MNB Bulletin

DECEMBER 2008
The aim of the Magyar Nemzeti Bank with this publication is to inform professionals and the wider public in an easy-to-understand 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.

The articles and studies appearing in this bulletin are published following the approval by the editorial board, the members of which are Gábor P. Kiss, Róbert Szegedi, Daniella Tóth and Lóránt Varga.

The views expressed are those of the authors and do not necessarily reflect the official view of the Magyar Nemzeti Bank.

Authors of the articles in this publication: Éva Fischer, Péter Koroknai, Rita Odorán, Zoltán Reppa, Balázs Sisak, Adrien Szűcs

This publication was approved by Ágnes Csermely, Péter Tabák, András Kármán.

Published by: the Magyar Nemzeti Bank
Publisher in charge: Judit Iglódi-Csató
H-1850 Budapest, 8-9 Szabadság tér
www.mnb.hu
ISSN 1788-1528 (online)
Contents

Summary 5

Éva Fischer: Challenges of financial integration in the Central and East European region 6

Péter Koroknai: Hungary’s external liabilities in international comparison 13

Rita Odorán and Balázs Sisak: Cash demand of the Hungarian economy – is the shadow economy still running smoothly? 19

Zoltán Reppa: Interest rate expectations and macroeconomic shocks affecting the yield curve 26

Adrien Szücs: The 200 forint denomination will be a coin 33

Appendix 41
Summary

DEAR READER,

The Magyar Nemzeti Bank attributes great importance to making central bank analyses on current economic and financial developments of general interest available to the wider public. This publication is the third issue of the third volume of the MNB Bulletin, containing five articles. Hungary’s external liabilities, the risks arising from financial integration, the central bank analysis of the yield curve and yield changes, the economy’s high cash demand and the introduction of the 200 forint coin will be the issues regarding the Hungarian economy and the central bank’s current work discussed in the articles.

Éva Fischer’s article notes that the risk of contagion in both directions may arise from the high level of financial integration characteristic of Central and Eastern European countries due to the high ratio of non-resident owners. On one hand, problems affecting the countries of parent banks may contaminate those of subsidiaries, while on the other hand, problems arising in the CEE region may spread to the bank markets where parent banks are located. As a result, it is vital to have adequate capital and liquidity allocation within the bank group, in other words the continuous and secure operation of each member must be ensured. Furthermore, financial authorities must successfully tackle challenges with the help of national prudential and crisis management frameworks.

In his article, Péter Koroknai presents how Hungary’s foreign liabilities exceed that of equally developed countries. Over the past years, all new EU member states have experienced processes similar to the one taking place in Hungary, which is consistent with the theoretical relation stating that an increase in foreign liabilities is natural in converging countries. However, a substantial difference is that Hungary’s external liabilities had already exceeded that of neighbouring countries in the past. Large foreign liabilities leads to an outflow of revenue, which in itself contributes to maintaining the level of foreign liabilities. Therefore, it can only be reduced if the external balance continues to improve significantly and the economy grows at a faster rate.

In their article, Rita Odorán and Balázs Sisak examine the Hungarian economy’s cash demand, high even in international comparison. This demand has a negative impact because for one, it incurs extra costs compared to cashless payment methods, and furthermore, it may facilitate the activities of the hidden economy. While there are numerous examples of measures implemented in developed countries aimed at limiting the use of cash, Hungary has only seen failed attempts. The article also attempts to pinpoint the reasons which led to increased cash demand over the past two years, not stemming from economic fundamentals. One possible cause may have been the introduction of the interest tax in 2006 which altered the opportunity cost of holding cash. Moreover, higher tax burdens and stricter tax authority measures may have contributed to the hidden economy’s higher cash demand.

Zoltán Reppa’s article presents the instruments used by the MNB to create and interpret the yield curve and to analyse the reasons behind yield changes. The article first compares the yields of government securities, interbank and interest swap markets, and then assesses the reasons for their differences. Subsequently, it provides a summary of the dynamic model describing the interaction between the yield curve and the macroeconomy. The model enables the examination of macroeconomic shocks influencing the evolution of the yield curve. Among these, the impact of monetary policy shocks and monetary policy measures on long-term yields is especially important from a central bank perspective.

Adrien Szücs’s article summarises social and technical aspects taken into account by the central bank when making its decision on the introduction of the 200 forint coin. Transition from the banknote is supported by the fact that in case of small denomination banknotes, a substantial annual reproduction cost is incurred due to their fast wear and tear. In contrast, larger denomination coins are characterised by expenses primarily incurred from the one-off manufacturing of the initial stock. As this one-off investment is offset by continuous savings, the amount of net savings depends on the date at which the euro is introduced. A further factor in the decision was the convergence of the forint’s denominations with those of the euro, in other words, familiarising the general public with higher-denomination coins.

To conclude, we would like to call attention to the change which will take place as of next year: the MNB Bulletin will become a quarterly publication, so timely issues will hopefully be made available sooner to our readers. Simultaneously with the change, the Hungarian version will be published in electronic format only, similarly to the English version, in reflection of the MNB’s cost reduction and environmental governing principles. Finally, we would like to thank our readers who assisted us in making this decision by filling out our survey.

