tax changes is dominated by the negative effect of the phase-out of the wage tax credit). Effective labour supply may increase by a more substantial amount (4.7%) in the long term, as a result of the improved incentives of individuals with higher income. The complete package has a roughly neutral fiscal effect in static terms, but a substantial positive dynamic effect.

The third and fourth columns in the table show scenarios in which the risk premium on Hungarian capital investments increases by 50 and 100 basis points on top of the policy package analysed above.[10] The risk premium may increase to compensate for policy uncertainty perceived by investors if they interpret sectoral extra taxes, the forced exit of private pension fund members or retroactive taxation as a sign of growing uncertainty in the long term, or if they believe that their tax burden may rise again in the medium term in the course of a possible fiscal adjustment. In this scenario we did not quantify adverse effects of a possibly excessive minimum wage increase.

The results indicate that increases in the risk premium of Hungarian capital investments affect capital stock – and thereby output, wage levels and consumption to a large degree – with a limited effect on the labour market. Effective labour supply decreases only by three-fourths of a percentage point in reaction to a 50 basis point increase in the expected return, while capital stock decreases by over ten percent. According to our calculations, the persistent rise of the required return on capital investments levies a significant impact on the budget: a permanent 50 basis point increase involves a long-term annual fiscal cost of about HUF 550 billion.

In the last scenario of Table 5, there is no risk premium change, but the policy package differs from the other scenarios above in three ways. This scenario basically assumes that current policy – as opposed to the planned policy – will continue over the long term. First, in this hypothetical scenario the current level of sectoral taxes (including the one on financial institutions) remains

[9] Here we took into account an additional measure: extension of child care aid up to age 3 of the youngest child (as opposed to age 2). The long-term effect of the measure is small; therefore it is not shown separately.

[10] The risk premium on investments is not equivalent to popular country risk indicators, such as the CDS spreads related to government bonds: the risk premium relevant to us is related to the required rate of return on investments in the private sector, while the CDS spread relates to government solvency.

unchanged. This means that the effective tax burden on capital increases (rather than decreases) relative to 2010. Secondly, this scenario does not include any re-evaluation of eligibility for disability benefits. Finally, in this scenario, super-grossing remains in effect above the average wage; that is, the effective PIT rate remains about 1.27 * 16 = 20.3 per cent for higher income groups.

The effect of the resulting economic policy package significantly differs from the one shown in the first column of Table 5. In this case, too, the additional burden on capital has only a limited effect on the labour market, but it affects capital stock, wages, output and consumption to a larger extent. Keeping the super-grossing in the upper income segment improves the fiscal position of the government, but reduces the positive intensive- and extensive-margin labour market effects of the package. Finally, in this scenario, cuts in disability benefits do not contribute to employment by one per cent or to the budget revenue by HUF 120 billion. Overall, this hypothetical package stimulates the economy by approximately one per cent, but has a moderately negative effect on employment.

SUMMARY

In this study, with the help of the new behavioural microsimulation model of Benczúr, Kátay and Kiss (2011), we analysed the tax and transfer changes enacted in 2010 and planned in the Széll Kálmán Plan and the Convergence Programme. According to our estimates, in the event of full implementation of the planned measures, the level of long-term GDP is increased by over five percent while employment is increased by only one and a half percent, i.e. by approximately 60,000 workers (the planned cuts in unemployment and disability benefits may increase long-run employment by 1 per cent each). The positive employment effect is entirely attributable to cuts in unemployment and disability benefits. The reduction of capital taxes under the current government – assuming the subsequent phase-out of extraordinary sectoral taxes and the reduction of credit institution taxes – may result in substantial capital inflows, potentially resulting in roughly a 0.3 per cent increase in employment.

The changes affecting labour taxes, however, negatively contribute to the employment effect of the policy package. While the effective and planned PIT cuts improve the incentives of high-income earners to increase their work intensity and hours worked, and therefore have a stimulating effect on the economy, their overall effect on employment is estimated to be negative. The complete phase-out of super-grossing may increase long-term employment by 0.8 per cent, while the phase-out of the wage tax credit and the planned increase of the health insurance contribution may decrease employment by approximately two per cent and 0.3 per cent, respectively.

The dynamic effects reduce the fiscal cost of stimulative measures in the long term. However, we note that prudent fiscal planning must always be based on a conservative estimate of dynamic effects.

The results are significantly altered if the country's risk perception deteriorates as a side-effect of certain measures; in such a case, it is easily possible that growing risks completely offset the stimulating effect of tax and transfer changes on the economy through the required returns of Hungarian capital investments. Results may also be affected by possible measures aimed at compensating those who are negatively affected by the tax changes. If compensatory measures are enacted within the tax system, the fiscal and incentive effects may differ from those analysed in this study. If compensatory measures are enacted by an increased minimum wage (or mandatory wage increases), these measures may have a substantial negative employment effect of their own.

In terms of distribution effects, the changes in the tax system that have already been implemented and those that are currently planned significantly increase the disposable income of households with high income, while the phase-out of the wage tax credit means major losses for households with lower incomes. According to our calculations, the GINI index – measuring income concentration – may rise from 0.264 to 0.304; that is, the income distribution of Hungary among the 27 EU Member States may fall from the sixth most equal distribution to the fourteenth.

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APPENDIX

Tax and transfer changes analysed, and parameters used for simulation

PIT and contribution changes coming into effect in 2011

- Flat PIT rate of 16% (applied to super-gross tax base, i.e. tax base multiplied by 1.27)
- Reduction of the wage tax credit from HUF 15,100 to HUF 12,100 monthly; the wage tax credit is withdrawn starting at yearly income of HUF 2.75 million (as opposed to HUF 3.188 million).
- Expanded child tax credit
- Increase in employee pension contribution from 9.5% to 10%

Planned PIT and contribution changes

- Complete phase-out of super-grossing
- Complete phase-out of the wage tax credit
- Increase in employee health insurance contribution by one percentage point
- Employer health insurance contribution has to be paid on at least 1.5 times the minimum wage

Changes affecting transfers

- Abolishment of the second phase of unemployment benefits, tightening of eligibility. (Before the change, benefit for one day was provided for every 5 days of prior employment. After the change, one day of benefit is provided for every 10 days of prior employment.)
- Reduction of the maximum amount of unemployment benefit from 120% to 100% of the minimum wage.
- Abolishment of the so-called "unemployment aid" (the "third phase" of unemployment benefits).
- Partial review of individuals receiving disability benefits. We assumed that in accordance with government plans, 100 thousand recipients of disability pension under the age of 57, and 84 thousand recipients of so-called reduced working ability benefit will lose their eligibility; they account for approximately 30 percent of those currently receiving benefits.
- Extension of child care aid (gyes) up to a three years of age for children.

Changes in taxes on capital

- Abolishment of the extraordinary tax on corporations (+4%), increase in the corporate income tax (CIT) from 16% to 19%.
- Extension of the upper limit of the 10% CIT rate from a tax base of HUF 50 million to HUF 500 million.
- On the basis of information currently provided by the government, we assumed that among the extraordinary

sectoral taxes only approximately one-third of the extraordinary tax of financial institutions will remain in effect in the long-term; we regarded the extraordinary tax of other sectors to be transitory and excluded it from our calculations.

- Planned modification of loss carry-forwards and the corporate car tax.
- Overall, we assumed that the effective tax burden on capital will decrease by 15% (from 7.3% to 6.2%) compared to 2010. The effective tax rate on capital increases to 8.8% in the scenario where all current extra taxes are assumed to be made permanent (Table 5).

Zsuzsanna Hosszú: Pre-crisis household consumption behaviour and its heterogeneity according to income, on the basis of micro statistics[1]

Following the crisis, since mid-2009 domestic GDP has been growing slowly, but steadily. In 2011, there may have already been a material increase in real incomes as well, although a slight decline in consumption has been observed recently. In spite of more cautious consumption behaviour with greater emphasis on saving and debt repayment, the ratio of non-performing loans within banks' outstanding household loans continued to increase in the aforementioned period. The underlying reason for this phenomenon is that households accumulated considerable debt prior to the crisis. As a result, a protracted balance sheet adjustment process may currently be hindering an increase in consumption. These developments are reflected in the macro statistics as well, but the measure of indebtedness can vary significantly across the different income groups of households. An exploration of this heterogeneity may facilitate a more thorough understanding of consumer behaviour and enable more precise identification of the extent of the indebtedness of different income groups. For this examination, in my analysis I have used the Household Budget Survey compiled by the CSO as a database and reviewed changes in real incomes in the various income deciles prior to the crisis (until 2008), as well as typical consumption patterns and the borrowing behaviour stemming from them. According to the data, prior to the crisis it was mainly the low- and medium-income social strata, in which households adopted a consumption path that departed from actual income while their real income was declining. For the low-income strata, due to the high instalments compared to their income, even a slight strengthening in the exchange rate of the Swiss franc may have resulted in debt repayment problems, whereas in the case of the medium-income strata the increase in the ratio of non-performing loans may have primarily been caused by loss of employment and been exacerbated by the depreciation of the Hungarian forint against the Swiss franc.

INTRODUCTION

In the period since the crisis, following the trough in 2009, household disposable income started to increase continuously, partly as a result of the changes that took place in the personal income tax system and partly as a result of the slow increase in employment since early 2010. However, consumption, which fell considerably during the crisis, continues to be restrained (Chart 1).[2] The adjustment that took place as a result of the crisis caused a 5 per cent decline in the consumption rate in 2009 H1, compared to 2008. No growth trend began from 2009 H2, and consumption has remained low, compared to the pre-crisis level.

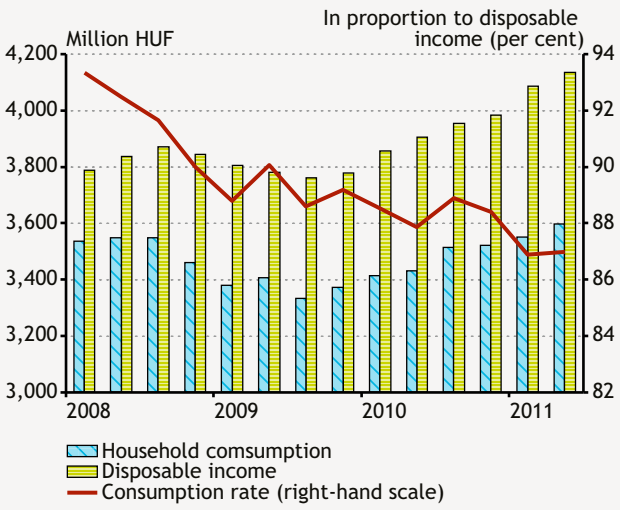
In the following I examine the role played by changes in households' real income situations, as well as consumption and borrowing decisions typical of the pre-crisis period in the aforementioned, seemingly contradictory changes. It is possible to analyse this problem with macro data as well, but the disadvantage of such a time series is that the heterogeneity behind the changes cannot be examined. For this reason, it is impossible to identify the social strata to

[1] Acknowledgements are due to Áron Kiss and Barnabás Virág for their valuable comments on this article. Responsibility for any errors or mistakes that may have remained in the article lies with the author alone.

[2] Changes in personal income tax affected various households differently. Therefore, the heterogeneity of changes in income according to income levels may have a significant effect on consumption in this respect as well. These changes resulted in a considerable increase in income, primarily in the higher-income strata. These households are usually characterised by a lower consumption rate, so consumption may have expanded to a lesser extent. In the database I used, data were only available up to 2008, so the above could not be taken into account.

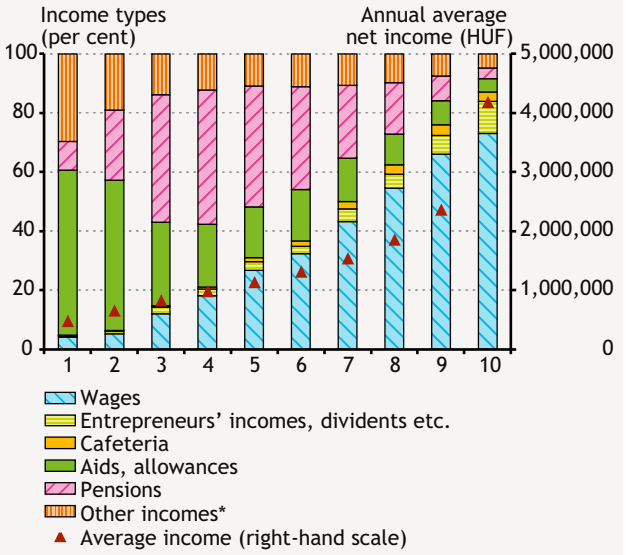
Chart 1
Current household consumption, disposable income and consumption rate

(seasonally adjusted level data)



Sources: MNB and CSO national accounts.

Chart 2
Income structure according to income deciles in 2008[4]



** Note: other income: incomes from abroad, orphan allowance, sums received from insurance company, in-kind income, housing maintenance allowance, value of consumption originating from own production, total income of a child below the age of 16, child support received, casual work, tip, other income.*
Source: HBS.

which the problem is primarily related. As a means of examining this issue, I use the Household Budget Survey[3] (hereinafter HBS) database compiled by the CSO. On the basis of the HBS, I examine in the various income deciles the pre-crisis changes in real incomes, consumption patterns, and typical borrowing behaviour stemming from them. I also analyse the changes in real income situations belonging to the various strata of households, comparing them with one another in the period preceding the crisis.

COMPOSITION OF AND CHANGES IN HOUSEHOLD INCOMES

Considering the total population (based on 2008 data in Chart 2), the most important sources of income are as follows: wages account for the highest portion (48 per cent of total income), followed by pensions (19 per cent). Aid and allowances (15 per cent) also represent a significant share (entrepreneurs' incomes and dividends account for a considerable portion of the remaining part). However, their distribution according to income deciles reflects significant differences. Aid and allowances, as well as income from casual work and other sources, are typical sources of income for the poorest strata (i.e. households with the lowest income). The middle strata have higher income, with pensions and wage type incomes representing a larger proportion, while the aforementioned sources of income are less important. Finally, in the case of the highest-income strata, incomes from wages dominate and the proportion of transfers received from the state declines. This is in line with an organisation of society according to activity: the poorest strata are comprised of people who are of active age but are permanently unemployed; as income increases, in the middle strata, the ratio of pensioners becomes significant, along with an increase in the number of employed. In the upper deciles, active wage-earners primarily dominate.

As far as changes in nominal incomes are concerned, a considerable increase was observed in the total population from 2004 until 2006, but the growth rate then slowed

[3] The HBS is prepared according to primary social characteristics, based on sampling. Every year, 8,000-9,000 households keep detailed diaries of their monthly incomes and expenditures. In addition to these data, important characteristics of the given households and some borrowing-related questions are also included in the database. It consists of two parts, personal and household. This survey has been conducted since 1993; the latest one is from 2008. Its disadvantage is that it is not representative of some important criteria, nor is it representative of income distribution (because those who record the responses are unable to access the poorest and the richest strata). The HBS has been used as a database by other analyses in order to analyse household decisions (for example, Gáspár and Varga, 2011 or Benczúr et al., 2011).

[4] Persons are classified into one of the deciles according to income in the first chart, and households are shown in the other charts. 1 indicates the lowest-income, while 10 indicates the highest-income decile.

Table 1
Growth rate of nominal wages by deciles, in per cent

	1	2	3	4	5	6	7	8	9	10	1 and 10 compared*	2 and 9 compared
2004–2006	22.1	26.5	22.5	21.1	19.8	18.9	17.5	15.9	15.7	6.5	805% (2004)–738% (2006)	349%–319%
2006–2008	7.1	–2.8	–1.7	3.0	–0.1	0.5	2.3	3.2	1.5	5.7	738% (2006)–693% (2008)	319%–334%

** The numbers in the column before the last show how much the income of the highest decile was at the beginning and at the end of the period if the income of the lowest decile is 100 per cent. The last column can be interpreted in a similar manner.*
Source: HBS.

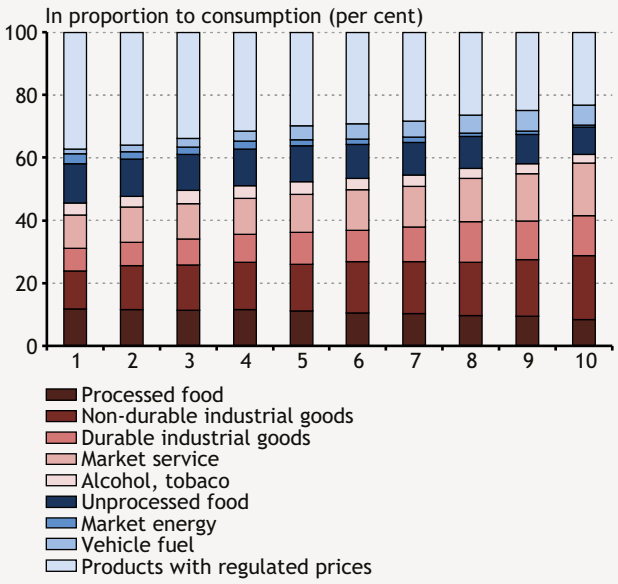
during the following two years. In addition to changes in the economic environment, this is mainly attributable to the effects of fiscal policy. Beginning in 2002 (especially 2002 and 2003), expansive fiscal measures and a favourable economic situation contributed to a significant increase in incomes. The restrictive steps that became necessary due to fiscal imbalances resulting from the previous years were then constrained the increase in incomes in 2007 and 2008. In terms of the direction of the change, an examination by deciles shows a result that is similar to that seen at the level of the national economy. Taking into account the magnitude of the increase, the picture is much more heterogeneous (Table 1). In general, in the first two years of the period under review, the income of those in the lower deciles increased faster than those of the upper deciles. In 2007 and 2008, a decline was observed in the income of several lower-income strata, while a slight increase occurred in the upper deciles.

The relative income situations of the various strata of the population and their changes compared to one another are usually measured on the basis of the size of the difference between the lowest and the uppermost deciles. During HBS data collection, the data of the two extreme deciles were the most imprecise, due to the difficulties of measuring the poorest and the richest strata. For this reason, it is more prudent to compare the second and the ninth deciles. Based on the above, in the period under review a general convergence was observed in the income situations of various strata when compared to one another (especially in 2005 and 2006). This process did not continue in the subsequent two years; smaller changes occurred in incomes, and thus differences remained at nearly the same levels. A more refined picture of the changes in income differences becomes clear if real incomes are examined instead of nominal ones, also taking into account that the structure of consumption varies across deciles. Thus, different inflation rates may be experienced by consumers with different incomes.

INFLATION EXPERIENCED BY HOUSEHOLDS

In the HBS statistics, consumption expenditures are sufficiently detailed to allow a breakdown of total consumption into categories usually used to measure inflation (processed and unprocessed food, durable and non-durable industrial goods, market services, market energy, alcohol and tobacco, vehicle fuel, products with regulated prices). This product classification corresponds to that of the HICP (harmonised index of consumer prices) applied by Eurostat. Based on the pattern of consumption reflected in the HBS (Chart 3), the proportion of core inflation items is smaller in the lower-income strata; thus, price fluctuations that are typical in the case of the other

Chart 3
Consumption structure by deciles in 2008*



** Note: in the chart, burgundy indicates core inflation, whereas blue indicates other items.*
Source: HBS.

items have a stronger effect on the poorer strata. The greater weight of items outside core inflation in the lower deciles is caused by the higher consumption of unprocessed food and products with regulated prices. This phenomenon is attributable to the fact that the poorer strata consume a higher proportion of sustenance goods, which primarily belong to the aforementioned type of products.

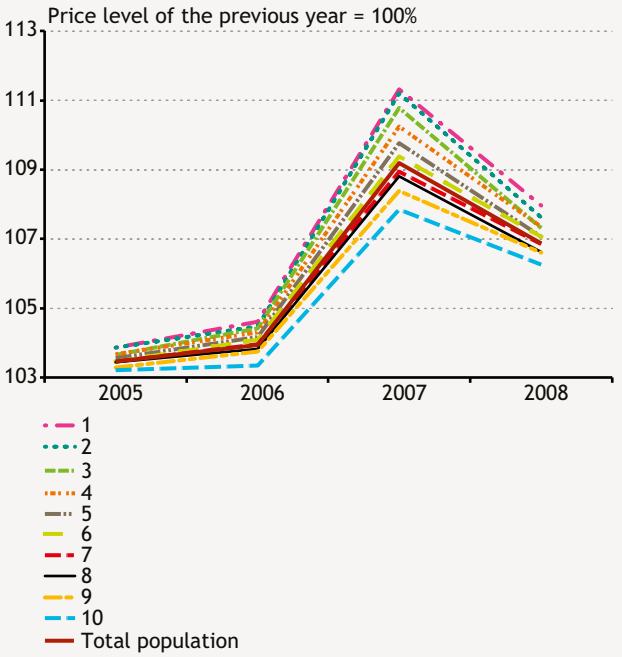
In recent years, major price shocks were observed in such items as food, products with regulated prices and vehicle fuel. Following patterns of consumption by deciles, households in the lowest decile spend a negligible proportion of their incomes on petrol; with growth in income, this proportion becomes increasingly greater, while the share of the other two product groups declines. Accordingly, an increase in the price of petrol primarily affects those with higher income, whereas food price increases have a greater effect on the situation of the poorer strata.

It has been a generally observed phenomenon in recent years that the price increase of items outside core inflation exceeded core inflation not only in volatility but also in terms of magnitude (which is partially attributable to considerable shocks in commodity prices and partially to the inflationary effects of government measures on regulated prices). Therefore, following the consumption patterns discussed above (i.e. the proportion of core inflation items is smaller in poorer households), lower-income households faced higher inflation. This correlation was consistent across strata: the higher the decile in question, the lower the observed increase in the consumer price index. The difference between the inflations of the two extreme deciles was significant; the lowest decile experienced 20–40 per cent (1–3.5 percentage point) higher inflation than the top decile (Chart 4). This confirms that the poorest strata are more afflicted by higher inflation. Moreover, differences in inflation between the deciles are larger as inflation grows. In the case of lower inflation, the difference between the two extreme deciles was only 1–1.5 percentage points, whereas this indicator reached 2–3.5 percentage points in high inflation years.

Following this examination of inflation, it is worth returning to changes in real incomes and their differences. Here, the definition of real income is as follows: nominal income is deflated with the inflation typical of the decile, as this method allows calculation of typical consumption patterns as well (Chart 5).

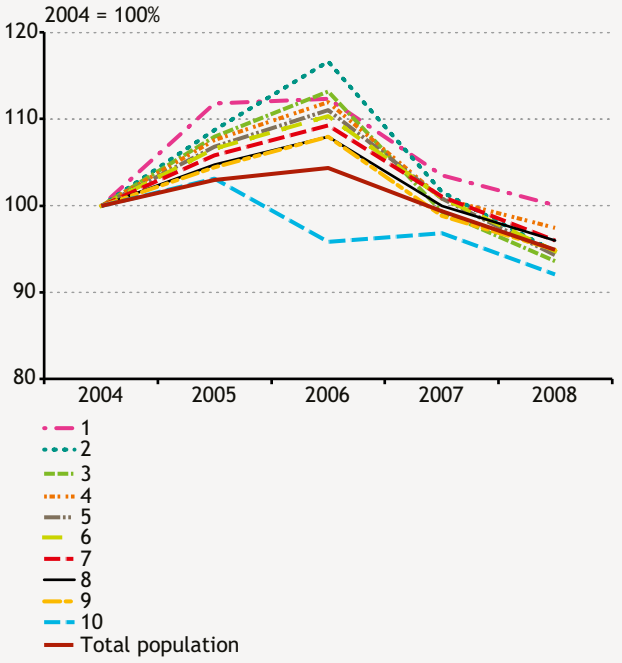
The dynamics of the resulting real incomes are similar to those of the nominal time series, but heterogeneity is lower. There was an increase in all deciles (except for the highest one) in 2005 and 2006, but real incomes declined across all deciles in the last two years. Examination of changes across the deciles shows significant differences compared to

Chart 4
Examination of inflation by deciles



Consumption data in the detail needed to conduct calculations have been available in the HBS statistics since 2005.
Source: HBS.

Chart 5
Real income by deciles, deflated by experienced inflation

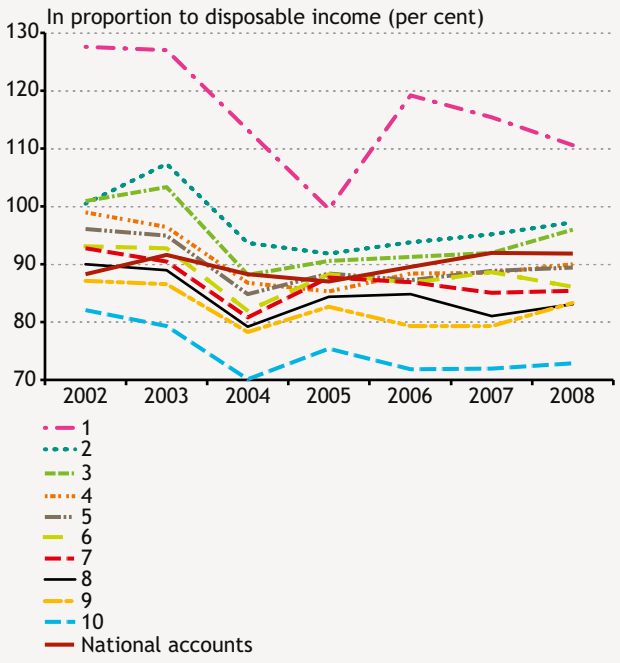


Source: HBS.

nominal incomes; in the first two years, a less pronounced convergence was visible, compared to the original calculation. This process came to a sudden end in 2007; as a result, stabilisation of the differences was typical of only 2008.

However, the decline in real incomes typical of 2007 and 2008 did not entail a similar decline in consumption. The result of these two processes was reflected in changes in the macroeconomic consumption rate as well. Starting in 2005, this rate was usually characterised by a slight increase every year. It is worth having a closer look at consumption rates by income levels as well (Chart 6). In general, the higher the income decile, the lower the consumption rate. Overall, households consume approximately 90 per cent of their expenditures. It is remarkable that every year the expenditures of the lowest decile were higher than its income,[5] a pattern that is unsustainable over the long term. In addition, growth that appears in the consumption rate at an aggregate level was not generally typical for each decile; it was primarily a result of growth that occurred in the low- and medium-income strata, while the higher deciles were instead characterised by stagnation or even decline. In the case of the low- and medium-income strata, therefore, changes in consumption were not tied with changes in income; consumption expenditures slightly increased as real incomes declined.

Chart 6
Consumption rate by income deciles



Sources: HBS and MNB.

Summarising the above, significant heterogeneity is observed across the various income deciles both in terms of income composition and changes. Real incomes increased in the first two years of the period under review and then generally declined. As a result of this different extent of changes, income differences lessened in this period. However, due to different consumption patterns, those belonging to the lower deciles experienced higher inflation, and therefore, welfare differences declined to a lesser extent compared to nominal incomes. Households did not limit consumption in line with their decline in real income, leading to an increase in the consumption rate. This increase was especially typical of the low and medium deciles.

In parallel with the decline in real incomes, a significant portion of households financed their increasing consumption with borrowing. Similar to consumption rates, significant heterogeneity is experienced in the lending and indebtedness indicators as well as in the less aggregated data.

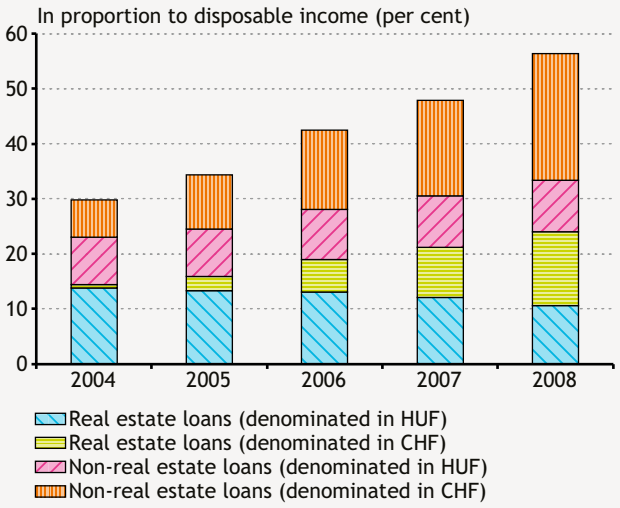
LENDING AND INDEBTEDNESS

The increase in loans outstanding and their ratio to household income was clearly observable on the basis of macro data in the period under review. As a proportion of household disposable income, total loans to households amounted to some 30 per cent in 2004. This ratio nearly doubled by 2008. With the increase in total loans outstanding, both real estate and other types of outstanding loans expanded, but the increase in the latter type was more significant. During HBS data collection, questions were asked only in connection with housing loans. Therefore, the calculations presented here exclude other types of loans, and the data covers only approximately 40–50 per cent of total household loans outstanding (Chart 7). Accordingly, the analysis can reflect changes typical of total loans outstanding if we assume that the behaviour of households as regards non-real estate loans was similar to their behaviour with real estate loans. The HBS also does not contain data regarding the foreign exchange/forint ratio within loans. Macro statistics reveal that the increase in total loans outstanding is mainly attributable to foreign exchange loans, the share of which in total loans increased to 65 per cent by the end of the period.

The results calculated on the basis of the HBS data show that the measure of indebtedness increased in each decile, particularly in 2007 and 2008 (Chart 8). However, with the consumption rates discussed above, borrowing and thus

[5] Sampling problems may play an important role in these data. First, those with the lowest income are underrepresented in the HBS statistics. Consequently, data related to them are more uncertain. Secondly, hidden (black) incomes are significant in this decile. This is not reported by households in the HBS surveys either.

Chart 7
Ratio of real estate and other types of loans to disposable income

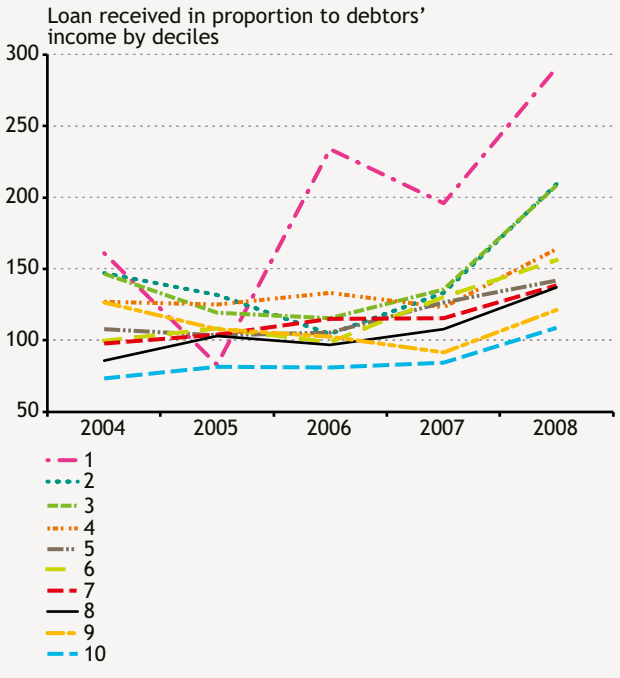


Source: MNB, financial accounts.

indebtedness compared to income increased, being higher in the lower-income deciles.

The increase in total loans outstanding in this period may have been facilitated by factors on both the demand and supply side. On the demand side, as a result of the decline in real incomes, households may have attempted to finance their consumption by borrowing. On the supply side, increasing competition led to an easing in lending conditions. As a result, households that had earlier been considered too risky and that consequently had liquidity constraints also gained access to loans (Chart 9).

Chart 8
Housing loan received/income by deciles

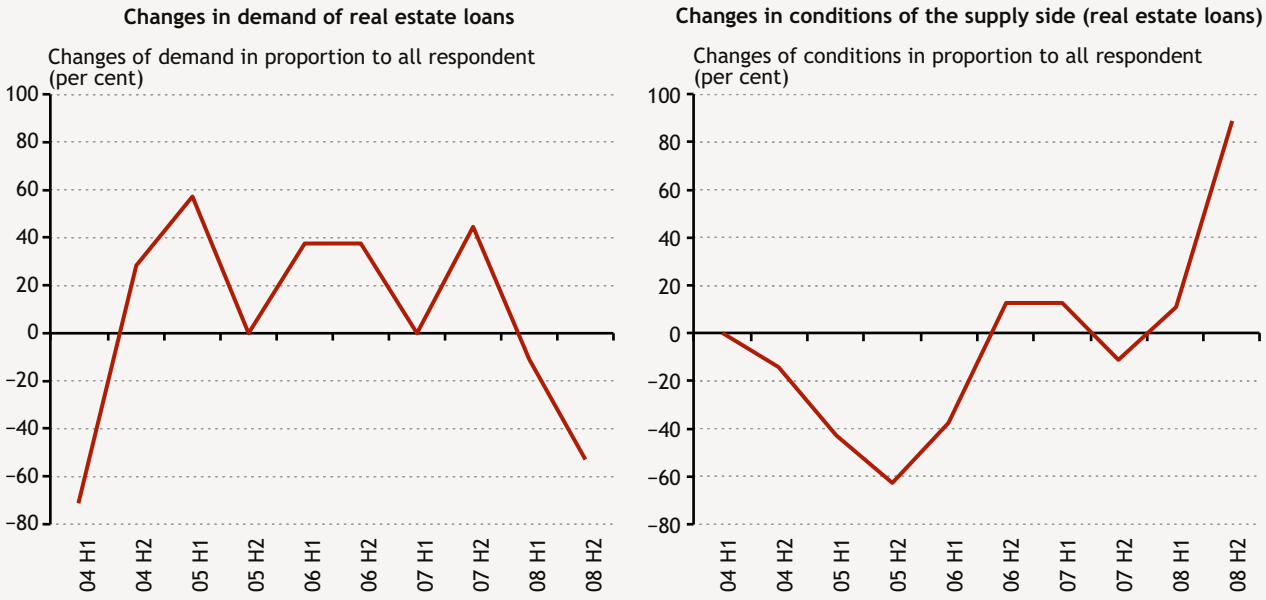


Source: HBS.

Although the loan received/income ratio is higher in the lower deciles, these strata account for a smaller share in total loans outstanding. Within the population classified into deciles, the proportion of debtors is very low in the lowest deciles. This proportion increases steadily with an increase in income. The changes in instalments as a proportion of income are similar to those of the loan received/income indicator, except that instalments as a proportion of income are lower in the higher-income deciles (Chart 10). Taking the two extreme deciles into account, a significant difference is experienced in this respect: instalments as a proportion of income in the lowest decile are three times higher than what is seen in the top decile.

In the case of households that struggle with loan repayment difficulties, there may be three main sources of problems that resulted in limited consumption and the increasing NPL ratio: from the outset, the household undertook an instalment that was too high compared to its income; increased exchange rates; and/or loss of employment. Determining what is considered to be too high of an instalment as a proportion of income raises many questions, and it is difficult to give a standard definition. A still acceptable, maximum level may be estimated on the basis of consumption expenditures, but this may vary significantly by types of households. No concrete figure for this is specified here. This kind of problem typically arises in the case of the three lowest deciles, where the average instalment of housing loans as a proportion of income already exceeds 20 per cent. In these deciles, however, there are fewer household that have borrowed. Therefore, within the total population, the proportion of households that became non-performing due to this reason, which already happened as a result of a relatively minor strengthening of the exchange rate, may be low. Employment fell considerably during the crisis, although in terms of qualifications it affected employees in different ways. The decline was very low among those engaged in white-collar occupations, and the level of decline is almost completely attributable to those doing physical work (whose educational level is typically lower) (Chart 11). According to the HBS, the proportion of employees with a lower educational level within the total population of the given decile is most significant in the medium-income strata; therefore, the instalment payment problems stemming from loss of employment may be the most typical in these deciles, and these problems may be exacerbated by the increasing trend

Chart 9
Changes in demand for and supply conditions of housing loans*

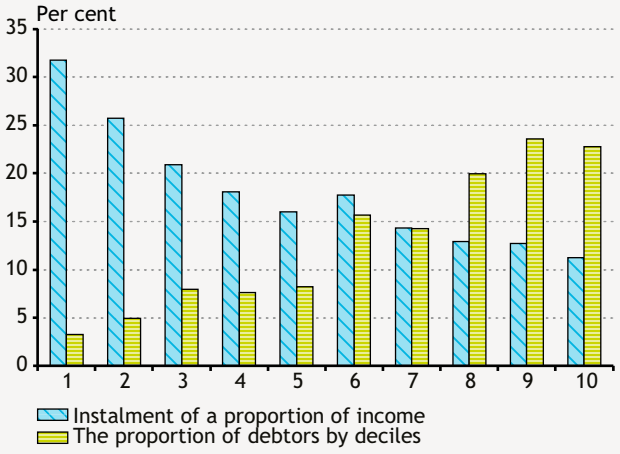


** Note: In the chart on the left, the responses of banks were weighted according to market share; the weights were multiplied by −1 if a decline in demand was experienced, by 0 in the case of unchanged demand and by +1 if an increase was observed. The chart on the right was created similarly to the previous one; the positive direction means a tightening of lending conditions.*
Source: MNB lending survey.

of the exchange rate of the Swiss franc. These households already represent a more significant number, as the proportion of debtors in this stratum is already much higher. The top three deciles are probably only slightly or not even affected by the aforementioned problems. For these, instalment as a proportion of income is sufficiently low, and many of those employed have a high level of education. In addition, the restructuring of the personal income tax system in 2011 generated the most additional income for them. They account for the largest proportion of those who borrowed.

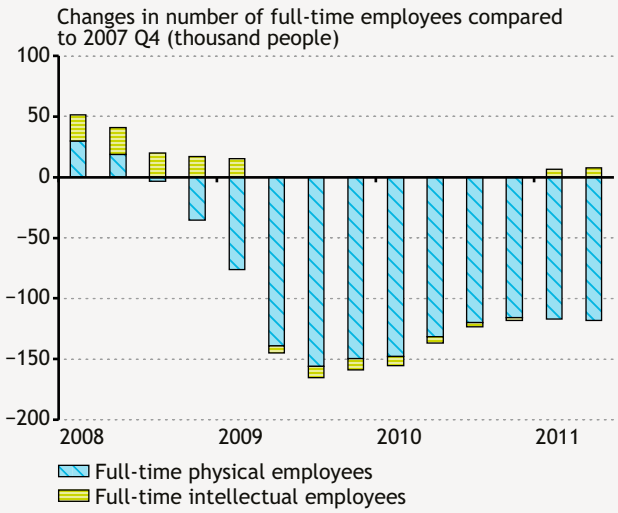
Overall, in the case of housing loans, excessive borrowing and indebtedness may have primarily been typical of the lower- and medium-income strata. The lending problem of instalments being too high as a proportion of income

Chart 10
Average instalment as a proportion of income and the proportion of debtors by deciles in 2008



Source: HBS.

Chart 11
The number of full-time physical and intellectual employees in the competitive sector
(seasonally adjusted data)



Source: CSO institutional statistics.

already at the time of borrowing was mostly observed in the three lowest deciles, although their number is relatively insignificant compared to the number of all indebted households. Problems due to loss of employment may have mainly affected the medium deciles, where one finds a higher proportion of employees with a lower level of education that are seriously affected by the crisis. These households represent a sizable proportion of borrowers. Most debtors belong to the upper deciles, where the extent of payment problems may be lesser, presumably due to their having sufficiently low instalments as a proportion of income.

SUMMARY

In recent quarters, the significant increase in net earnings has not entailed substantial growth in consumption, while the NPL rate of household loans followed an increasing trend. My analysis sought an answer to the question of what role the income situation of households, their consumption decisions, borrowings and indebtedness level may have played in the above developments in the pre-crisis period. I examined all of this on the basis of the HBS, whose micro database allows for an exploration of the heterogeneity hidden behind the macro data.

In the pre-crisis period between 2004 and 2006, nominal wages increased significantly. Affected by the economic environment and fiscal policy, they increased in a more restrained manner over the following two years. The differences in nominal income among the various strata of the society declined. Meanwhile, 2007 and 2008 were characterised by a general decline in real incomes. Due to the increase in inflation, convergence in the income situation was less pronounced.

In terms of consumption brackets, significant differences exist across strata with various incomes. Differences are also reflected in the level of inflation experienced by households. Generally, the lower the income of a household, the higher inflation it experiences, and the higher the increase in consumer prices, the greater the difference in inflation experienced by households with different incomes. In the period under review, in spite of the decline in real incomes in 2007 and 2008, households did not adjust their consumption expenditures, as shown by the general increase in consumption rates during this period. This phenomenon is especially typical of the lower and middle deciles.

With declining incomes, households financed consumption partly from loans, which resulted in a considerable increase in the borrowing and indebtedness of households in this period. With increases in income, the share of households with loans within individual social strata also increased, while instalments as a proportion of income dropped. Instalments that were already too high at the time of borrowing were presumably typical of the lower third of the population, according to income distribution; in their case, even a slight strengthening of the exchange rate of the Swiss franc may have led to non-performance. However, the number of households with this scenario is relatively low. During the crisis, the increase in unemployment primarily affected blue-collar employees, whose educational level is typically low and who proportionally have the closest to average income. Therefore, repayment problems due to loss of employment may be the most typical in their case, exacerbated by changes in the exchange rate of the Swiss franc). They represent a major share of indebted households. Accordingly, it is possible to conclude that the loan repayment problems that have arisen to date may have mostly been caused by the increase in unemployment and only to a lesser extent by the strengthening of the exchange rate of the Swiss franc.

Presumably, the current restraint in consumption growth is mainly attributable to the pre-crisis indebtedness of households and subsequent balance sheet adjustments. The micro database also reveals that the repayment of earlier loans causes problems mainly in households that belong to the lower- and middle-income strata; consequently, it probably restrains the consumption expenditures of these households.

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Zalán Kocsis and Dénes Nagy: Variance decomposition of sovereign CDS spreads[1]

In this paper we analyse the information content of correlations between daily changes in CDS spreads. Using factor analysis, we can break down the variance of CDS spreads into global, regional and country-specific components. Our results confirm the finding of other studies, namely that there is a strong global factor underlying credit risk spreads. Comparison of different time samples reveals that the global correlation of spreads has become stronger during the financial crisis; at present, the global factor universally affects emerging and developed countries. CDS spreads are most strongly correlated with other countries in geographically interpretable regional country groups. The Hungarian CDS spread generally follows the global factor; in recent years, the escalating crisis on the periphery of the euro area has also affected the country's spreads. From the summer of 2010 until the end of the year, country-specific events led to a considerable deterioration in Hungary's risk assessment. However, the shift in the government's fiscal policy stance in early 2011 restored most of the lost investor confidence.

INTRODUCTION

This paper analyses correlations between CDS spreads of major developed and emerging countries in order to study the behaviour of the Hungarian CDS spread. Analysis of the correlations of spreads and their segmentation into global, regional and country-specific components reveals the relative importance of factors in the case of individual countries and allows a better understanding of the driving forces behind changes in the market's assessment of sovereign credit risk.

Comparisons can work in various ways. For each country, we can calculate the relative impact of various components (e.g. we can estimate and compare the effect of global, regional and idiosyncratic factors on the Hungarian CDS spread). This is performed on the whole sample period and on shorter time samples as well. Segmentation also allows for international comparisons. For example, the sensitivity of the Hungarian CDS spread to global or regional shocks can be compared against similar indicators in other countries.

The paper first provides a brief discussion of the information content of CDS spreads. Then the global, regional and country-specific factors of CDS spreads are presented. Next, correlations between countries and factors and the sensitivities of countries to those factors are compared. Finally, based on the results of the last subsample, the Hungarian CDS spread is segmented into factors, and we present how these factors contributed to changes in the risk indicator over different time periods.

ON CDS SPREADS IN GENERAL

The information content of CDS spreads

A CDS (credit default swap) is a derivative transaction, the payoffs of which depend on a bond issuer fulfilling its debt obligations or defaulting. If the default event specified in the contract occurs, the seller of the CDS protection has a payment obligation vis-à-vis the buyer of the CDS protection. The seller meets this obligation either by paying the notional of the reference bond in exchange for the bond's physical delivery, or by paying the difference between the notional and the market value. In both cases, in effect, the seller of CDS protection compensates the buyer for losses arising from the credit event.

Thus, the buyer of the CDS can theoretically cover credit risk exposure to an issuer by using a sovereign CDS transaction, provided that the seller remains solvent. Essentially, the buyer of the sovereign CDS obtains a kind of insurance for the referenced sovereign's default event, for which a fee is

[1] We would like to thank several of our colleagues for their proposals and useful comments. Special thanks to Csaba Csávás, Szilárd Erhart, Norbert Kiss M., Júlia Király and Zoltán Reppa for their help.

paid at regular intervals. The magnitude of the fee is determined as a percentage of the nominal value of the underlying instrument and is called the CDS spread.[2]

Theoretically, the magnitude of the CDS spread has to be in line with the risk of the investor's expected loss arising from the potential default event. The value of this risk is the product of the probability of default and the loss expected in this case (the difference between the notional and the market value). If the CDS spread is too high compared to the credit risk (i.e. the difference between the notional value and the market value is relatively low), it is worth entering the market as a CDS seller, because the expected value of the fees collected on the transaction exceeds the expected value of the conditional disbursement. If many market players recognise this opportunity, their entrance into the CDS market and underbidding of the market price will result in a decline in the CDS spread.

The fundamental value of CDS transactions for sovereign issuers is determined by the product of the probability of default of the given country and the loss suffered in such a case. This fundamental value is related to macroeconomic conditions of the reference country, since the probability of default depends mainly on these factors. Political factors are also important, since non-payment of the debt obligation and its specific form are usually the result of political decisions.

In addition to fundamentals, market confidence is also important in terms of the creditworthiness of the issuer. Market confidence may be a considerable factor both in terms of the long-term sustainability of the debt of the sovereign and its short-term financeability. Increasing wariness about a sovereign's creditworthiness reduces demand for its bonds, which may result in an increase in yields and exchange rate depreciation, as well as a failure of bond auctions. Thus, market confidence by itself – independent of the endogenous changes in the fundamentals – can affect the solvency of the sovereign. This may also influence CDS spreads, and therefore both the seller and the buyer of the CDS must take into account how other investors assess market confidence and, accordingly, the expectations of other investors. This provides a game theoretic aspect for the determination of CDS spreads, and may be a possible answer to the dilemma that the empirical literature faces when it finds that the volatility of CDS spreads is far larger than what fundamentals can explain.

Decomposition of CDS spreads

There are many ways of segmenting CDS spreads into different factors.[3] The extensive empirical literature focuses on identifying a component that can be explained by fundamentals and separating a component above that (the latter is known by different names: market sentiment component, risk aversion/appetite, risk premium). Most papers use a linear regression on panel data for this purpose, where the credit spreads of several countries are dependent variables. The fundamental part is then attributed to fundamental variables in the regression (macroeconomic variables expressing solvency and liquidity or sometimes even variables relating to the political situation), while the risk premium is either simply the error of the regression or proxied by variables capturing global market confidence (VIX index, TED spreads).[4] In certain cases, the fundamental part of the credit risk is captured with credit ratings or historical default frequencies[5] instead of macro variables.

Instead of using simple OLS regressions, several authors apply instrumental variables and 2SLS procedures in order to avoid endogeneity. Error correction models assuming cointegration are also found in the literature, while other authors apply factor analysis or a similar method of principal component analysis.[6]

Factor or principal component analyses typically establish that (1) a significant proportion of the spreads of the countries included in the analysis has a strong positive correlation with the first principal component (this is why it is called a global component), (2) this factor is mainly explained by global investor sentiment, as it also strongly correlates with related variables (for example, the VIX index). Usually, the (in general, relatively low) variance proportion remaining in addition to the global component is identified as the local (regional or country-specific) and typically fundamental factor.[7]

Our paper also confirms the existence of a global factor and its important role in common variance. The novelty here is that in addition to the global factor, we elaborate on the

[2] A more detailed description of the transaction is provided by Varga (2008).

[3] This may also include the analyses of other credit risk variables besides CDS spreads (foreign exchange bond spreads or ratings), as the concept is the same: all of them deal with the decomposition of the sovereign credit risk.

[4] Some studies that are often referred to in this field: Edwards (1984, 1986), Cantor and Packer (1996), Eichengreen and Mody (1998).

[5] Kamin and Kleist (1999), Sy (2001), Kocsis and Mosolygó (2006).

[6] A few examples for the above: 2SLS: Benczúr (2001), Remonola et al. (2008), cointegration: Rosada –Yeyati (2005), principal component analysis: Kisgergely (2008), McGuire and Schrijvers (2003), Broto et al. (2011)

[7] Westphalen (2001), McGuire and Schrijvers (2003), Longstaff et al. (2010).

factors associated with smaller groups of countries as well. As we will see, factor analysis arranges CDS spreads into groups on a regional basis. That we can deal with these additional country groupings is partly made possible by the choice of the sample: the inclusion of a wide cross-section (which comprises several regions) and of the period of the crisis. In earlier samples, changes in CDS spreads were not arranged into such regional groups. Our analysis also addresses changes in factor structure over time, which is an important, albeit less discussed, topic in the literature.

VARIANCE DECOMPOSITION OF SOVEREIGN CDS SPREADS

Data and method of analysis

Our data set consists of time series of daily changes in the 5-year CDS spreads available on the Bloomberg system. Our sample runs from May 2006 to July 2011 and includes the data of 37 (developed and emerging) countries[8] in the cross-sections. The resulting roughly 5-year-long time series contains 1,375 temporal observations (1,374 for CDS differences). This number of observations allows us to perform analysis on three main subsamples (pre-crisis: May 2006–December 2007;[9] financial crisis: January 2008–August 2009; sovereign crisis: September 2009–July 2011) even with the examined large cross-section.

Analysis is conducted on the daily changes of CDS spreads. Stationarity is not a condition in the factor analysis procedure; the method can be applied to CDS levels and CDS changes alike. (The relevant literature is divided in this respect; there are examples for analysing both the levels and the changes.) Nevertheless, correlations between changes may better express the direct relations between countries (and country groups), whereas indirect responses given in relation to a third variable, as well as common trends, may play a greater role in the levels; therefore, in our opinion, examination of changes is more justifiable.

The method applied in the paper is factor analysis. The essence of factor analysis is that it allows segmentation of the common variance of a large number of variables (the CDS spreads include nearly 40 countries in this case) into a few factors. It is important that factor analysis deals only with the common part of the variance rather than the total variance.[10]

Factor analysis establishes the factor matrix, which is the table of correlation coefficients (or factor loadings) between variables and factors. In the case of each variable (CDS spread), the factor loadings express the correlation with different factors. If the value of the loading is 1, it implies a perfect positive correlation between the factor and the variable; a 0 value shows that the variable and factor are uncorrelated, whereas a –1 value represents movements in opposite directions.

In a mathematical sense, there are an infinite number of ways to divide the common part of the variance among the factors. However, some have a more notable role in applications. This paper uses three methods of segmentation (Chart 1).

In terms of explaining the variance of CDS spreads, the (unrotated) factors extracted in the first step of factor analysis have a hierarchical order: the first factor explains the greatest part of the common variance, the second one explains the greatest part of the remaining common variance, etc. Of these first-step, unrotated factors, only the first factor is used in this analysis. This will be our global CDS factor, and its role in different countries may be examined by means of an international comparison. We do not use other factors of the unrotated factor solution.

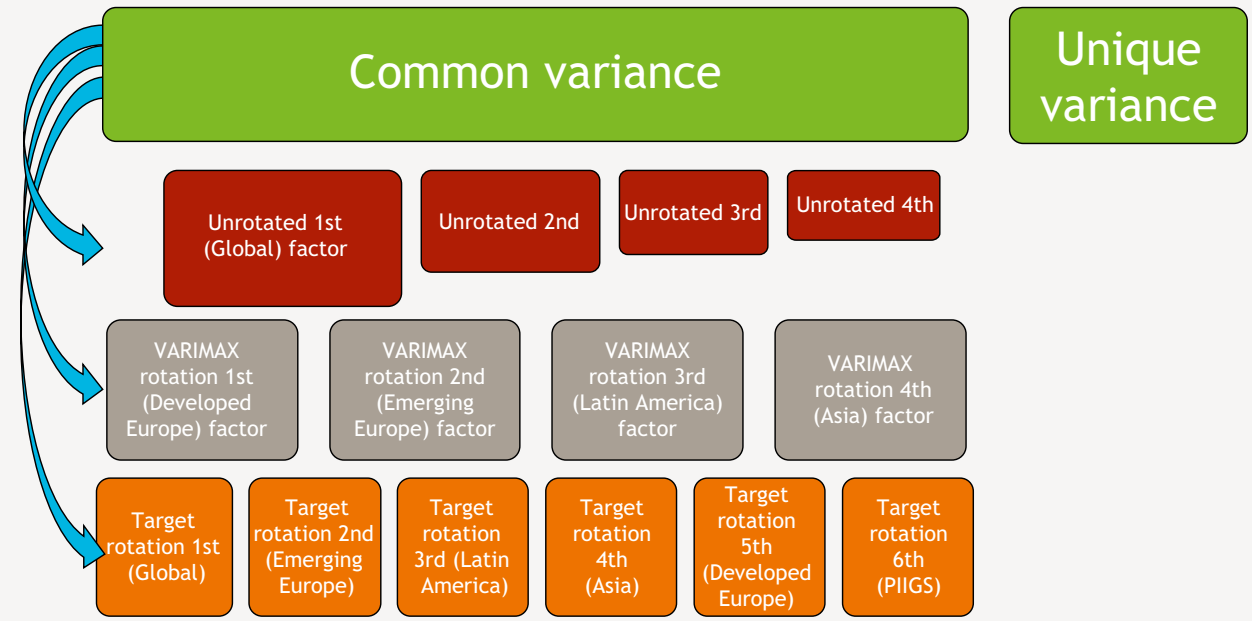
The factors that express the correlation of country subgroups are obtained during the rotation phase of the factor analysis procedure. The first rotation method used here is the varimax rotation, which is an optimisation procedure minimising a complexity function. The objective function reaches a minimum value if the variables are well separated by the factors. Technically, this separation means that for each variable there will be one factor with a high factor loading (the variable correlates with this factor), but its loadings will be low in the case of other factors. This is useful in most applications using factor analysis, because it allows a clear linking of variables to factors and usually provides an intuitive interpretation of what different factors mean. In this analysis as well, the varimax rotation

[8] Developed countries: Austria, Belgium, France, Greece, the Netherlands, Ireland, Japan, Italy, Portugal and Spain. Emerging countries: Bulgaria, Czech Republic, South Africa, Estonia, Croatia, Kazakhstan, Poland, Lithuania, Hungary, Russia, Romania, Slovakia, Turkey, Ukraine, Argentina, Brazil, Chile, Colombia, Mexico, Peru, Venezuela, South Korea, Indonesia, China, Malaysia, Thailand and Vietnam.
In the second and third subsamples, data on Denmark, Lithuania, Great Britain, Germany, Sweden and the USA were also available; for the sake of comparability of the samples, the findings regarding the narrower cross-section are discussed.

[9] A more realistic pre-crisis period, with a sample ending in July 2007, exhibits a factor structure that is more difficult to explain; this is why the end-2007 period, which can be considered as relatively calm compared to the events experienced in the later financial crisis, was also attached to the first subsample. The next chapter draws the conclusion that correlations between countries were weaker and individual groups were less separated from one another in the pre-crisis period. This is even more true for the narrower sample of 2006 to mid-2007.

[10] In contrast, principal component analysis distributes the total variance among the components.

Chart 1
Three possible segmentations of the common variance



Source: MNB.

creates factors that allow a good identification of which of the variables (CDS spreads) belong to which factors (regions). Thus, the regional factors used in the analysis are created by the varimax solution.

A third segmentation is carried out in the last part of the paper, which deals with the Hungarian CDS spread. In this section, a target pattern rotation is used, as it allows the simultaneous segmentation of the common variance into (uncorrelated) global and regional factors. For this method, however, a factor structure (i.e. which variable belongs to which factor) has to be established a priori; to that end, the conclusions drawn from the varimax rotation are used.[11]

Factor structure

The conditions usually checked prior to starting factor analysis are met by the whole sample and by all subsamples of our data set.[12] The optimum number of factors indicated by various statistical methods[13] was, however, different across subsamples and methods. Finally, we decided on extracting four factors, which was justifiable for the full sample both on interpretational and statistical grounds. In the four-factor case, the countries in the varimax rotation form an emerging European bloc, a Latin American bloc, an emerging Asian bloc and a developed European bloc.[14]

Table 1 contains the unrotated global factor loadings, the loadings of the varimax rotated factors and the unique variances for the full sample (May 2006–August 2011). (The unique variance is the same in the case of the unrotated and rotated solutions.)

The first column of the table presents the correlation coefficients (factor loadings) with the global factor for each country. As mentioned above, this is the first factor of the

[11] See the Appendix for more details about factor analysis.

[12] The anti-image correlation matrix almost exclusively contains close-to-zero elements, whereas the complete correlation matrix contains mostly high values. The correlations between variables are significant on the basis of the formal Bartlett test as well (the p value is less than 0.001). The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (MSA) value is also adequately high: 0.9617 for the complete sample; it is 0.89 even for the pre-crisis subsample, which has a weaker factor structure (an MSA value of 0.7 is already considered good, and a value above 0.9 signals an extremely suitable data set for factor analysis).

[13] Eigenvalue greater than 1, cumulated variance proportion greater than 60 per cent and the minimisation of the average partial correlations.

[14] Most methods indicated a larger number of factors to be extracted for the pre-crisis subsample. After rotation, these factors usually made up groups that were difficult to interpret; even the higher loadings were relatively low, compared to loadings of later subsamples. For this sample, the factor structure was weak and indicated that the co-movements of CDS spreads of individual countries were less easy to separate, although the correlations of the global factor of the unrotated solution were adequately high in the case of most emerging countries (mainly Latin American and Asian countries). In the sovereign crisis subsample, adding a fifth regional factor is acceptable on statistical grounds and would separate the group of the euro-area peripheral countries (PIIGS) from the other developed European countries. However, because this was only characteristic of the last period we applied the four factor solution in this phase of the analysis.

Table 1
Correlations between credit default swaps and factors, including the unique variance

		Factors (common variance)					Unique variance
		Unrotated 1st factor	Varimax rotation factors				
Region	Country	Global	Developed Europe	Emerging Europe	Latin America	Emerging Asia	share of variance
Emerging Europe	Hungary	0.642	0.326	0.680	0.296	0.239	32.5%
	Poland	0.647	0.357	0.501	0.265	0.309	30.2%
	Czech Republic	0.678	0.221	0.607	0.351	0.254	31.9%
	Slovakia	0.692	0.227	0.632	0.356	0.302	32.7%
	Romania	0.639	0.224	0.762	0.315	0.193	31.3%
	Croatia	0.626	0.231	0.736	0.279	0.253	34.4%
	Bulgaria	0.711	0.238	0.708	0.353	0.276	23.1%
	Latvia	0.540	0.124	0.572	0.261	0.248	55.9%
	Estonia	0.589	0.115	0.358	0.235	0.350	42.4%
	Ukraine	0.275	0.066	0.569	0.121	0.153	88.4%
	Russia	0.774	0.081	0.620	0.421	0.525	25.6%
	Turkey	0.829	0.117	0.298	0.600	0.383	28.9%
	South Africa	0.805	0.147	0.608	0.464	0.448	23.0%
	Kazakhstan	0.710	0.070	0.612	0.449	0.347	41.5%
Emerging Asia	China	0.655	0.143	0.250	0.296	0.764	27.8%
	Thailand	0.679	0.124	0.242	0.337	0.764	26.1%
	Malaysia	0.699	0.115	0.288	0.296	0.850	13.2%
	Indonesia	0.799	0.038	0.102	0.478	0.634	22.8%
	Vietnam	0.743	0.069	0.235	0.406	0.739	22.6%
	Korea	0.681	0.103	0.190	0.249	0.838	14.5%
Latin America	Mexico	0.920	0.076	0.311	0.857	0.292	11.2%
	Brazil	0.943	0.082	0.271	0.936	0.234	2.1%
	Argentina	0.434	0.112	0.364	0.336	0.157	80.8%
	Peru	0.901	0.081	0.065	0.914	0.195	8.6%
	Venezuela	0.568	0.129	0.270	0.452	0.194	67.2%
	Chile	0.709	0.080	0.274	0.531	0.379	48.7%
	Colombia	0.940	0.088	0.299	0.867	0.332	7.7%
Developed	Spain	0.325	0.871	0.102	0.099	0.072	20.7%
	Portugal	0.238	0.835	0.105	0.057	0.041	29.5%
	Ireland	0.255	0.791	0.094	0.059	0.050	35.8%
	Italy	0.373	0.873	0.241	0.099	0.133	17.2%
	Greece	0.182	0.634	0.205	0.046	0.008	59.3%
	Austria	0.429	0.526	0.211	0.112	0.229	51.1%
	France	0.352	0.704	0.288	0.091	0.146	42.4%
	Belgium	0.334	0.783	0.284	0.089	0.090	32.8%
	Netherlands	0.367	0.543	0.296	0.093	0.196	57.5%
	Japan	0.286	0.190	0.220	−0.004	0.378	75.8%

Note: factor loadings in the table denote the correlation between a given country's CDS spread and a factor. Values close to 1 indicate strong positive correlation; values close to 0 suggest that the given factor has an insignificant effect on the spread. (Only the 1st factor of the unrotated solution is shown.)

four-factor unrotated loading matrix, the factor that explains the greatest share of common variance of the CDS spreads. The factor loadings are positive in the case of each country and are highly significant (i.e. not close to 0 in most cases). Therefore, it can be asserted that a dominant global factor does exist, making it possible to explain a significant proportion of the changes of CDS spreads of most countries. The global factor shows the highest correlations within emerging countries, while loadings are the highest for certain Latin American and Asian countries. The remaining

three columns of the unrotated factor matrix are not shown in the table.

The next four columns display the values of the factor loading matrix following the varimax rotation step. These factors create country groups which are easy to interpret and are separated along geographical units. It must be emphasised that this structure is not at all evident. Based on much of the literature, it would be just as reasonable to expect credit spreads to form groups on the basis of macro variables instead of regional units. Debt ratios, GDP dynamics or yield levels could form equally plausible criteria for creating country groups.

Although the emergence of regional factors may partly be justified by common macro-economic and political conditions within regions, the common structure of investors' portfolios may also play a greater role in the larger regional CDS correlations. Large international financial organisations, as well as the economic-financial media and analysts that thematise the markets, also think along such regional lines.

Correlation coefficients show that the first regional factor basically constitutes developed European countries. The factor does not correlate strongly with Japan (and neither with the USA in the second and third subsamples, based on data not presented here), so it does not represent developed countries in general. The second factor groups emerging European countries in a wider sense. In this group, Bulgaria, Croatia and Romania have the highest factor loadings of the full sample. The loadings of Hungary and Poland are lower for this factor, because a relatively greater part of the variance in these countries is explained by the developed European factor. The third and fourth factors aggregate the Latin American and emerging Asian countries, respectively. Russia, Turkey, South Africa and Kazakhstan, which are generally included in emerging Europe in regional analyses, have strong correlations with the Asian and Latin American factors as well (in addition to the emerging European factor), which suggests their higher shares in global investment portfolios. It is also possible that although on a regional portfolio investment basis these countries are more linked to Europe, their foreign-exchange rates are usually taken into account compared to the dollar and not to the euro, which, in the case of a major shift in the euro/dollar exchange rate, also changes the perspective of the risk assessment of these countries compared to the Central and Eastern European ones.

The last column shows the unique variance for each country (i.e. the share of the variance that cannot be linked to common factors). In the factor analysis procedure, variables with a high unique variance (above 50 per cent, as a rule of thumb) are usually removed and the analysis is repeated; here, however, we present the original results for two reasons. First, in this way an international comparison can be made for the same set of countries across various time samples. Secondly, the traditional procedure eventually leads to the same factor structure, with very similar factor loadings for the countries remaining in the sample.

Unique variance is typically higher in countries that experienced a major country-specific risk shock in one of the periods: Argentina, Ukraine, Venezuela and, to a lesser extent, Greece and Latvia as well. Outside of periods of country-specific shocks, these countries had high factor loadings and low uniqueness. It is only in the case of Japan that the higher unique variance is a consequence of the country not belonging to any of the CDS regions.

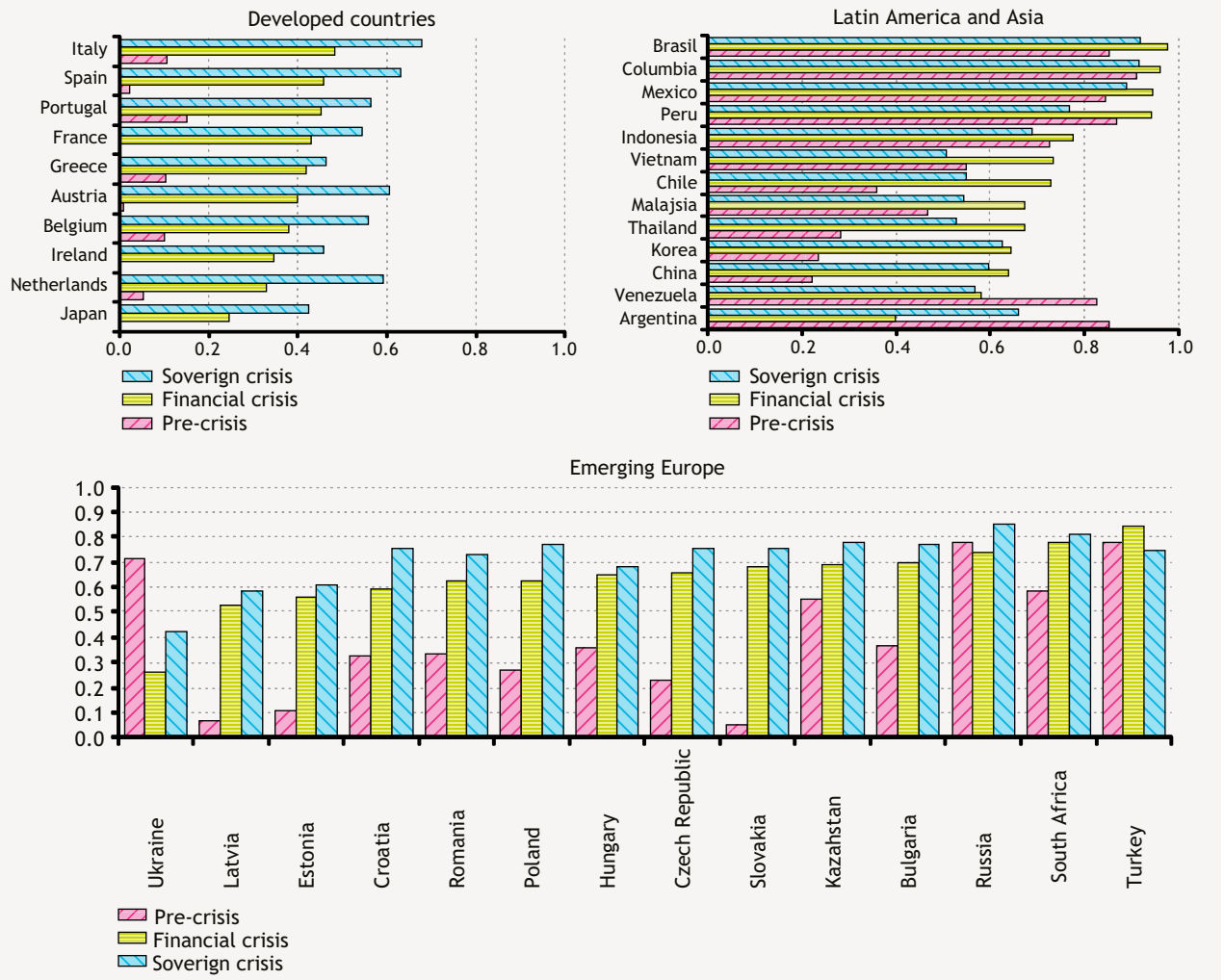
Characteristics of the global factor

The (daily changes in) CDS spreads of the majority of sovereigns – and especially of emerging countries – demonstrate high positive correlation with the global factor, which is shown by the factor loadings of the first factor of the unrotated solution (first column of Table 1). The squares of loadings show the proportion of CDS spreads' variance explained by the global factor. Based on the Hungarian factor loading of 0.64, the changes in the Hungarian sovereign CDS were 41 per cent, related to the global factor in the full sample. In terms of an international comparison, this ratio can be considered average; the ratios were generally lower in developed countries, but higher in emerging Asian and Latin American countries.

However, an inspection of the subsamples reveals that factor loadings changed considerably over time (Chart 2). In the pre-crisis period, the loadings of most countries were much lower than those experienced in the full sample; coefficients of around 0.5–0.6 were already considered high, even though that accounts for only 25–36 per cent of the variance. Regional or local, country-specific factors accounted for the remaining variance. Hence, in the pre-crisis period the general co-movement of emerging sovereign spreads was less strong, while the correlation with developed countries was negligible.

Chart 2 also shows that correlation with the global factor varied across countries. Prior to the crisis, it was mostly the CDS spreads of Latin American and certain Asian countries that correlated with the global factor. Therefore, a relatively smaller fraction of emerging European spreads, and accordingly the Hungarian CDS spread, was attributable to global developments. In the sample for the financial crisis

Chart 2
Factor loadings of the global factor



period, the co-movement between CDS spreads increased significantly in most countries. The significance of the global factor also became considerably more general by covering most of the variance of both emerging and developed countries.

In the period following the financial crisis (sovereign crisis subsample), correlation with the global factor declined in many of the emerging countries. However, in the case of the emerging European countries and developed European countries, the correlation coefficients stagnated or even increased. This highlights the increased importance of investor concerns related to the euro area periphery, which has become an increasingly dominant issue in sovereign credit risk changes and a factor that has affected sovereigns worldwide.

Thus, the global factor has had different connotations in different periods. Underlying this phenomenon is the time-varying correlation structure between financial variables, as investors re-interpret common risks from time to time. In the period preceding the financial crisis, the widest concept of sovereign risk premium shocks may instead have meant changes in general investor confidence related to emerging bond markets. The financial crisis resulted in the global re-evaluation of fiscal paths and an increase in perceived systemic risks, which linked sovereign credit risks worldwide to more universal, general global market and macroeconomic factors. Daily news about the outlook for the duration and depth of the crisis have simultaneously affected the assessment of economic policy prospects for most (developed and emerging) countries. With the decline in the intensity of the crisis, the role of individual or local factors may have increased again, but the sovereign crisis of the euro area also came to the fore and gained in global importance.

Another group of indicators – the 'betas', which reflect the sensitivity of CDS spreads to factors – are worth

elaborating on. Changes in the global sovereign risk factor have had a different impact on different countries' CDS spreads. The relation with the correlation coefficient is direct: the value of the beta is the product of the correlation coefficient and the standard deviation of the given variable (on a given sample). Accordingly, the higher beta can be the outcome of both a greater correlation with the global factor or the relatively high volatility of the CDS spread changes. A comparison of the emerging European countries makes it clear that the relatively high sensitivity of the Hungarian CDS is caused by the latter fact, higher volatility, while the magnitude of the correlation coefficient of Hungary is similar to that of other countries in the region.

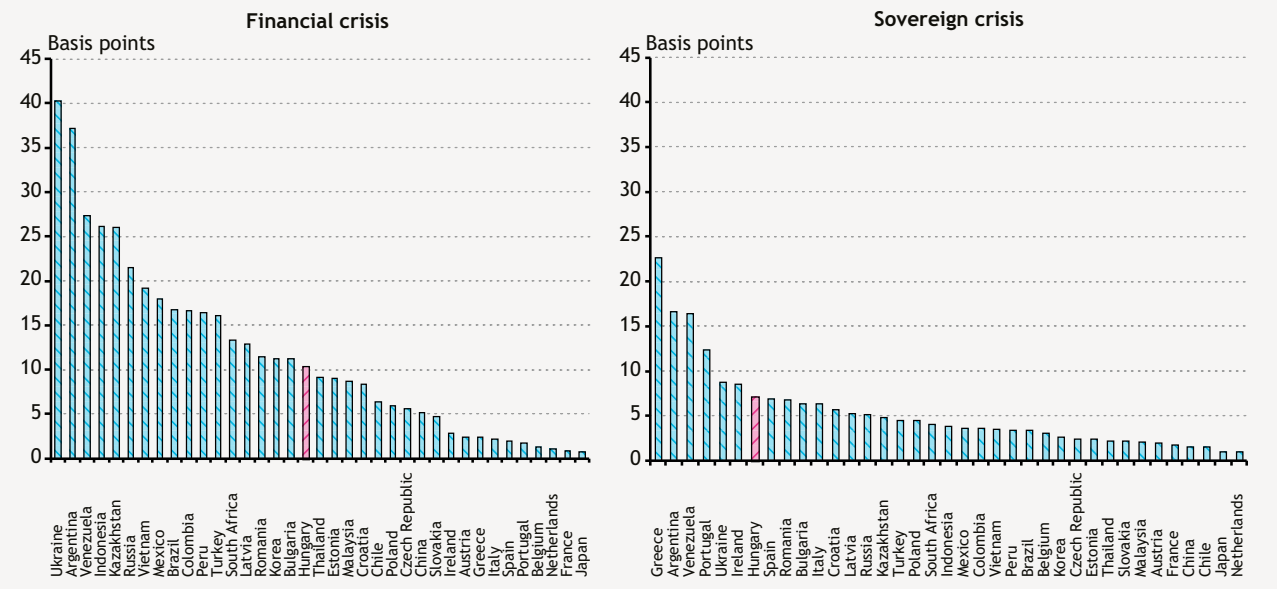
The value of the beta is the magnitude of CDS response to a unit of factor shock. Thus, the size of global betas expresses how sensitively the CDS spreads of individual countries react to a shock of a global origin. The sensitivity of CDS spreads has also changed over time. With the exception of the euro area peripheral countries, betas have declined in each country since the financial crisis, but the degree of this decline was not the same everywhere. Although the sensitivity of the Hungarian CDS spread also fell to nearly one half, the Hungarian beta increased, comparatively speaking. In the sovereign crisis subsample, the Hungarian CDS spread was the second most sensitive to global developments of all the emerging European countries (preceded only by Ukraine), although the Hungarian beta did not materially exceed that of Romania or Bulgaria.

The ranking of betas for international comparison is very similar to the ranking of the levels of CDS spreads. Comparing the two components of the betas (the correlations and the standard deviations) to CDS levels, we find that this similar ranking is due to levels of CDS spreads being correlated with the standard deviation of spread changes. Hence, riskier countries have both a higher level of CDS spreads and a greater volatility of CDS spread changes. Because there is less difference in factor loadings, it is this higher volatility of spreads in riskier countries that leads to their higher sensitivity to global shocks.

The regional factors

The varimax rotation produces the aforementioned four regional factors on the full sample (developed Europe – emerging Europe – Latin America – emerging Asia). For the subsamples, the range of optimum factor numbers varies greatly across statistical methods and samples. For the pre-crisis sample, different methods estimate the ideal number of factors to be between 2 and 11. For nearly all factor numbers, the rotated solutions contain an emerging Latin American, emerging European and Asian factor, though the developed countries form different groups depending on the different solutions. For the financial crisis and sovereign crisis subsamples, the number of factors recommended by different methods is between 2 and 5. The first four factors create well-separated regional groups for these subsamples (in the case of two factors, CDS spreads separate into emerging and developed groups; in the case of three factors Latin America is additionally separated from other

Chart 3
The sensitivity of CDS spreads to global shocks
(betas)



emerging countries; with four factors, the structure aligns with that on the full sample presented earlier).

The correlations (loadings) with the regional factors also change from sample to sample, as observed in the case of the global factor. This can be interpreted in two ways: from the aspect of a certain country, a greater correlation coefficient means that the country's credit risk assessment is more strongly impacted by CDS spreads of that region. On the other hand, viewed from the factor's aspect, a higher loading usually means that the spread of the given country has a larger influence on the factor. If the correlation coefficient changes relative to the other countries the interpretation of the regional factor will also change.

Looking at the individual factors, all of the regional factors' loadings significantly increased in the last two subsamples compared to the first (pre-crisis) sample. This is primarily the consequence of the aforementioned increase in global CDS spread correlations, which affected most countries, and especially those in the developed and emerging European regions. (The regional factors of the varimax rotation partly contain the information of the global factor.) The developed European factor emerges only in the financial crisis; factor analysis on the first subsample extracts a fourth factor that separates the four countries of Kazakhstan, Turkey, South Africa and Russia from the rest of the emerging European region.

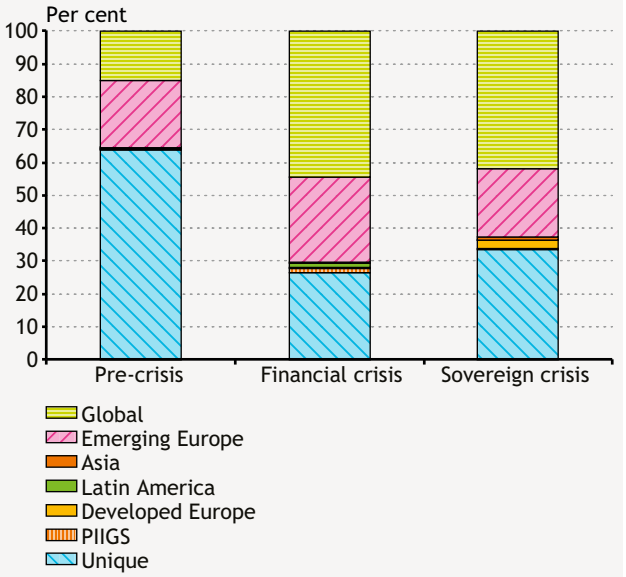
Romania, Bulgaria, Croatia and Hungary had the largest correlation with the emerging European factor in the pre-crisis sample. In subsequent samples, the regions' factor loading increased and became more homogeneous. On the last subsample, the Romanian, Bulgarian and Croatian factor loadings were somewhat higher than correlations of other regional countries. Therefore the emerging European factor also had a different interpretation on different samples.

In the case of Asian and Latin American factors, the last subsample exhibits slightly lower correlations with emerging countries outside the region compared to the financial crisis subsample. Accordingly, the co-movement within all emerging countries increased considerably throughout the crisis, but before and after that the Asian and Latin American regions constituted more separated groups.

THE FACTORS OF THE HUNGARIAN CDS SPREAD

To investigate the components of the Hungarian CDS spreads, another method, the aforementioned target pattern rotation is used. Its result is a factor structure in which global and regional factors appear simultaneously (in the previous methods the common variance was either decomposed into a global and three other, unrotated factors, or in the varimax case it was distributed between four regional factors).

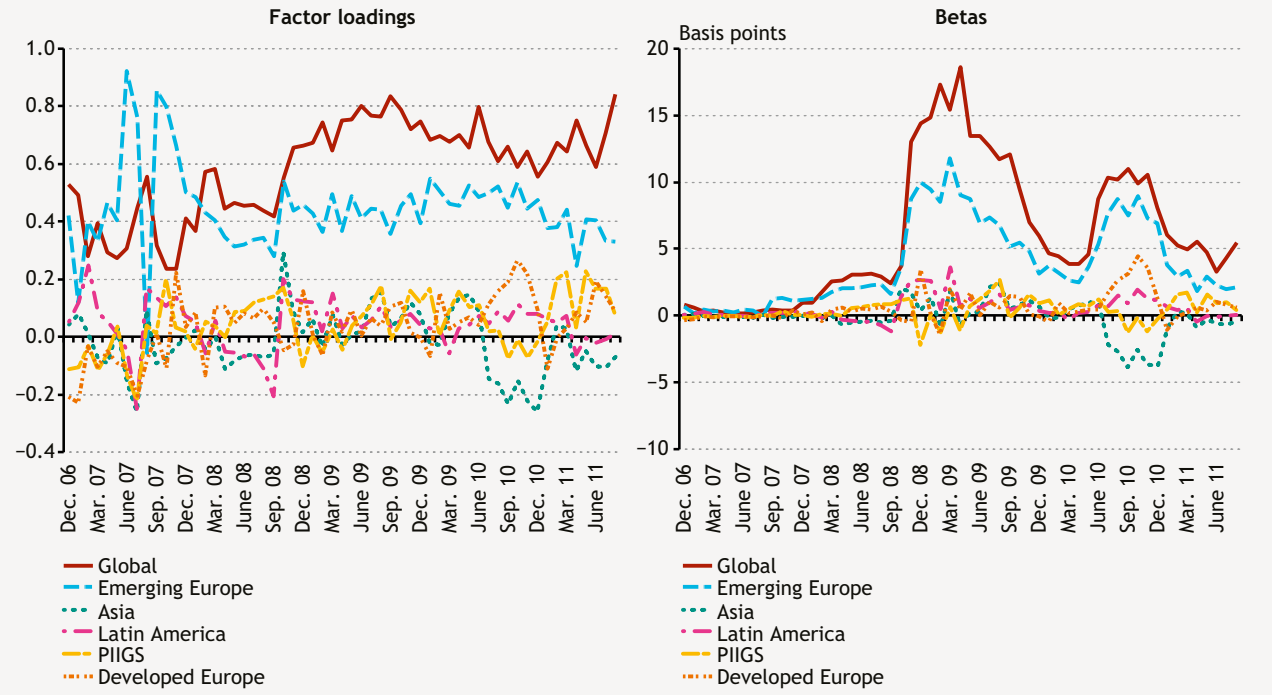
Chart 4
Component shares of the Hungarian CDS spread's variance



There are two important differences in the factors' interpretation compared to previous sections. First, the developed European countries are divided into two groups, which creates an additional regional factor, the group of euro-area peripheral countries (PIIGS). Second, the interpretation of each regional factor changes, as in this procedure the regional factors represent only the part of CDS variances that excludes the global component. Therefore, the regional factor loadings will generally be lower. Of course, the sum of the squares of factor loadings (common variance) plus the unique variance share still adds up to 100 percent, the total variance in each country's case. However, this time the factors decompose the common variance into one global and five regional components.

Chart 4 depicts the variance shares attributed to each component in the case of the Hungarian CDS spread for the three subsamples (pre-crisis, financial crisis, sovereign crisis). In Hungary, just like in CDS spreads elsewhere, the global component's weight increased and that of the unique component declined during the financial crisis. The emerging European factor also increased in this period. In the third subsample (September 2009–July 2011), during the sovereign crisis, the developed European and unique

Chart 5
Changes in factor loadings and betas of Hungarian CDS spreads
(betas)



components gained share, while the emerging European factor decreased. The effect of other regional components was insignificant. Therefore, the impact of euro-area periphery's crisis also mostly affected the Hungarian CDS spread through the global factor. Hungarian risk assessment did not correlate with this region directly. A minor contagion effect may have occurred via the developed European region.

Changes in factor loadings and betas over time

The analysis on half-year moving windows also shows that the global factor was consistently the most significant component in Hungarian CDS spreads (Chart 5). The emerging European effect (net of the global effects) was typically somewhat more moderate. Thus, the Hungarian spread was significantly influenced not only by global shocks but also by developments in the region. In the case of the regional factor, the direction of causality was probably two-way. Times of higher factor loadings may occasionally have meant that Hungarian events affected the risk assessment of other East European countries and this has been the source of a larger correlation with the region.

The correlation vis-à-vis other factors was practically insignificant, though the increase of the developed European factor's loading in the spring-autumn of 2010 should be mentioned. This increase indicates that the euro-area periphery's problems at that time partly affected the Hungarian CDS spreads through this factor.

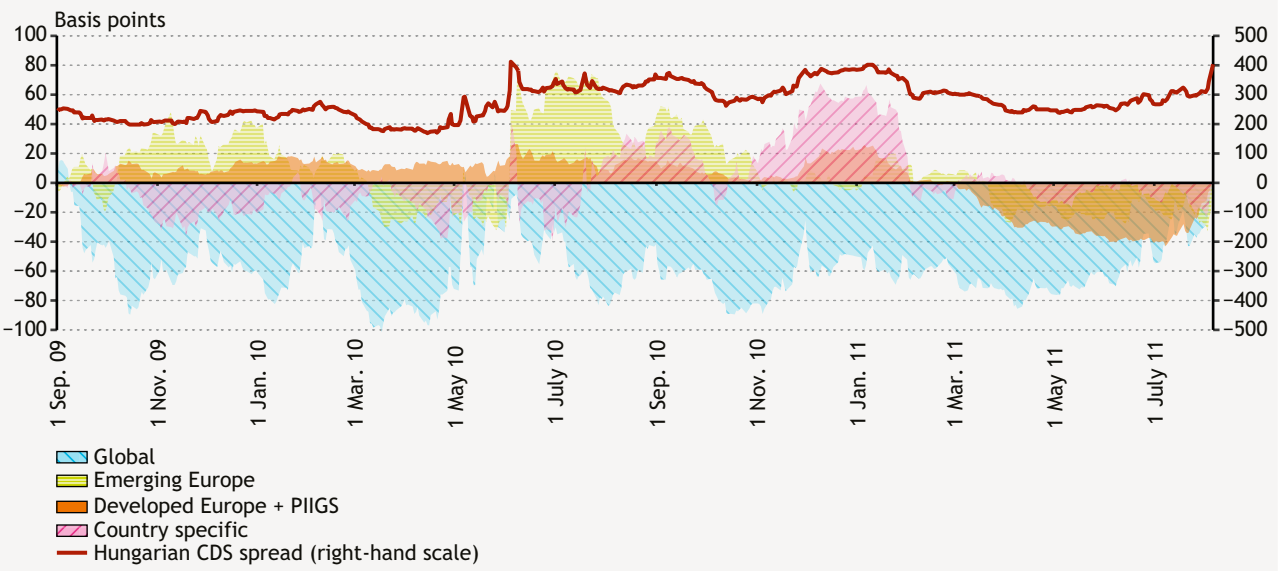
Hungary's risk assessment in the sovereign crisis period

Next we turn to changes in the Hungarian CDS spread in the two years of the sovereign crisis period (September 2009 – July 2011). We use the target pattern rotation result on this sample in generating the components of the Hungarian CDS spread. Sample selection is important, as we have seen that factor loadings change across samples, and thus the factors themselves also have different meanings.

The choice of a longer sample represents correlations between CDS spreads that are relevant over a longer period. This has both advantages and disadvantages. The results of factor analysis will be more robust to the arrival of new data, but it will be less able to capture the latest trends. Shorter samples represent the correlations that are valid at a given point in time, but new data may significantly overwrite these. The sovereign crisis period is nearly two years long, and is a relatively homogeneous period in that correlations in this period were mainly thematised by sovereign risks with the centre of attention on the euro-area periphery.

One important feature of this period is that the global factor universally incorporates emerging and developed and

Chart 6
Components of the Hungarian CDS spread in the sovereign crisis subsample



Note: the chart depicts the Hungarian CDS spread and cumulated components. An increase in component values indicates that the component raised the CDS spread. A decreasing component, in turn, means an improvement in the risk assessment of Hungary, a factor contributing to the decline in the CDS spread.

PIIGS sovereigns; nearly all countries have high loadings on the global factor. Because the global, emerging European and unique factors are the key components affecting the Hungarian spread, the shocks of the peripheral countries are mostly propagated through the global factor and, to a much lesser extent, through the developed European factor.

Chart 6 depicts the cumulated components of the changes in the Hungarian CDS spread (net of the trend). The daily changes in these cumulated series represent the magnitude of daily shocks that a component causes in the Hungarian CDS spread. Factor analysis deals only with the variance of the changes (the deviations from the mean) and not the mean change, which in this case constitutes an approximately 50 basis point increase for the whole sovereign sample. Thus factor analysis separates the relatively favourable/unfavourable time periods in terms of each factor and reveals the extent (either in a positive or a negative direction) that these periods contributed to the variance of the CDS spread.

Regarding the global factor, the end of 2009 and the beginning of 2010 was a period of a relatively steady recovery from the financial crisis. During that period, the global factor gradually contributed to a decline in the Hungarian CDS spread. However, in January 2010, prior to the ECOFIN meeting and the EU summit in early February, the first wave of Greek contagion was reflected in the increase in the developed European component, and the global factor was also rose temporarily (the extent of its negative contribution to the Hungarian CDS spread declined). Thereafter, however, a favourable global atmosphere resumed until mid-April, which is also seen outside of the CDS market in this period's large increases in leading stock exchange indices and improvements in main global risk indicators. From April on, however, the global CDS factor increased as concerns relating to Greece escalated, and the favourable (negative) global effect on the Hungarian CDS spread nearly disappeared by the beginning of May. The first framework of the IMF-EU assistance was able to reduce the sovereign concerns, which was reflected in the decline in the global factor until August.

The global factor reduced the Hungarian CDS spread as well from mid-May, although in this period, barely a few weeks after the favourable European announcements the unfortunate communication of the Hungarian government, which compared the Hungarian fiscal situation to that of Greece, resulted in a sharp spike in the country-specific component. This surge was nonetheless temporary, as foreign investors quickly realised that the statements were related more to domestic political rhetoric than new information on the fiscal position.

The emerging European factor also increased simultaneously with the statements. Based on the coincidence in time, it is likely that in this case the Hungarian events spilled over to cause a regional increase of CDS spreads. In addition, the

Chart 7
Components of the Hungarian CDS spread
(April–October 2010)

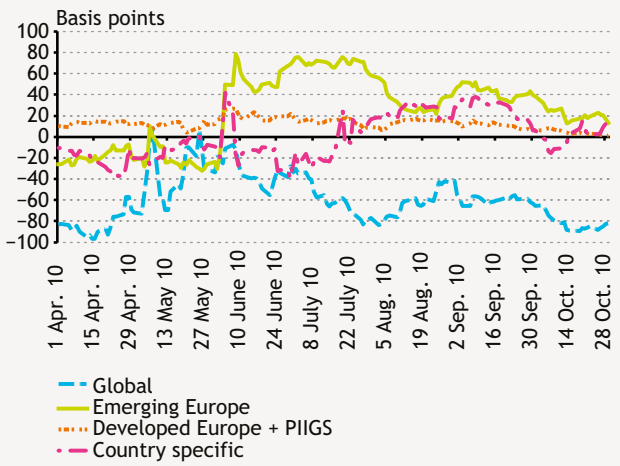
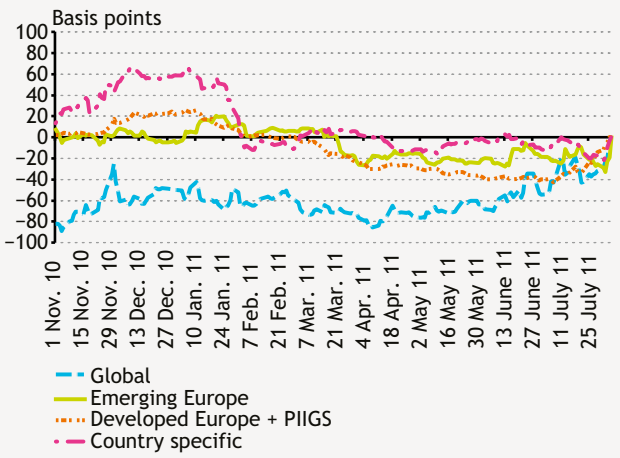


Chart 8
Components of the Hungarian CDS spread
(November 2010–July 2011)



more persistent nature of this increase suggests that the event turned investors' attention to Eastern Europe's fiscal problems. During this period, analyses related to Eastern Europe mostly pondered the possible outcomes of Romanian and Ukrainian IMF negotiation rounds. Following the successful closure of these negotiations in July, the region's CDS spreads generally declined, which also resulted in a decline in the emerging European part of the Hungarian risk spread.

Again, an increase in the country-specific factor, which proved to be permanent this time, prevented the Hungarian CDS spread from declining together with those of other countries in the region. Presumably, this was a result of the deteriorating IMF relations, the bank tax and other measures that were unpopular among investors.

The country-specific component continued to deteriorate until mid-January 2011, which by then was also reflected in actions of credit rating agencies. In the final weeks of January, however, Hungary's risk assessment took a favourable turn, which can be attributed to the anticipation of the Széll Kálmán Plan. Government officials' statements suggested that the plan would mark a shift in the fiscal policy path. The country-specific factor, which raised the CDS spread by nearly 100 basis points from the beginning of the sample fell by the same amount within a couple of weeks. In early 2011, the decline in the Hungarian CDS spread was also supported (to a lesser extent) by favourable changes in the developed European and global risk factors.

The increase in the Hungarian CDS spread in June–August 2011 was primarily related to global developments and was triggered again by investor concerns related to the euro-area periphery. Investor anxiety was a consequence of an increased perceived probability of an imminent Greek sovereign default and its potential consequences, at the worst a spillover to either the euro-area financial sector or major euro-area countries, to Italy, in particular. In this case the Hungarian CDS spread was affected relatively more through the developed European factor as well, although the global factor's increase still caused the largest share of the CDS spread movement.

CONCLUSIONS

The general and significant positive correlations between sovereign CDS spreads confirm the existence of a global factor. The information content of the global factor changed over time. Prior to the crisis, it mostly represented investor confidence related to emerging countries, but by the end of our sample it became a much more universal factor, which also affects the risk assessment of developed European sovereigns as well.

CDS spreads' correlations form groups that can be well interpreted on a regional basis. Regional factors became more defined during the crisis and their content also changed over time. The four groups identified on the full time sample are the developed European, emerging European, Latin American and Asian regions.

The Hungarian CDS spread was most influenced by the global factor in the full sample and in all subsamples. This is the factor through which the fiscal crisis of the euro-area periphery has the greatest effect, although some of the shocks were to a smaller extent propagated through the developed European and peripheral regions.

In addition to the global factor, the emerging European and the country-specific factors had a time-varying, but still important impact on Hungarian sovereign credit risk. Between summer 2010 and January 2011, the country-specific factor caused a considerable increase in the CDS spread; in 2010, the Hungarian events could have also contributed to a worsening assessment of other countries in the region. During January 2011, however, the shift in the government's fiscal policy stance strengthened investor confidence, which was reflected in the decline in the CDS spread.

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APPENDIX: THE DECOMPOSITION METHOD (FACTOR ANALYSIS)

Factors analysis is used in the paper to identify components of CDS spread changes. Factor analysis allows the representation of the information content of a high number of variables (the 37 sovereign CDS spreads in our case) with a few estimated, latent variables called factors. In general, one of the advantages of factor analysis is data reduction, i.e. the substitution of the large number of variables in the analysis with much fewer factors. If the data set is suitable for factor analysis, little information (a small proportion of the variance) is lost due to this substitution, while the small number of factors allows a considerably simpler interpretation of the data set's full information, which may be useful in further analyses.

Another advantage of the method, however, which is more relevant in our case, is that the factors that are extracted help in identifying an unobserved (latent) structure shaping the variables. The correlations between the latent factors and the original variables show the extent to which factors explain each of the variables. This allows us to learn more about the original variables and their interrelatedness as well.

The technique uses the variance–covariance matrix of the variable data set (time series). It separates the variance of the variables into two major parts: a common variance part that can be explained by other variables (this is called *communality)* and a unique, idiosyncratic component. The method extracts the factors[15] from the common variance, so that the common variance of each variable is a linear combination of the factors. The standardised form (deducting the mean and norming the variance to 1) of a given variable (x_i) is thus decomposed into two main factors: the linear combination of the n factors (the common component) and the unique component. The importance of a factor in forming a variable's variance is expressed by the factor loading ($l_{i,j}$, *or loading),* which take values between −1 and +1.

$$z_i = \frac{x_i - \mu_{x_i}}{\sigma_{x_i}} = \sum_{j=1}^{n} l_{i,j} F_j + \varepsilon_i \qquad (1)$$

If the factors were interpreted as observed variables, equation (1) would actually be a multiple linear regression, where the standardised variables (in our case the CDS spread of the *i*-th country) are explained with the factors, and where the regression coefficients are the factor loadings. The error of the regression would then represent the unique component.

If the factors are not correlated with one another and the error term, (1) can be rewritten as a decomposition of the variable's variance:

$$var(z_i) = \sum_{j=1}^{n} l_{i,j}^2 var(F_j) + \sigma_i^2 \qquad (2)$$

This formula shows the decomposition of the examined variable's variance (CDS spreads in our case). The explanatory power of the factors are expressed by the squares of the factor loadings $(l_{i,j}^2)$, when the variance of the factors are 1 (the variables in this representation are standardised so: $[var(z_i)=1]$). The weight of the unique (country-specific) component is expressed by the error variance (σ_i^2).

One of the basic issues in factor analysis is the choice of the number of factors to be extracted. The literature recommends several methods and the examination of several indicators in order to determine the number of factors. The essence of these recommendations is that the number of factors should be sufficiently large to explain a relatively large proportion of the total variance (especially if data reduction is the main objective), but should be small enough to aid in the interpretation of the factors. In the standard iterative procedure of factor analysis the analyst extracts factors choosing their number based on several criteria, and then eliminates variables with large unique variance from the sample (thus facilitating that fewer factors explain a greater proportion of the total variance). Even at the end of the iteration it is not always clear what number of factors are worth using. In this case it is sensible to take into account the objective of the analysis (data reduction: as few factors as possible or latent structures: all factors that can be well-interpreted).

The first step of factor analysis extracts factors in a hierarchical order of explained variance. The first factor receives the greatest possible share of the common variance, the second factor the greatest part of the remaining variance, etc. This structure usually does not create factors that are easy to interpret. Therefore, in the next step of the analysis a rotation is applied, which produces a mathematically equally valid factor loading matrix (with the same communalities − unique variances by variables), but one that is easier to interpret. Most rotation procedures minimise a complexity function, which penalises if variables are associated with more than one factor (variable complexity), or if the factors' correlate with the several variables in a similar way (factor complexity). Therefore, the rotation usually produces a factor structure, where variables are more clearly linked to one specific factor, and thus the factors separate the variables into groups. Typically, the rotated factors distribute the variance much more evenly than the original solution.

[15] On this point factor analysis differs from the other popular data reduction technique, the principal component analysis, which distributes the complete variance of variables, not only its common component, among the components. The advantage of the principal component analysis is that it leads to an unambiguous solution, whereas in the case of factor analysis the common-individual decomposition has to be estimated first, which may result in different solutions depending on the estimation technique. At the same time, the decomposition used in factor analysis is usually easier to justify theoretically than the total variance decomposition of the principal component analysis. In practice, the principal component analysis is a preferred method when the primary objective is data reduction, whereas the factor analysis is mostly used when the primary goal is exploring the latent variable structure.

There are two basic types of rotations; the orthogonal and the oblique rotation methods. The former maintains uncorrelatedness among factors, which is advantageous if the factors are included in subsequent regressions. In this case, multicollinearity will not be an issue and the factors' partial effects can be well identified. On the other hand, the oblique method allows factors to correlate and creates factors that can be interpreted even more easily.[16]

The two rotations applied in this paper are both orthogonal. The first is the varimax method, which is one of the most popular methods in various applications. The varimax rotation minimises factor complexity by finding the minimum of the following objective function:

$$f(L) = \sum_{j=1}^{n} \left(\sum_{i=1}^{m} \sum_{k \neq i}^{m} l_{ij}^2 * l_{kj}^2 \right) \quad (3$$

where *m* and *n* are the numbers of variables and factors, respectively, whereas *l* denotes factor loadings. This method assembles variables (the CDS spreads) into well separated groups. It is well suited to explore the latent correlation structure among the variables, to discover which CDS spreads move together with each other the most, and to indicate which the relative importance of spreads in the factors.

The second method we apply is the target pattern, or Procrustes, rotation. With this procedure, we find a factor matrix that, while keeping factors uncorrelated, differs least from the target matrix. Therefore, the rotations' objective function is the Euclidean distance between the elements of the target matrix and the factor matrix. This method is able to produce a factor structure with uncorrelated global and regional factors. More common rotation types, e.g. the varimax rotation, cannot achieve that because those methods aim to create a structure that links variables to only one factor where possible. Our goal is, however, different, we would like to link two factors to each of our variables; the global factor and the regional factor indicated by the varimax method. In the target pattern matrix the first (global) column will be a vector of 1s, while the regional factors will have cells of 1s for countries that belong to the region and values of 0 for countries outside of the region. For example, the target value of the Hungarian CDS spread is 1 on the global and 1 on the emerging European factor, and 0 on the Latin American, Asian, developed European and PIIGS factors.

[16] See Hair et al. (1998) for more details of the factor analysis procedure and rotation types.

Péter Koroknai and Rita Lénárt-Odorán: The role of special purpose entities in the Hungarian economy and in statistics[1]

The external debt and liability indicators which are important in terms of the external vulnerability of the Hungarian economy are significantly distorted if data on the so-called special purpose entities (SPEs) are taken into account. This is due to the fact that the gross external liabilities of SPEs amount to more than 100 per cent of GDP; taking these into account, the external liabilities of Hungary exceed 300 per cent. Accordingly, including SPEs results in a much less favourable picture of Hungary's external vulnerability. Clearly, data that exclude SPEs are appropriate for economically sensible analyses, as these entities do not engage in any real economic activity, but typically perform a financial intermediary function. They forward funds originating from abroad to foreign companies, attaining considerable tax savings for their group of companies (taking advantage of Hungarian tax regulations). By international comparison, including data on SPEs significantly exaggerates FDI inflows and changes in the intercompany loans of Hungarian companies. Recently, however, several events have occurred that may reduce the risks related to SPEs. First, as a result of efforts by the MNB, beginning in 2011 numerous organisations (e.g. ECB, Eurostat, OECD) consider as standard data that excludes SPEs. Secondly, several measures have been taken recently that reduce the tax advantage attainable by SPEs; these are also reflected in the decreasing domestic activity of SPEs. Regarding external vulnerability, the declining presence of SPEs in Hungary results in obvious advantages, as the external liabilities of Hungary are decreased, and the risk assessment of the country may improve.

INTRODUCTION

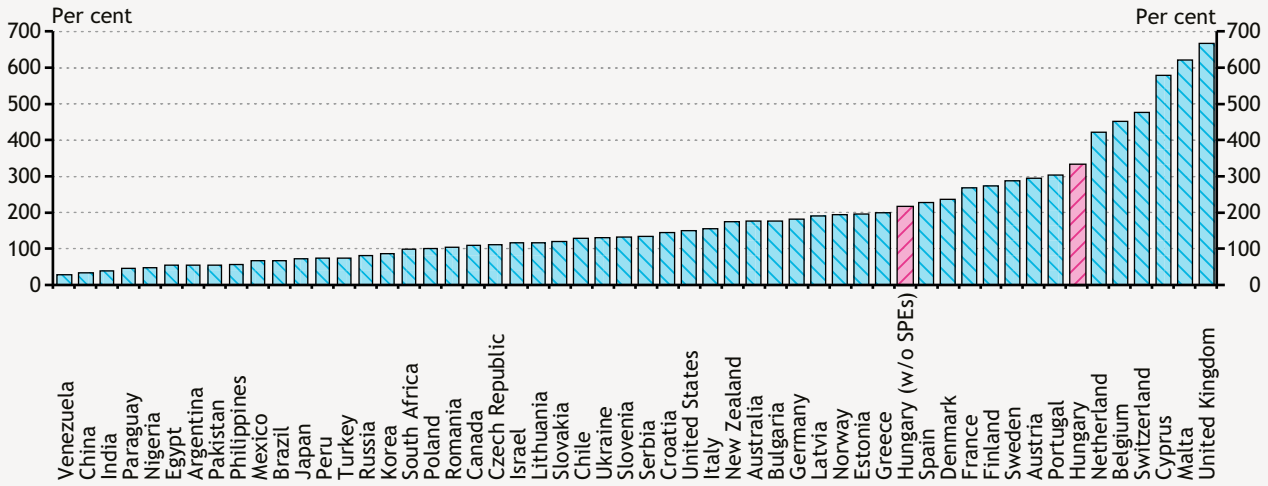
Taking into account the financial operations of special purpose entities (SPEs) significantly distorts the gross external liability and debt indicators of the Hungarian economy. External debt and liability indicators are key vulnerability indicators monitored by foreign investment banks, credit rating agencies and international financial institutions in their analyses. Data including SPEs significantly increase these indicators, thereby presenting a less favourable picture of the changes in the external liabilities of the Hungarian economy (the database of the IMF, which contains data including SPEs, was used for Chart 1; in order to demonstrate the magnitude of the distortion, data on Hungary excluding SPEs were also shown). These entities, however, do not engage in any real economy activity and typically perform a financial intermediary function – usually as arms of multinational groups of companies. Looking at their actual activity, however, money only flows through these firms, 'blowing up' both their financial assets and liabilities, and thus significantly distorting the statistics.

The gross external liabilities of SPEs exceeded 100 per cent of GDP last year. Excluding SPEs, the value of gross external liabilities as a proportion of GDP fluctuated around 200 per cent in this period. This is already high in terms of an international comparison, but including SPEs this indicator significantly exceeded 300 per cent (Chart 2). The external liabilities of these types of domestic entities are almost entirely non-debt type liabilities, mostly consisting of foreign direct investment (FDI). At the same time, the magnitude of inflows and outflows of their debt-type liabilities (e.g. loans, deposits, bonds) is negligible. Despite this, data on SPEs may distort not only liabilities but debt indicators as well, as many analyses – in contrast to our central bank analyses – calculate gross external debt with the inclusion of intercompany loans (loans extended by parent companies).[2] These types of gross liabilities of SPEs

[1] The authors would like to thank Judit Antal, Tamás Berki, Mihály Durucskó and Mihály Hoffmann for their help in preparing this article.

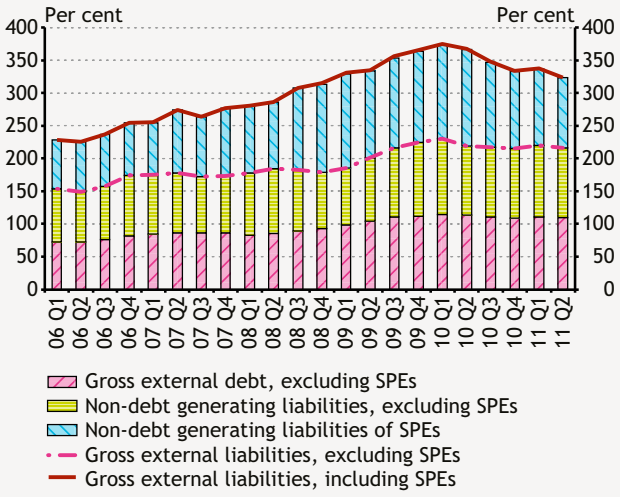
[2] Although based on the international statistical methodology intercompany loans within direct capital investment mean debt-type financing, due to economic considerations, in this article and in our central bank analyses they are treated as non-debt type liabilities. This is justified by the fact that parent companies are able to finance their affiliates through intercompany loans as well, similarly to equity capital. Based on our experience, passage between individual forms of financing is rather flexible. Our data indicate that equity capital-type liabilities and intercompany loans usually moved in opposite directions in recent years, and their common time series was much more stable.

Chart 1
Gross external liabilities as a proportion of GDP
(2009 values)



Note: The IMF data usually include the SPEs (for details, see footnote 8). In the case of Hungary, data excluding SPEs are shown for illustration.
Source: IFS.

Chart 2
External debt and liability indicators of the Hungarian economy as a proportion of GDP



Note: External liabilities related to financial derivatives and intercompany loans are included in non-debt type liabilities. Due to their negligible magnitude, the debt-type liabilities of the SPEs are not shown in the chart.
Source: MNB.

reached 20 per cent of GDP at end-2010, and this measurement was added to the external debt indicator calculated with the inclusion of SPEs.

WHAT ARE SPECIAL PURPOSE ENTITIES?

The main feature of special purpose entities is that their relationship with the domestic economy is minimal; usually they only play a financial intermediary role in transactions, as part of the global tax optimisation activity of large international corporations. SPEs are resident companies with foreign owners and foreign affiliates that are not engaged in any real economic activity in Hungary. These firms specialise in financing groups of companies, holding activities, dealing in royalties or asset leasing. According to our unofficial information, the most typical of the above activities is the financing of groups. The direction and amount of funds flowing through SPEs are regulated by their parent companies. Examination over a longer period of time reveals the net cash flow of SPEs to be nearly zero. Therefore, their activity does not significantly influence their respective financial positions, but the magnitude of their receivables and payables is considerably increased.

The statistical filtering of special purpose entities is based on features that characterise their activity. Currently, there is no internationally accepted, uniform standpoint in regard to what companies should be considered SPEs (IMF, 2009). However, despite this lack of a standard definition, there are commonly accepted criteria that allow individual countries to identify these companies. Based on the recommendations of the OECD handbook (OECD, 2008a, 2008b) which deals with the subject in a detailed manner, it is the convention of Hungarian statistics to separate SPEs within resident companies. The separation of SPEs within the corporate sector, starting in 2006, initially resulted in the identification of some 700 special purpose entities. Based on a more or less bi-annual revision, their number declined by 2011 to below 500 (i.e. 15 per cent of the

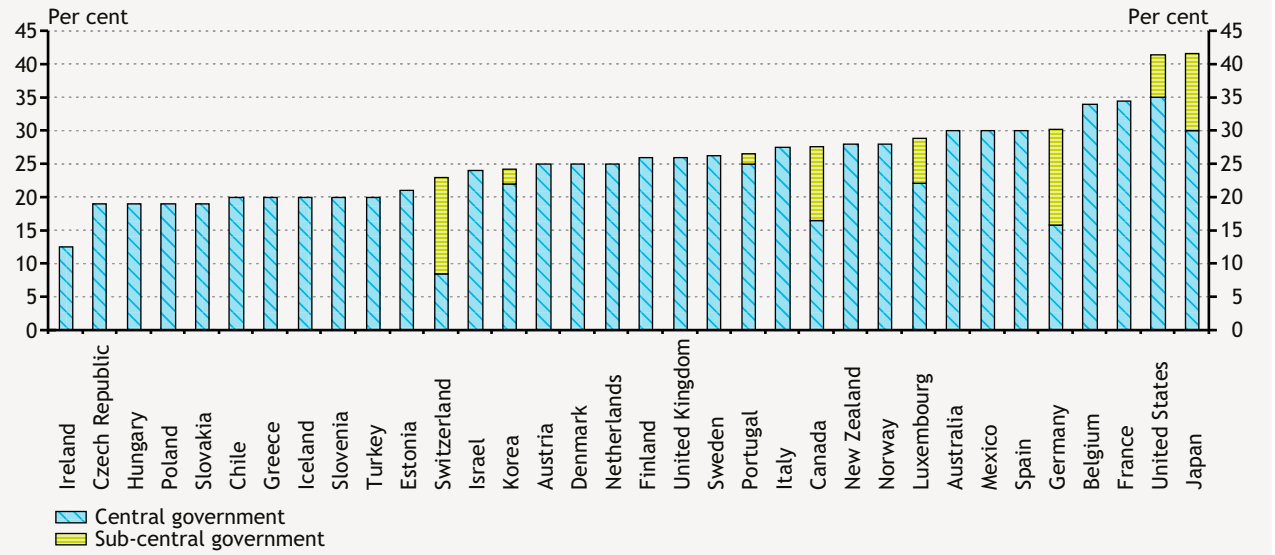
foreign-owned companies included in the balance of payments). The system of rules developed jointly by the Magyar Nemzeti Bank and the Hungarian Central Statistical Office in 2005 (MNB, statistical methodology) contains the following main criteria for SPEs:

- They do not engage in real economy activity in Hungary.
- They have foreign ownership, with financial assets and liabilities that pertain to countries other than Hungary.
- In their balance sheets, the weight of real assets is negligible relative to that of their financial assets.
- Low number of staff (90–95 per cent of SPEs employ two people maximum).
- Negligible material costs.
- In some cases, the name of the enterprise indicates the special nature of the activity (e.g. group financing company, holding company).

In terms of their operation, special purpose entities are similar to domestic off-shore companies (which ceased to exist in 2006), although the nature of their classification is not legal, but rather statistical. Mainly due to benefiting from tax advantages, the activity of SPEs is similar to that of the earlier off-shore companies. Off-shore companies were identified by Act LXXXI of 1996 on Corporate Tax and Dividend Tax as companies performing activities abroad, subject to a significantly lower corporate tax rate. Accordingly, the off-shore classification was a legal category, subject to separate tax rules, whereas the special purpose entity is merely a statistical classification. SPEs are subject to the same tax regulations as other companies. In 2002, the Act on Corporate Tax changed in a way[3] such that, starting in 2006, it no longer distinguished off-shore companies in terms of corporate tax rate.

Special purpose entities basically settled in Hungary in order to exploit taxation advantages. In terms of international comparison, the Hungarian corporate tax level is considered low (Chart 3) and companies in Hungary pay taxes according to a relatively low rate. In addition, the effective corporate tax rate may have further been reduced by the various tax allowances prevailing in Hungary. From the point of view of SPEs, the most relevant rule was that until 2010 it was possible to deduct half of net interest income from the corporate tax base (Act LXXXI of 1996).[4] In the event that a group of companies financed a foreign company through a domestic SPE, it could attain considerable tax savings at a group level as a result of interest income being subject to a preferential tax in Hungary. It is also

Chart 3
Corporate tax rates in 2011



Note: Excluding surtaxes and the business tax in the case of Hungary.
Source: OECD.

[3] From January 2003 onwards, it was not permissible to set up an off-shore company. Previously existing ones lost their status by 31 December 2005 at the latest.

[4] Financial institutions (banks, insurance companies, investment funds) are not allowed to do this.

worth mentioning that exemption from local business tax exists in many settlements in Hungary. This may have attracted companies specialising in leasing; this exemption does not apply to group financing firms.

A large proportion of domestic SPEs have US owners as their primary owners; accordingly, the significant difference between Hungarian and US corporate tax rates and the characteristics of their tax regulations played a major role in their establishment. According to our information from market participants, the primary owners (and thus the decision-makers responsible for the allocation of funds) of these companies are often US residents. The difference between the 35 per cent corporate tax rate in the US and the much lower rate in Hungary was an important motive behind the foundation of these types of domestic enterprises (Chart 3). In addition, a determining factor in the creation of SPEs in Hungary may have been the convention signed in 1979 between the USA and Hungary on the avoidance of double taxation, which allowed a 0 per cent withholding tax (on income transferred abroad) on interest income inflows to Hungary from the USA (e.g. on loans extended from Hungary). In addition to the Hungary-specific tax advantages listed above, the domestic activity of SPEs may also have been facilitated by the fact that, in general, tax and accounting regulations were not globally harmonised. Thus, for example, funds are shown as capital or credit on the balance sheets of domestic companies; clearly, this is done on the basis of legal statements. As the authorities do not examine the underlying content, the liability shown abroad as an equity may also appear in the balance sheet of a Hungarian firm as a loan. Accordingly, dividend payments related to the equity may be accounted for as earning interest in Hungary, which may allow for a reduction of the tax payment obligation.

In recent years, several measures have been taken in Hungary that may hinder the activity of special purpose entities here. Tax revenues from SPEs in the budget may exceed HUF 10 billion.[5] Nevertheless, there have been several changes in the tax system recently, which may reduce the tax advantages of SPEs. EU directives and growing transparency (which may even lead to increased tax revenues through the improvement of general tax compliance) may have played a role. The main changes are as follows:

- In parallel with the renegotiation of similar treaties with other countries, the convention signed in 1979 between the United States and Hungary on the avoidance of double taxation was amended in 2010 (Act XXII of 2010). For example, an important change was the possibility of the 0 per cent withholding tax on interest incomes arriving in Hungary being tied to strict conditions (such as real economic presence). It is important to note that, taking capital flows as a basis, the weight of directly US-owned SPEs within all SPEs may be around 10 per cent (see below). In addition, however, it must also be mentioned that the reports of companies and statistics only reveal direct foreign owners and affiliates. The company on the top of the ownership structure of the companies is unknown, while the actual proportion of indirectly US-owned enterprises may be higher. Accordingly, the amendment to the US–Hungarian convention may have brought a material change in the activity of domestic SPEs; some changes are already reflected in the available data.

- Since 2010, half of net interest income cannot be deducted from the corporate tax base (Act LXXXI of 1996; Adózóna, 2010). An important reason for this decision may have been that this kind of tax allowance is unprecedented in the EU, for which reason an infringement investigation was conducted against Hungary (Brückner, 2009).

- In 2010, a rule was introduced stipulating that domestic enterprises must pay 30 per cent withholding tax on interest, royalties, consulting or agency services paid to foreign companies if no double taxation agreement is in place (RSM–DTM, 2011; Act LXXXI of 1996). However, Hungary has signed agreements of this type with more than 70 countries. This obligation ceased to exist by 2011, but its introduction may have driven some SPEs to relocate their respective registered offices to other countries.

DOMESTIC STATISTICS

For the purpose of Hungarian statistics, special purpose entities belong to the sector of non-financial corporations. It is typical of SPEs that they do not generally participate in production, but only forward funds originating from foreign companies to other foreign companies. The financial intermediation of SPEs is considered in a statistical sense to be a financial service provided within a closed circle, meaning that these companies must be classified as non-financial sector

[5] According to the income declarations, for example, some 500 companies took advantage of the tax allowance related to interest income in 2010, which entailed a tax payment obligation of HUF 15 billion (F. Szabó, 2011a).

companies. Another argument for their classification in the sector of non-financial corporations is that in domestic statistics the classification of enterprises according to activity is based on self-assessment, according to which SPEs are registered as non-financial corporations. The underlying reason is that the majority of companies presumably declare the activity of their respective mother companies, and thus these companies usually distort the statistics of the sector of non-financial corporations.[6] Due to the increasing impact of SPEs, new international statistical methodologies deal with the accounting rules related to SPEs in more detail. Based on the new national accounts methodology (SNA 2008 and within the EU ESA 2010), within financial corporations SPEs need to be classified in a newly created sub-sector (captive financial corporations), which is expected to be applied by the EU countries from 2014 onwards.

Data on special purpose entities affect the financial accounts of non-financial corporations and the balance of payments statistics. Until end-2005 (i.e. as long as off-shore status existed), data on off-shore companies appeared in net terms in the *balance of payments;* therefore, they did not influence the statistics. The balance of payments statistics of SPEs are available from 2006 onwards, and the high volume of external assets and liabilities significantly affects the gross amounts. Data on SPE-type companies appear in financial accounts not only following the termination of the off-shore status. Because the statistics – by excluding companies that meet the statistical criteria typical of SPEs – attempted to trace data all the way back to the beginning of financial accounts in order to have a uniform, unbroken time series. Data on SPEs exist (on an annual basis) starting from 1990, but the operation of SPEs has materially influenced developments since 1999. Accordingly, data on the scope of companies excluding SPEs and including SPEs are available separately in the case of both statistics and are accessible on the website of the central bank of Hungary. At the same time, in line with methodological standards, the MNB forwards balance of payments and financial account data including SPEs, as well as international investment positions, to several international institutions (MNB).

The MNB makes efforts to ensure that international institutions also regard data excluding SPEs which are closer to economic changes are perceived as the standard. In earlier years, the MNB strived to ensure that international organisations were able to receive data including and excluding SPEs in their databases. Clearly, for economically sensible data releases and analyses, data excluding SPEs are appropriate; for the compilation and comparison of mirror statistics, however, users also need data calculated with the inclusion of SPEs. As a development of recent months, the MNB has achieved that many organisations (ECB, Eurostat and OECD) use data excluding SPEs for their country analyses, data releases and scoreboards containing the external imbalance indicators of individual countries. At the same time, data including SPEs are contained in the statistics of several institutions (IMF, World Bank).

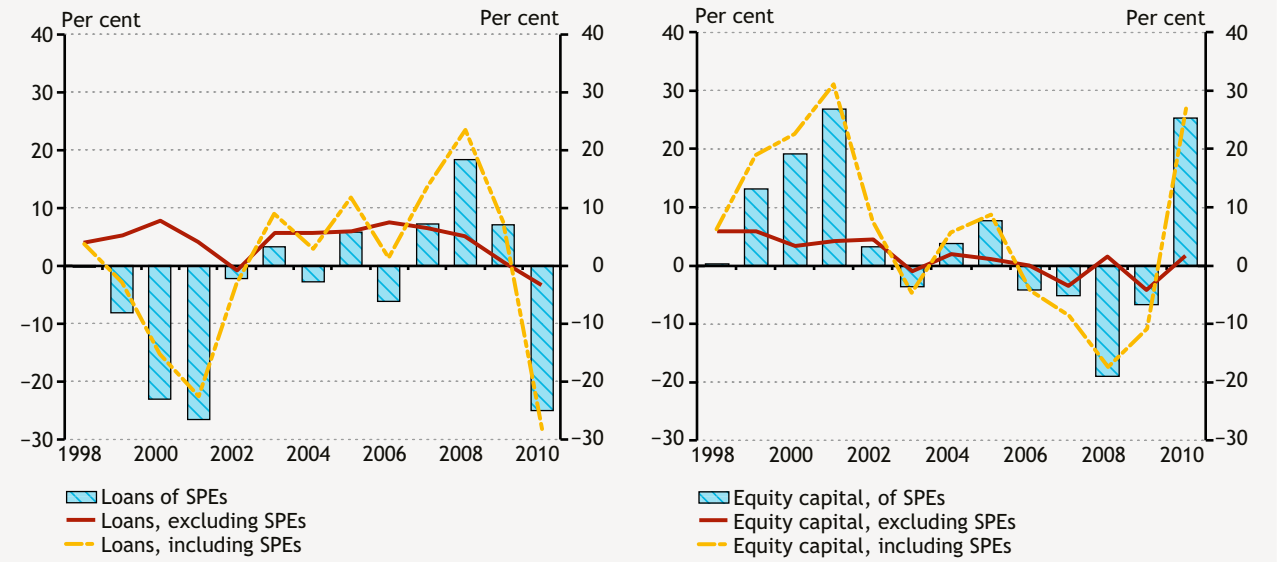
a) Financial accounts

As international statistics address the corporate sector that includes special purpose entities, data in financial accounts significantly exaggerate the picture of changes in the loans of the Hungarian corporate sector during the crisis. Considering that intercompany loans belong to loan type liabilities in financial accounts, in terms of an international comparison, changes in the loans of Hungarian companies may be considerably affected by the activity of SPEs. Based on the data, changes in net borrowing and net obtaining of equity capital by SPEs were contrary to one another for the whole period (Chart 4). In the years before the outbreak of the crisis, it was typical for SPEs to raise equity capital in foreign companies by using intercompany loans originating from abroad. Starting from 2009, in parallel with the narrowing of financing possibilities, loans to SPEs also declined considerably. In 2009, this was still offset by the even greater fall in loans extended, and thus net borrowing remained positive. In 2010, however, SPEs reduced their equity type receivables to an extent equalling 25 per cent of GDP (consequently, their net equity type liabilities increased sharply), which was partly spent on the repayment of earlier received intercompany loans and partly on increasing of lending (which resulted in a decrease in their net borrowing – see Chart 4). It is important to note that on the basis of the information available, SPEs only have external liabilities and assets (i.e. they are not exposed to the domestic banking sector). Accordingly, their operation or eventual liquidation does not pose any financing risk to the domestic banking sector and, by extension, to Hungary.[7]

[6] The Dutch statistics also contain separate data release concerning special financial corporations. The Dutch distinguish this circle of companies that perform special tasks (special financial institutions, SFIs) on the basis of considerations similar to the Hungarian ones, and according to the methodological description they classify them among the non-financial corporations (De Nederlandsche Bank, 2005).

[7] While of course SPEs also may have bank accounts, in most cases the transactions performed by an SPE do not entail any real monetary movements; they are only book entries or, as far as we know, if there are monetary movements, they entail intraday transactions. SPEs need bank transactions only for technical reasons, not for the purpose of investment.

Chart 4
Net borrowing and net transactions in equity capital type liabilities of the non-financial corporate sector, as a proportion of GDP

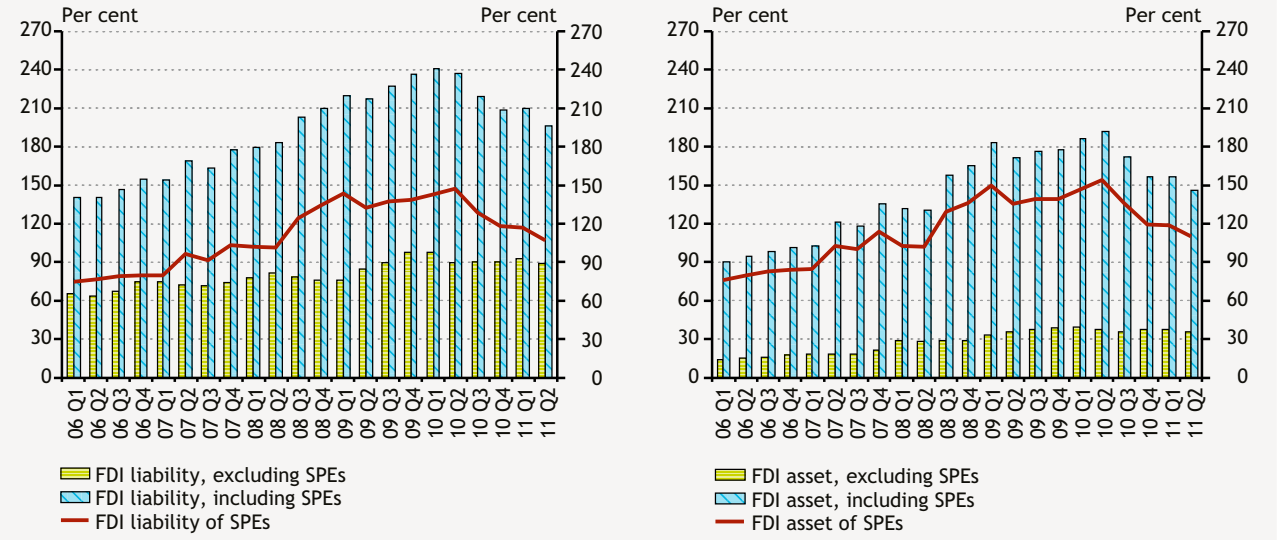


Source: MNB.

b) Balance of payments

The presence of special purpose entities on the financing side of balance of payments statistics distorts foreign direct investments considerably. The financial intermediary role of SPEs is well reflected by the identical sizes of their direct investments in Hungary and abroad and by their co-movement (Chart 5). Based on corporate reports and accounts, equity-type liabilities account for the major portion of foreign direct investments. At end-2010, total direct investment liabilities of SPEs (and related assets) were around EUR 120 billion, of which equity-type external liabilities amounted to EUR 100 billion. Compared to that, the amount of total non-equity type liabilities (typically intercompany loans) is low, but transactions of liabilities of this kind may be significant. It is important to call attention to the fact that as circulation between the two forms of financing (equity and loans within the group

Chart 5
Foreign direct investment (FDI), end-of-period stocks as a proportion of GDP



Source: MNB.

of companies) is very frequent, it is worth dealing with the two together.

Loans of special purpose entities within a group of companies also cause problems in the calculation of gross debt indicators which take these loans into account. In many analyses, external debt indicators are calculated with the inclusion of intercompany loans. Intercompany loans of non-SPEs increased gross debt indicators by 30 per cent of GDP at end-2010. This may be further increased by taking into account the types of liabilities of SPEs, amounting to some 20 per cent of GDP. Accordingly, calculating gross external debt in this way results in 160 per cent of GDP last year. By contrast, the debt indicator that ignores intercompany liabilities was around 110 per cent of GDP.

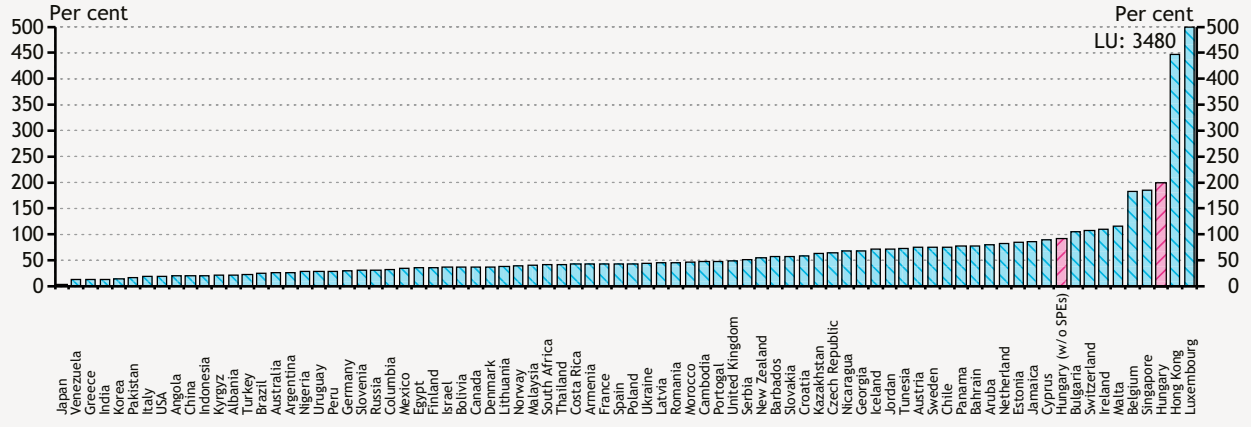
During 2010, a decline was observed in the domestic and foreign direct investments of special purpose entities. FDI stock declined to 120 per cent by end-2010 from the level of 130 per cent which was typically seen earlier. The primary reason underlying this phenomenon may be the narrowing of the scope of tax allowances discussed in detail above. In addition, as a result of losses due to the crisis and falls in profits, tax optimisation efforts may already have declined, also contributing to the capital outflows of SPEs.

The presence of special purpose entities entails significant gross income flows vis-à-vis the rest of the world, without having any material effect on the income balance and the picture of external financing capacity. It follows from the lack of real economy activity of SPEs and their statistical classification that they do not engage in investment activity or participate in foreign trade turnover (including the exports and imports of services). At the same time, considerable income flows are related to the foreign affiliates and parent companies of SPEs. In the balance of payments, they have a material effect on the gross values of income balance. However, their net effect is insignificant.

INTERNATIONAL COMPARISON

By international standards, the FDI stock of Hungarian companies is extremely high (Chart 6). Official statistics available in international databases usually contain the corporate sector including SPEs.[8] On this basis, the total FDI stock invested in the receiving country amounts to nearly twice as much as GDP in Hungary, which is the third highest value following Luxemburg and Hong Kong. As such, it is, inter alia, greater than that of Switzerland, Ireland or Cyprus, which are considered to be favourable target countries in terms of FDI. It is also important to note that the approximately 100 per cent value of GDP-proportionate FDI stock excluding SPEs is also considered to be very high. In addition to early privatisation and the central role of Hungary in the region[9], another underlying reason may be

Chart 6
Foreign direct investment in 2009, international comparison, as a proportion of GDP



** 2008 data.*
Note: The IMF data usually include the SPEs (for details, see footnote 8). In the case of Hungary, data excluding SPEs are shown for illustration.
Source: IFS.

[8] The MNB has succeeded in convincing the ECB, Eurostat and the OECD that they should also receive balance of payments data excluding SPEs, and make them available for users as country data in their databases. The MNB has already indicated to Eurostat and the ECB that it would like to shift to a similar practice in the case of financial accounts as well. It is as a result of these kinds of efforts of individual countries that in spite of the theoretically uniform database, in IMF statistics the Dutch data do not include special financial institutions (SFIs); the FDI stock including the latter exceeds 400% of GDP.

that data excluding SPEs may also contain capital flows that are not related to production but to financial services (see the box for details on arguments supporting this). This latter point is also confirmed by the level of FDI outflows that are considered high in the region (Czech, Polish and Slovak economies).

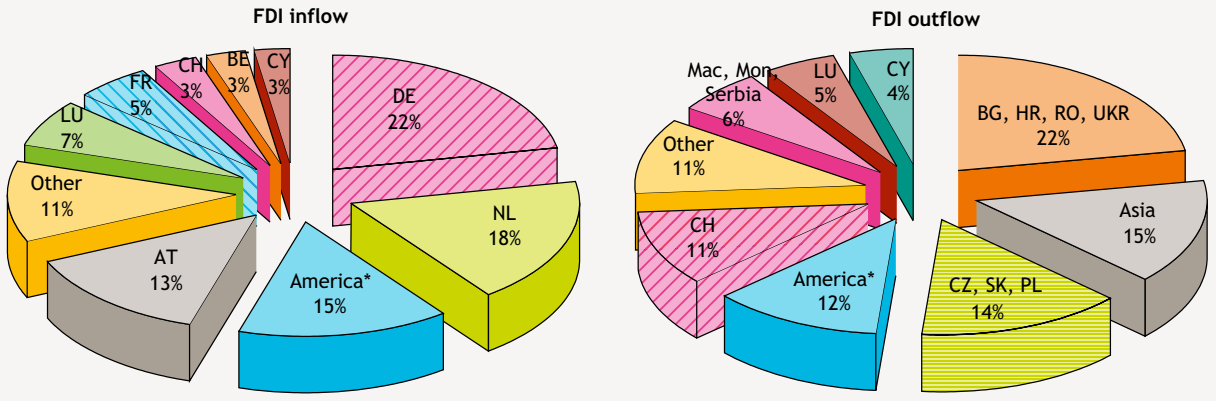
Are the data excluding SPEs also distorted?

Several factors indicate that although the exclusion of SPEs considerably reduces distortion of data, adjusted data may continue to overestimate actual FDI inflows related to the real economy. This is indicated by the fact that even FDI stock excluding SPEs exceeds the data of several countries where the role of SPEs may be significant.

First, the operation of cash-pools performing financial settlements of groups of companies that operate in several countries and also deal with production significantly distorts the data. The cash-pool is a cash management technique, the objective of which is the combined management of liquid assets of a group of companies (for example, in order to attain more favourable bank conditions). At the same time, a cash-pool may also serve for financing of the activities of the companies, as lending is possible from this source within the group of companies (group financing). In 2009 Q1, for example, the domestic affiliate of a foreign-owned company engaged mainly in production had a cash-pool liability in excess of EUR 3 billion, although it simultaneously extended a loan of a similar magnitude abroad. Accordingly, this transaction added considerably to the gross amount of the receivables and payables of the corporate sector without having any effect on domestic economic developments.

Secondly, examining the FDI stock of the corporate sector excluding SPEs, one finds that a significant portion of these investments originates from (and goes to) countries where SPEs typically operate. Of course, most of FDI flows originate from Western European countries (e.g. Germany, the Netherlands and Austria) intending to invest in Hungary or go to countries in the region (e.g. Visegrád countries, Bulgaria, Romania, Croatia, member states of former Yugoslavia). Nevertheless, even in the case of the corporate sector excluding SPEs, approximately one third of FDI outflows are aimed at countries that are presumably not targets of Hungarian companies' expansion abroad (e.g. United States, Switzerland, Luxemburg, Cyprus). This indicates that data excluding SPEs also contain capital flows that are independent of fundamental economic changes (Chart 7).[10] However, as mentioned above, the statistics only mention the primary foreign owners and affiliates. Only knowing the highest-level company would allow an establishment of where money flows actually started and whom they financed.

Chart 7
FDI flows of domestic companies excluding SPEs in 2009



** 30-40 per cent North America, 60-70 per cent Central America.*
Source: MNB.

[9] For example, the Deutsche Telekom and the Bayerische Landesbank also continue their regional expansions through their respective affiliates located in Hungary.

[10] At the international level, within the framework of examining the effects of globalisation, this phenomenon is being treated as a separate research subject by the OECD working group that elaborates the methodology of foreign direct investments. In connection with this work, the MNB Statistics Department plans to examine the weight of the economic activity of multinational companies operating in Hungary by separating their data within the FDI statistics.

Table 1
FDI inflows of selected countries
(transactions as a proportion of GDP)

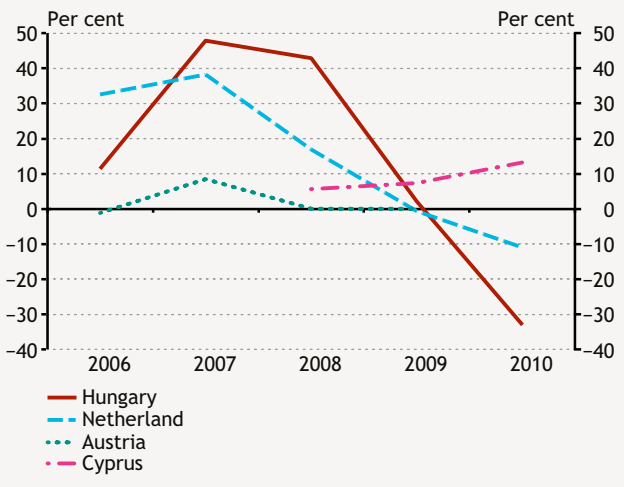
		2006	2007	2008	2009	2010
Excluding SPEs	Netherland	2.1	15.3	0.4	4.3	–2.1
	Cyprus	10.0	10.2	10.4	17.0	7.8
	Austria	2.5	8.4	1.7	2.3	
	Hungary	6.1	2.8	3.9	1.2	1.4
Including SPEs	Netherland	34.6	53.6	17.3	3.7	–13.1
	Cyprus			16.0	24.3	21.0
	Austria	1.3	16.8	1.6	2.3	
	Hungary	17.5	50.6	46.8	3.3	–31.7

Sources: Websites of central banks of selected countries.

In Hungary, the FDI flows of the corporate sector including special purpose entities are considered high in terms of an international comparison. Although it is known about several countries that their statistics are considerably distorted by capital movements related to SPEs, as a result of our lengthy investigation, Hungarian data can be compared against the officially released breakdowns of the Netherlands, Austria and Cyprus. Accordingly, while the data on GDP-proportionate capital inflows to Hungary excluding SPEs are not much different from those experienced in other countries, the FDI inflow including SPEs was very high prior to the crisis, and the magnitude of the fall in the years following the crisis was also greater (Table 1).

Prior to the crisis, FDI inflows related to special purpose entities were close to 50 per cent of GDP in Hungary, significantly exceeding the value seen in countries that gave a breakdown regarding SPEs (Chart 8). FDI inflows to SPEs amounted to around 10 per cent of GDP in Austria and Cyprus. While this size of inflow continued following the crisis as well in Cyprus, the data indicate outflows of funds in the case of Hungary and the Netherlands. This may mean that an affiliate – in connection with the fall in demand for loans as a result of the crisis – repaid a loan received earlier, but in the case of Hungary the tax changes that took place in the meantime may also have played a role in the outflow of funds.

Chart 8
FDI inflows of SPEs
(transactions as a proportion of GDP)



Sources: National central banks.

SUMMARY

The external debt and liability indicators that are important in terms of the external vulnerability of the Hungarian economy are significantly distorted if data on the so-called special purpose entities (SPEs) are taken into account. Although the MNB publishes the balance of payments statistics with the exclusion of SPEs as well, and this version is also considered economically sensible, in the past international organisations typically took into account the statistics including SPEs. As the presence of SPEs is not typical in countries that constitute a relevant basis for comparison for Hungary (newly joined Central and Eastern European Member States), indicators that also take SPEs into account depict a less favourable picture of Hungary in terms of its external vulnerability.

SPEs are companies that do not engage in any real economy activity, but typically perform a financial intermediary function: they forward funds originating from abroad to foreign companies, while (taking advantage of the Hungarian tax regulations) they attain considerable tax savings for a group of companies. The external liabilities (and assets) of SPEs, which belong to the sector of non-financial corporations, amount to more than 100 per cent of GDP; considering these, the external liabilities of Hungary exceed 300 per cent. In an international comparison that

usually includes SPEs, changes in loan disbursements to Hungarian companies are exaggerated by the presence of SPEs: namely, prior to the crisis they received significant amounts of intercompany loans, whereas following the crisis their external loans fell. In addition, the presence of the SPEs on the financing side of balance of payments distorts the FDI data considerably. At the same time, the SPEs have not borrowed from domestic banks (i.e. their eventual liquidation does not pose any financing risk).

Recently, however, there have been several events that may reduce the risks related to SPEs. First, as a result of efforts by the MNB, starting in 2011 numerous organisations (ECB, Eurostat, OECD) consider data excluding SPEs to be standard. Secondly, several measures that reduce the tax advantage attainable by SPEs have been taken recently, which are also reflected in the declining domestic activity of the SPEs. Regarding external vulnerabilities, the declining presence of SPEs in Hungary entails obvious advantages. As the external liabilities of Hungary fall, the risk assessment of the country may improve.

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Judit Páles and Dániel Homolya: Developments in the costs of external funds of the Hungarian banking sector[1]

The high dependency of the domestic banking sector on foreign funds and its open on-balance-sheet foreign exchange position, as well as the considerable increase in sovereign and parent bank credit risk premia due to the sovereign debt crisis, warrant a more accurate mapping of the pricing principles and costs of foreign (primarily parent bank) funds. For this reason, in the summer of 2011 we conducted a survey of the pricing practices of banks at the individual bank level and the evolution of the costs of foreign funds in recent years. Both personal interviews and historical data confirmed that since 2010 the country risks of subsidiaries have been increasingly included in the premia above the interbank reference rates, mainly on maturities of over one year. Accordingly, the price of funds obtained from abroad changed significantly, as the importance of risk-based pricing increased during the crisis. The historical data also suggest that this took place gradually at the system level. Following the onset of the subprime mortgage market crisis in 2007, premia averaged at the system level gradually approximated the credit default risk spreads of the parent banks. From the October 2008 crisis until the autumn of 2009, at the system level parent banks effectively passed their own premia on to domestic subsidiaries. From 2010 on, with the deepening of the European sovereign debt problems, sovereign CDS-based pricing corresponding to the country risk of subsidiaries (i.e. corresponding to the Hungarian sovereign risk in the case of domestic subsidiaries) became increasingly prevalent. At the system level, premia on longer-term currency swaps used for covering the on-balance-sheet open foreign exchange position were typically lower than the premia on foreign funds: the inclusion of counterparty and liquidity risks in prices started only later, and on average up to the level of parent bank CDS spreads at most. All of this has driven domestic banks in the direction of short-term financing and swap-based foreign exchange financing.

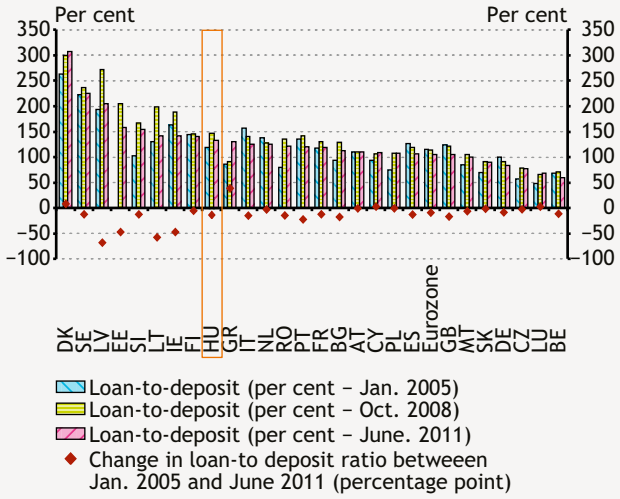
MOTIVATION: THE SIGNIFICANCE OF FOREIGN FUNDS IN THE HUNGARIAN BANKING SECTOR

Reliance on foreign funds is high in the Hungarian banking sector, which is also well illustrated by the loan-to-deposit ratio. The liquidity position of banks can be measured with the loan-to-deposit ratio, because due to the relatively low level of customer funds, the raising of (partly foreign) money and capital market funds becomes necessary. While in early 2005 the approximately 120 per cent loan-to-deposit ratio of the Hungarian banking sector was around the average level of the euro area, the level of approximately 180 per cent in October 2008 significantly exceeded the 115 per cent loan-to-deposit ratio of the euro area's banking sector. Since the autumn of 2008, a considerable adjustment has taken place in the domestic banking sector (14 percentage point change in the loan-to-deposit ratio), but based on comparative data released by the European Central Bank, the 132 per cent loan-to-deposit ratio of the Hungarian banking sector at end-June 2011 was still high from an international comparison (Chart 1). The loan-to-deposit ratios measured in the banking sectors of some developed West European and Baltic countries (Denmark, Sweden, Ireland, Finland, Latvia, Estonia and Lithuania) and in Slovenia exceed that of the Hungarian banking sector.

Based on the loan-to-deposit ratio, foreign funds play a prominent role in the Hungarian banking sector. Among credit institutions operating in the form of a joint stock company, the share of foreign funds within external funds exceeds 30 per cent. During the ongoing financial and economic crisis, the parent banks of the domestic banking sector have provided evidence of their significant commitment: from the 50 per cent level in September 2008, the share of parent bank funds increased to 60 per

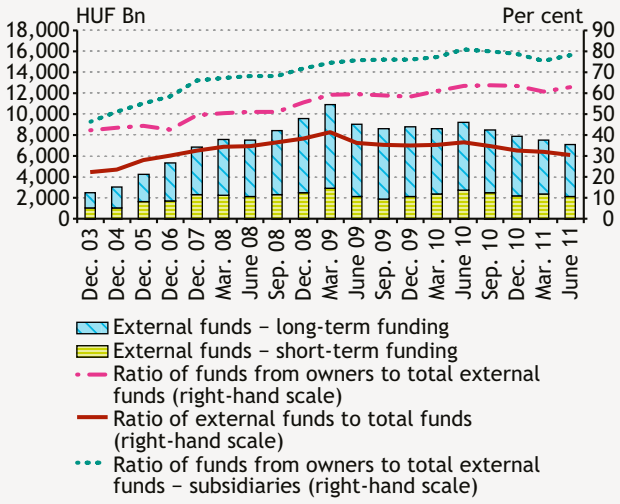
[1] We would like to thank the bank experts who participated in our survey and participants in the discussion within the MNB for their valuable advice.

Chart 1
Comparison of loan-to-deposit ratios of the banking sectors of the European Union



Source: ECB.

Chart 2
Foreign funds of the Hungarian banking sector



Note: Distinction between short-term and long-term funding is based on original maturity.
Source: MNB.

cent by March 2009. It has fluctuated around this level for the past two years, while the share within external funds reached a level of 30–40 per cent (Chart 2). In the case of subsidiaries in foreign strategic ownership, the share of parent bank funds is even higher: from the 68 per cent level in September 2008, it increased to 75 per cent by March 2009 and has fluctuated between 75 and 80 per cent since then.

Taking into account the above statistics, it is clear that the cost of foreign funds plays an important role in the determination of the costs of bank funds. Our primary objective is a system-level analysis of the costs of (foreign) funds and premia within the group and of market costs of funds and premia observed in the past, as well as an analysis of related fundamental principles. Due to the significant off-balance sheet hedging of the foreign exchange position of the banking sector, it is important to complement the above with a comparison with the prices of synthetic sources of foreign exchange funds (forint funds + foreign exchange swap).

Regarding our analysis, it is important to emphasise that previously we obtained qualitative information on pricing practices during the so-called Market Intelligence visits led by the Financial Stability organisational unit of the central bank. However, from these we could only conclude that the role of risk-based fund pricing strengthened during the crisis; we were only able to estimate the magnitude of the prices of funds from parent banks. Previously, therefore, we basically approximated changes in the premia on the obtained foreign funds above the interbank rates of corresponding maturities by averaging the parent bank credit default swap (CDS) spreads.[2] However, according to the Market Intelligence surveys of the MNB, anecdotal information and the current survey, the financing costs of domestic banks were determined to an increasing extent and scope by the Hungarian sovereign CDS spread, which reflects country risk.

Considering the above, a more exact examination of the changes in the costs of foreign funds is of importance for several reasons. First, the level of the domestic country risk premium and the extent of its fluctuations have differed greatly in recent years from those of the CDS spreads of the parent banks of domestic subsidiaries. Accordingly, the estimated level of and changes in the premia on foreign funds experienced in the past are also significantly different if they are approximated with the parent bank or Hungarian sovereign risk premia. The risks affecting the European banking sectors and states are interconnected through sovereign exposures, thus in the near future the pricing role of sovereign CDS spreads corresponding to the countries of subsidiaries (the Hungarian sovereign CDS spread in the case of domestic subsidiaries) may continue to strengthen. At the same time, the difference between the Hungarian sovereign and foreign parent bank credit default swap spreads may remain steady or continue to increase in the near future as well, mainly in the case of parent banks whose home countries are less affected by the sovereign debt crisis than Hungary. Secondly, during the crisis, as a result of

[2] See MNB (2008).

the considerable deterioration in market liquidity, the reliability of secondary market data and the relevance of market quotations declined. Therefore, only limited conclusions could be drawn from these as regards changes in the costs of foreign funds.

Based on our survey conducted among banks, this article first presents the pricing characteristics of the costs of foreign funds, touching upon some basic features of transfer pricing, which is followed by an analysis of the historical data gathered during our survey.

PRICING PRINCIPLES AND BANKING PRACTICE

Our survey was conducted in the summer of 2011. Using personal interviews and questionnaires, with regard to each bank we assessed basic principles for the pricing of foreign funds (primarily that of parent bank funds and funds within the group) and the changes in the costs of funds experienced in recent years. The sample of the survey included the largest credit institutions and branches of foreign banks that play an active role in obtaining foreign funds (altogether eight credit institutions operating in the form of a joint stock company and three branches of foreign banks). The practices of individual banks reflect a wide variety of methodologies, but many common features were found during our survey.

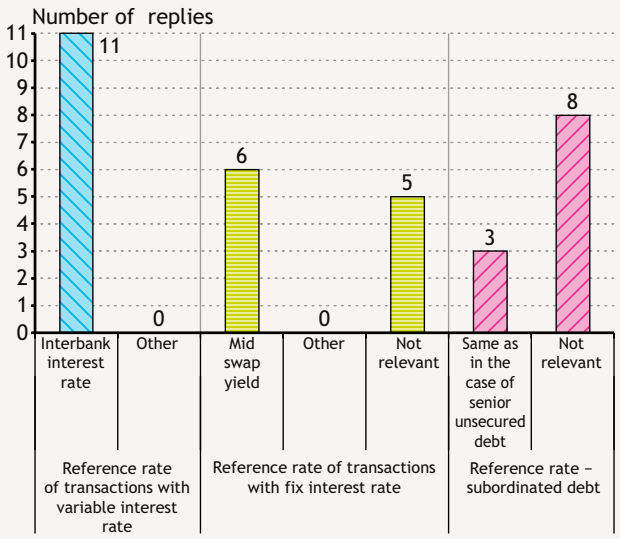
According to general bank practices, the Assets Liabilities Management (so-called ALM) organisational units and the related managerial committees (Assets Liabilities Committee, or ALCO) of banks determine the amount of funds that they will obtain, given current market prices, or at what price they are willing to raise a given amount of funds and at what transfer price they will be passed on to the business areas. In the case of resource allocation within a banking group, basic pricing principles are essentially determined by the parent bank. As is the case with obtaining funds from the market, often only the final price or the general conceptual framework (i.e. not the underlying exact algorithm) is available for the domestic subsidiaries and branches. Within conceptual frameworks, prices are composed of several main components [see, for example, Juhász (2011)]:

- interest rate risk:[3] risk stemming from changes in interest rate levels,
- country risk: risk related to activity in a given country,
- term liquidity risk,
- other risks: costs related to hedging, ALM cost, other bank-specific costs.

Management of *interest rate* risk is made possible by the bank practice according to which the repricing structures of the items on the asset and liability sides of banks are harmonised.[4] One of the related possibilities is that banks obtain foreign funds with interest rate conditions corresponding to the repricing periods and structures of corporate and household loans. Accordingly, foreign funds have short repricing periods. Their interest payments contain a variable interest component and a premium fixed for the whole term, resulting in a basic price (reference rate) and a premium component.[5] Based on our interviews, banks apply interbank reference rates (of the appropriate currency) with 1-, 3- and 6-month, as well as (to a lesser extent) 1-year, maturities (e.g. the 3-month EURIBOR, in the case of a 3-month repricing euro loan). In the case of longer repricing, fixed-yield transactions (the so-called mid-swap yield) are applied as the reference yield. The mid-swap yield corresponds to the mean of the yields of buy- and sell-side swap offers applied in interest rate swap transactions; basically, it expresses the amount of the annual yield, fixed in advance (for the whole term), to be paid by the participating partner for a variable interbank rate (e.g. 3-month EURIBOR) received during a given term. However, it is worth underlining that fixed-yield fund-raising with a maturity of over one year is not relevant for approximately half of the domestic institutions surveyed, but (in terms of their number) a significant portion of funds with a maturity of up to one year is considered as fixed-rate, as they mostly contain only one interest period. In the case of the latter, usually the unsecured interbank rates (LIBOR) are considered as reference yields (Chart 3). According to our survey, the indicator serving as the reference rate is not influenced by the type of the transaction. Thus, for example, at institutions where it is relevant, the reference yield of subordinated debt is the same as that of senior unsecured debt (Chart 3). A difference appears here in the levels of the spreads applied. In a breakdown by types of counterparties, the greatest difference may be that the parent banks of domestic subsidiaries are occasionally more flexible from the perspective of choosing the term of the reference yield (e.g. 3-month EURIBOR, in the case of a 6-month repricing).

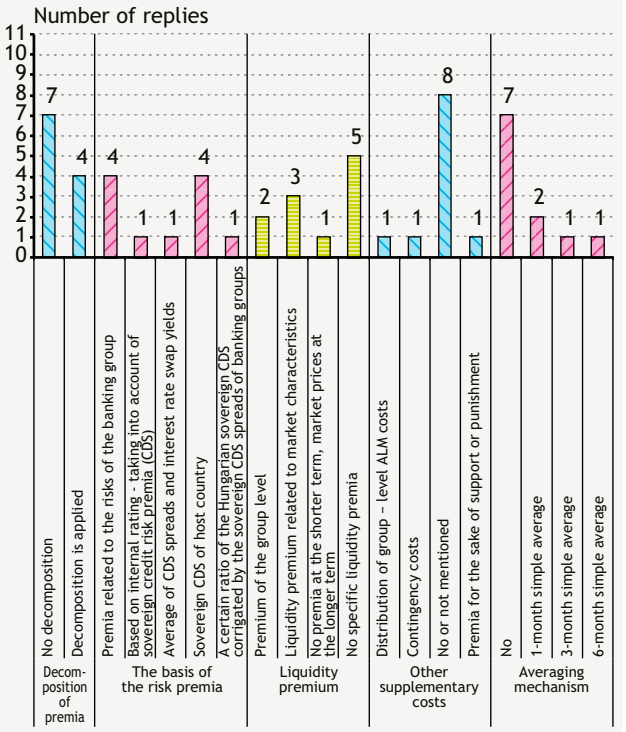
[3] A good overview of risk types is provided by Jorion (1999) or Crouhy et al. (2006).
[4] Interest rate risk hedging is possible with off-balance-sheet items (and with interest rate swaps within that). This article does not include a description of their application.
[5] The issue price is usually 100 per cent.

Chart 3
Reference yields of foreign funds according to replies of banks



Source: MNB survey of 11 banks. Eleven institutions were surveyed.

Chart 4
Premia on foreign funds according to replies of banks



Source: MNB survey of banks. Eleven institutions were surveyed.

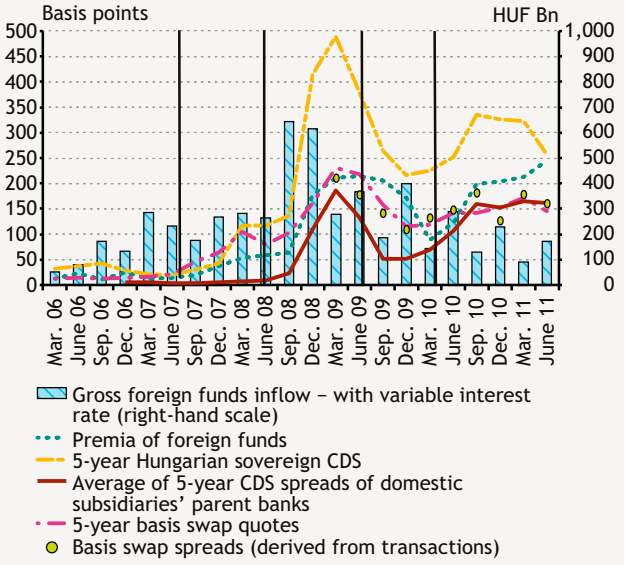
The risk and liquidity premia applied paint a very colourful picture; however, at the system level the inclusion of country risk plays an important role in pricing. First, in the majority (7 out of 11) of institutions surveyed, the premium is not decomposed into the aforementioned risk, liquidity and other premia (based on market share, this comprises 41 per cent of the banking sector). In those cases where there is no decomposition, the premia are typically depicted as 'risk premia' or as liquidity risk in those cases when no differentiation within the group is applied upon pricing. Our survey reveals that, for the majority of banks operating in Hungary, the risk premium used vis-à-vis the Hungarian credit institutions presently reflects the Hungarian country risk (7 banks, which is a vast majority in terms of market share). The sovereign risks of the host country, in turn, are usually approximated with the CDS spreads of appropriate maturity. There is an example where the determination of premia related to the Hungarian country risk (to the subsidiary) is built on the internal ratings of the members in the banking group and not on market information; in one case, domestic sovereign spreads are adjusted for sovereign CDS spreads of the banking group (using weighting that changes over time). In the surveyed sample, it is the practice of 36 per cent of institutions to not apply differentiation according to country risk during the allocation of funds within the banking group (this ratio is lower as a proportion of the balance sheet total). Considering the current high level of the credit default swap spread of the Hungarian state, this practice creates a more favourable opportunity for raising funds (Chart 4). However, the precise methods of determining risk premiums were often revised during the crisis; therefore, the survey results presented here expressly reflect the current situation. Based on bank reports, prior to the current crisis, which started in 2007-2008, strict and well-defined pricing principles within banking groups did not exist. However, as a result of the current crisis, the relevant internal rules have become stricter, and risk-based pricing mechanisms have been advanced.

In order to smooth fluctuations in the indicators used as a basis for risk premia, several banks apply averaging mechanisms to determine the premia priced in funds. In order to support smooth operations among business lines (i.e. corporate and household lending), four institutions apply averaging mechanisms. These review periods of one to six months, due to the significant fluctuations in risk premia experienced during the crisis. Without averaging mechanisms, in the case of radically fluctuating market indicators, credit prices may have to be changed often and significantly. Although the majority of credit institutions receive a daily price from the parent bank (Chart 4), due to the typical monthly frequency of determining transfer prices, smoother shifting is implemented in the banks' own business fields. Only three of the institutions surveyed mentioned the application of other premia in addition to the risk and liquidity premia. These other premia are the group-level ALM costs (e.g. so-called margin call requirements), so-called contingency costs to be applied in

'emergencies', mainly in the case of special loan products, or as a support or penalty in relation to some kind of central business objective.

One interesting question from the perspective of the pass-through of the liquidity and risk premium shocks affecting the domestic banking sector is how the costs of foreign funds are transferred to business lines. The organisational unit of the banking group or affiliate bank responsible for obtaining funds determines an settlement price (transfer price) vis-à-vis the business lines (e. g. corporate and household lending). The aim of the settlement price ('transfer pricing') is to express actual costs and, partly, business policy incentives for business branches. At the same time, the choice of method may have a significant effect on the business activity as well (e.g. it may result in considerable differences where profit/loss arises: in the treasury/ALM field or at the business branches). In the case of newly granted loans, the surveyed banks typically charge the market-based (partially marginal) costs of funds prevailing in the given period to business fields. However, the ALM centres of domestic banks fix the liquidity premia already priced in the loans until the end of the term, and they were/are changed only in the case of unexpected events. The charging of costs is attenuated by the fact that several institutions (8 institutions) determine the prices for business areas on a monthly basis; two institutions determine the prices daily; and one institution does so every 3 months. Although the longer price setting may delay the price adjustment required by the business and market environment, if the price setting is performed too often, it may significantly impair negotiating ability in the pricing of individual, higher-volume deals.

Chart 5
Changes in costs of foreign funds with a variable-rate
(with a maturity of over a year) (quarterly averages)



Note: The premia priced in foreign funds show the average premia weighted with the new foreign funds inflow in the given quarters. During the analysis, the 5-year CDS spreads are used for representing domestic sovereign risk, because this maturity can be considered the most liquid segment in the CDS market.
Source: MNB, Bloomberg.

WHAT DO HISTORICAL DATA REFLECT?

Within the framework of our survey, we asked for transaction-level data on the main parameters of newly obtained foreign funds for the period between 2006 and the summer of 2011: their premia, the amount of funds raised, their maturities, currency, length of repricing period and type of interest payment, as well as type of the financing partner and instrument. This transaction-level information allows an examination of premia according to various criteria. We calculated the banking sector level premia in a breakdown by instruments for a scope of loans, deposits and bonds. The premia presented here do not contain price data of mortgage bonds and subordinated debt type fund raisings, as mortgage bonds – given their covered nature – typically have lower premia, whereas subordinated debt elements have higher premia in line with their risk ratings. With this simplification, in the period under review, weighted either by amount or number of pieces, approximately 80–95 per cent of gross new issues were included. The majority of banks gave information regarding transactions longer than a month; emphasis is placed on the analysis of liabilities with a maturity over a year.

Based on these data, a significant portion of foreign liabilities with an original maturity of over one year are variable-rate transactions with short (3-6-month) repricing; transactions with a maturity of up to one year are mostly fixed rate ones (because typically they cover one interest rate period). Among variable-rate foreign liabilities, weighted with the amount of the gross fund inflow, the proportion of loans, deposits and bonds repriced every 3 months is approximately 65 per cent. The proportion of instruments repriced every 6 months is 30 per cent. The remaining 5 per cent is basically repriced annually. (Weighted by number of pieces, 3-month repricing accounts for 50 per cent, 6-month repricing accounts for 35 per cent, and 10 per cent is repriced on a monthly basis.)[6] Repricing every three months is reasonable because it allows for hedging of the interest rate risk appearing on the asset side of the domestic banking sector and related to loans of

[6] Within the period under review, before and after the crisis there was no significant shift in the distribution of the repricing period at the system level.

similar repricing (i.e. it allows narrowing of the repricing gap). The premia presented here should be interpreted as the average of premia above the interbank rates with maturities and in currencies corresponding to the repricing periods (e.g. the 3-month, 6-month EURIBOR in the case of instruments denominated in euro) weighted at the banking sector level. They approximately express to what extent the banking sector level costs of foreign funds exceeded the three-month USD, CHF and EURIBOR yields on average. Premia weighted by the amount of new issues are given in a quarterly breakdown. Within variable-rate liabilities with a maturity of over one year, the average original maturity weighted by quantity of issues was 3.6 years in the period under review[7] (in the period as a whole, it was 3.5 years when funds were raised within the group and 4.3 years in when funds were obtained outside the group, in the market). For the sake of comparison with prices of currency swaps, basis swap spreads with a maturity of 5 years are used in addition to actual swap deals. Below is a description of changes in the costs of foreign funds using premia calculated with the aforementioned method. In this analysis, the 5-year CDS spread is used to represent the domestic sovereign risk, because this maturity can be considered the most liquid segment in the CDS market.

Prior to the unfolding of the crisis in October 2008, the domestic banking sector was able to obtain funds with a maturity of over one year at a price that was lower than both the Hungarian sovereign and parent bank spreads. Before the unfolding of the subprime crisis in 2007 H2, risk premia reached low levels globally; domestic banks obtained foreign funds practically at levels corresponding to those of foreign parent banks and Hungarian sovereign CDS spreads (Chart 5). In the period between the subprime crisis and the Lehman bankruptcy in September 2008, the CDS spreads of foreign parent banks and the Hungarian sovereign CDS spreads increased considerably compared to earlier levels; premia priced in the costs of foreign funds with a maturity of over one year followed only partially. First, this is attributable to the fact that, in this period, foreign parent banks with higher risk premia provided less funds for domestic subsidiaries. Secondly, parent banks did not start to immediately and completely shift the premia expected of them to their domestic subsidiaries and branches.

Following the Lehman bankruptcy, at the level of the domestic banking sector, until 2009 H1 the premium on raising foreign funds (within the group) was, on average, close to the risk premium level of parent banks. Following the crisis in September–October 2008, the Hungarian sovereign and parent bank CDS spreads also increased sharply, but the increase in the Hungarian sovereign credit default swap spread was considerably higher. However, premia on foreign funds almost completely mirrored the changes in the average of parent bank CDS spreads. On one hand, this means that (on average) parent banks shifted their own credit risk premia on to their subsidiaries more directly than in previous periods of providing funds for the latter. On the other hand, it also shows that during placements to affiliate banks, foreign parent banks did not yet apply Hungarian sovereign CDS spreads, which had surged to an extremely high level. This is partly a result of the fact that, during the allocation of funds within the group, the country risks of their subsidiaries and branches were not yet included in pricing, in line with clearly determined basic principles.

From 2009 H2 onwards, the premium on external funds increasingly exceeded the average of risk premia expected of parent banks; from early 2010 onwards, growing in parallel with the escalation of the sovereign debt crisis, it increasingly approached the level of the Hungarian sovereign CDS spread. From 2009 H2 onwards, the sovereign Credit default swaps played an increasing role in determining risk premia above reference yields. This was attributable to the fact that some foreign parent banks started to introduce clearly CDS-based pricing in this period – mainly on maturities of over one year in fund allocations within the group. The temporary decline in costs of foreign funds in 2010 Q1 is basically attributable to the fund-raising of one bank at a more favourable price. The shift from parent bank credit default swaps in the direction of sovereign credit default swaps of the countries of subsidiaries took place starting from 2010 H2 (i.e. in parallel with the strengthening of the debt crisis, which was affecting the peripheral euro area member states, and the increase in country risk premia). The inclusion of country risks came to play an increasing role in parent bank pricing as well. In 2011 Q2, the costs of foreign funds roughly corresponded to the level of the Hungarian sovereign CDS spread. This was also attributable to the fact that in 2011 H1 primarily, those banks raised (non-subordinated) foreign funds whose parent banks clearly stopped considering sovereign CDS spreads (corresponding to the countries of subsidiaries) in their intragroup pricing principles.

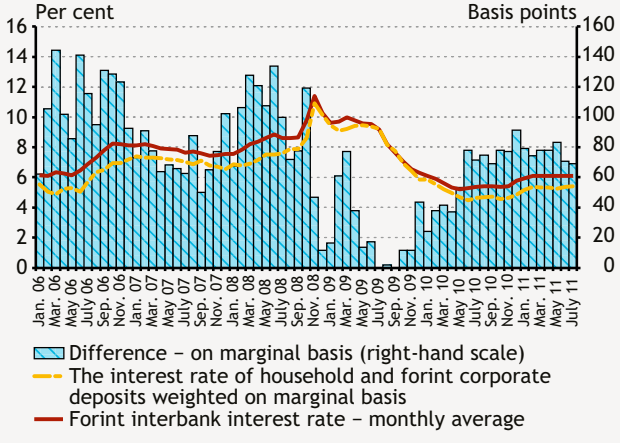
For a significant part of the period under review, external direct foreign exchange funds with a maturity of over a year proved to be more expensive than currency swaps. Until October 2008, the premia on obtaining foreign exchange liquidity through currency swaps with a maturity of over one year (above short interbank

[7] The value shown here does not include the 30-year maturity issue of one of the banks that participated in the survey.

yields with a maturity corresponding to the repricing period) practically reached a level around zero; resulting from their covered nature, the market did not price either the parent bank or the sovereign risk spreads in the transactions (Chart 5). From October 2008 onwards, the spreads of longer-term swaps increased considerably (by some 200 basis points until the spring of 2009), simultaneous with the intensification of FX swap market tensions (Chart 5). The costs of foreign funds increased to a lesser extent, although following the unfolding of the subprime crisis in 2007, as access to direct (mainly market) foreign exchange funds became limited, they had earlier already reached higher levels. Therefore, at the system level their cost exceeded the prices of synthetic production of foreign exchange sources during the swap market turmoil in the autumn of 2008 (and 2009 as well). This is partly attributable to the fact that, compared to direct lending, a currency swap transaction can be considered as a covered instrument. Between March 2009 and end-2009, in parallel with the consolidation of the swap market and the decline in swap market exposure, the gap between foreign funds' premia and currency swap spreads started to widen, because the costs of foreign funds declined more slowly. In that period, the currency swap spreads calculated from the transactions practically mirrored the foreign parent bank CDS spreads, demonstrating that foreign swap market participants were passing on their own costs of funds. Although the gap subsequently narrowed, from June 2010 onwards, in parallel with the acceleration in foreign fund outflows, at the system level the premia on foreign parent bank funds again diverged from the swap spreads with a maturity of over one year: through premia embedded in swap transactions, parent banks shifted only their own costs of funds (at most) to domestic banks; the country risk of domestic subsidiaries or branches did not appear yet. In addition, one must also take into account that the total cost of obtaining forint funds necessary for the synthetic foreign exchange fund is lower in aggregate than the level of forint interbank rates (in most cases, at the individual bank level as well), as a portion of the necessary forint liquidity is provided by corporate and household deposits. The interests on newly obtained deposits reached a lower level than interbank rates, even during the crisis. Calculating on a marginal basis (i.e. weighted by the amount of newly concluded contracts), in the whole period under review they reached a level that was approximately 70 basis points lower, although its magnitude also fluctuated significantly during the crisis period and among banks (Chart 6). On an average cost basis, taking into account the considerable total amount of sight deposits, the difference was even greater.

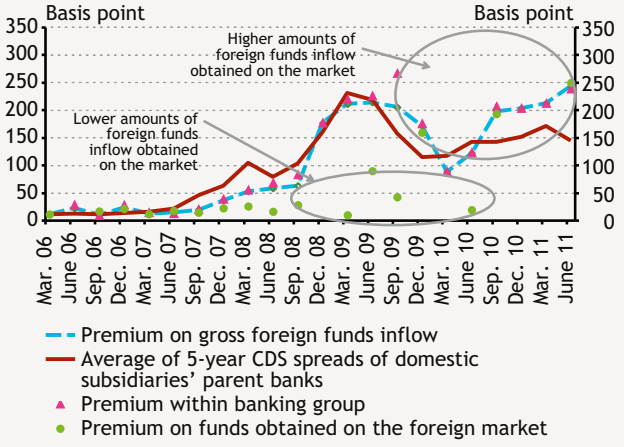
Overall, the premia on obtaining funds from parent banks were more favourable for the domestic banking sector than those on funds from the market, mainly due to the more advantageous pricing of short-term funds. In transactions within and outside groups, no significant difference in premia was experienced in the costs of variable-interest rate foreign funds with a maturity of over one year in the case of issues of higher amounts (Chart 7). Nevertheless, it cannot be stated that the premia on obtaining funds outside and within the group were identical at the system level. First, it was typical of several credit

Chart 6
Comparison of forint deposit interest rates weighted with contracts and forint interbank rates
(monthly averages)



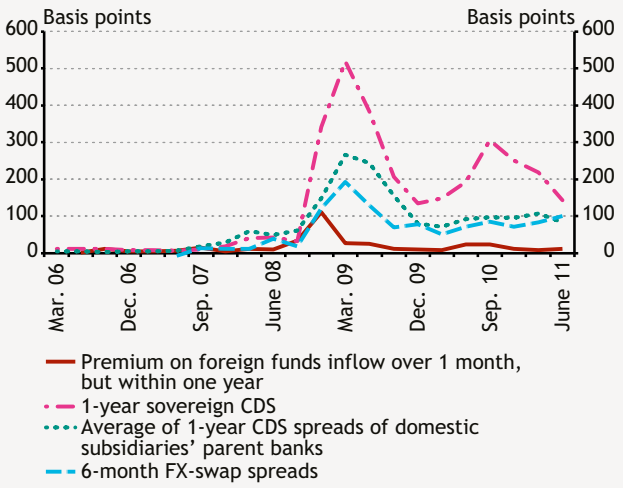
Source: MNB.

Chart 7
Changes in costs of variable-rate foreign funds inflow (with a maturity of over a year)
(quarterly averages)



Source: MNB.

Chart 8
Costs of foreign funds inflow over 1 month, but within one year
(quarterly averages)



Source: MNB.

institutions that they obtained foreign funds with shorter maturities, which were priced practically in line with the levels of international interbank rates (e.g. around the EURIBOR). Secondly, not once were they unable to obtain funds from the market. At the system level, in the shorter term, parent bank CDS spreads were not included in the costs of foreign funds at all or only to a much lesser extent, whereas the application of the Hungarian sovereign CDS spread was not typical. One of the underlying reasons is that at shorter maturities, the banks who obtained foreign funds were primarily the ones that did not apply differentiation in pricing during the allocation of funds within the group. In parallel with this, the spreads of swap transactions around 3–6 months did not deviate significantly from the average of the parent bank credit default swaps. This is partly attributable to the fact that other credit institutions had access to greater amounts of foreign exchange funds at more advantageous prices at the shorter maturities, not the ones that obtained foreign exchange liquidity through swaps (Chart 8).

SUMMARY

The findings of our survey on the pricing of foreign funds confirm that the significance of risk-based pricing increased during the crisis. Prior to the current crisis, which started in 2007-2008, strict and well-defined pricing principles within banking groups did not exist. As a result of the current crisis, however, the relevant internal rules have become stricter and risk-based pricing mechanisms have been advanced. Based on the findings of our survey, starting from 2009 H2 an increasing number of parent banks switched over to an application of Hungarian sovereign CDS-based pricing during the allocation of funds within the group. Considering the current high level of the Hungarian sovereign CDS spread, this creates a less favourable opportunity to obtain funds, compared to the practice where no differentiation according to countries is applied in pricing during the allocation of funds. The methods used for pricing were revised at certain intervals during the crisis; our survey primarily focused on the current state.

Historical data also suggest that risk-based pricing took place gradually at the system level in the case of liabilities with a maturity of over one year. From the summer of 2007 onwards, following the onset of the subprime mortgage market crisis, premia averaged at the system level gradually approached the level of foreign parent bank CDS spreads. Then, from the October 2008 crisis until the autumn of 2009, parent banks practically shifted their own premia on to their domestic subsidiaries. Starting from 2010, in parallel with the intensification of the debt problems of the European government, sovereign CDS-based pricing (corresponding to the country of the affiliate bank) increasingly came to the fore. Funds with a maturity of up to one year did not follow this trend at the system level, which is partly attributable to the fact that mainly credit institutions whose parent banks do not apply differentiation among countries were able to obtain foreign exchange funds with maturities of up to one year. The premia on longer-term currency swaps used for covering the on-balance-sheet open foreign exchange position were typically below the premia on foreign funds; the inclusion of counterparty and liquidity risks in prices started only later, and on average up to the level of parent bank CDS spreads at most. However, at shorter maturities at the system level, premia on foreign funds fell behind, compared to the FX-swap transactions of similar maturities.

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Appendix

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