The Editorial Board
Due to a high ratio of foreign ownership, countries in the Central and East European (CEE) region are characterised by particularly high financial integration. Therefore, contagion risks are high in both directions: a problem that develops in the country of a parent bank can easily spread to the countries of its subsidiaries; and likewise, a problem that evolves in the CEE region can spill over to the banking sector of the parent bank. In view of the significance of contagion risks, adequate capital and liquidity allocation within banking groups is crucial; in other words, continuous and safe operations must be ensured at all times for each member of the group. As their prudential and crisis management frameworks are rooted in a fundamentally national context, financial authorities have to deal with several challenges.

INTRODUCTION

The high level of financial integration through banking groups in the CEE region has a number of advantages, but poses several risks as well. The presence of west European banks improves the efficiency of the region’s banking systems in several ways: it provides more opportunities to obtain funds and reduces their costs; non-resident financial investors establish their own high quality risk management and technology in their foreign establishments, and non-resident capital inflow boosts competition in local markets. Besides the great number of advantages, a strong presence of non-resident investors also implies a higher risk that problems originating in foreign interbank markets may spread to the region.

The aim of this article is to describe the interrelationships between banking markets of CEE and other countries arising from the ownership linkages, and to assess the degree and direction of the contagion risk stemming from these interrelationships. In relation to contagion channels, we examine both directions. One possible scenario is that a problem affecting a parent bank jeopardises its subsidiary; another where a subsidiary bank may pose a significant problem for the operation of its parent bank. These scenarios may form a threat to the stability of individual countries if the ‘infected’ bank has an important weight in the market of its country, and therefore its failure may trigger turmoil in the financial markets of that country and create a considerable financial burden for actors of the real economy.

Of the sources of contagion risk within a banking group, we assessed those stemming from ownership linkages. Nevertheless, group level contagion may not solely be transmitted via ownership relations. Group level interconnectedness may be the result of group level or centralised market and liquidity risk management and the ensuing exposure, the transfer of certain internal decision-making competences to the level of the parent bank, or simply the risk of reputation contagion within the banking group. This study does not undertake to assess these risks.

We can measure contagion risk on the basis of two factors: a) the likelihood of contagion among individual members of banking groups; and b) the significance of potentially infected members in their own markets. Our analysis used data of the leading 24 banking groups in the region.1 The probability of contagion within a banking group depends on the group structure, i.e. the size of individual members relative to the other banks within the group. In order to approximate the group level weight of subsidiaries, we examined the proportion of the relevant subsidiary’s balance sheet total relative to the consolidated balance sheet total of the banking group. In addition, we estimated the degree of turbulence a credit institution may generate in a specific country by means of its market share based on its balance sheet total. It should be noted that this implies a considerable degree of simplification. A credit institution may in fact have such an important role in a financial market or the operation of financial infrastructures that its failure may generate a significant shock in the banking sector of a specific country independently of the size of its balance sheet total.

We need to stress that this study does not set out to define a threshold value over which a member of a banking group could generate shocks within the banking group and in the financial market of its own country. For the purpose of our analysis, we assumed 5 and 10 per cent limits for the

---

1 (Based on balance sheet totals) the bank groups in our sample cover 72-98 per cent of the total market share of non-resident subsidiaries in specific CEE countries. In some cases statements for 2007 were not available, in which case we used data from the end of 2006.
significance of a group member, both in its own market and within the banking group. These hypothetical limit values are mere indications. We definitely do not intend to imply that a credit institution with a market share below 5 per cent as per its balance sheet total is unable to generate market turbulence. This is especially true in view of the simplification noted above; market share measured on the basis of balance sheet total does not give an indication of the role of the specific credit institution in financial markets and in the financial infrastructure. Moreover, even a group member with a share of less than 5 per cent relative to the consolidated balance sheet total of the group may generate group-level shocks.

FINANCIAL INTEGRATION IN THE BANKING MARKETS OF CEE COUNTRIES

The degree of financial integration in the banking markets of CEE countries is extremely high. At the end of 2007 the consolidated market share of credit institutions with a non-resident parent bank amounted to 57-96 per cent in individual CEE countries (Chart 1). Most of the credit institutions with cross-border activities in the region are from EU countries. The subsidiary company form of operation is predominant across all member countries. However, a new trend has emerged in recent years in CEE countries – the presence of a growing number of branch offices. They have typically smaller balance sheet totals and they serve key customers or a certain target segment (so-called ‘wholesale’ and ‘niche’ banks).

Similar reasons account for the magnitude of foreign presence – most of the non-resident banks operating in the region obtained a share of the market during the privatisation process at the end of the 1990s and the beginning of the 2000s. In most countries in the region, foreign capital inflow was allowed after the bank consolidation process, which prepared members of the banking sector for privatisation, and markets for the appearance of foreign banks. Bank consolidation rid credit institution portfolios of bad and doubtful debt and stabilised the financial and capital position of credit institutions. Recent years have not seen any additional, significant growth in market share, except for Romania.

The main driving force behind expansion to CEE countries was the high growth potential of the target countries’ banking markets and the high profit margins compared to the home markets. The high growth potential is based on real economic and financial convergence of CEE countries to the more advanced EU Member States. Banks entered a less flooded market where they could instantly enjoy a number of advantages to expand. Branch transformations in Hungary may be boosted by a recent legislation modification, which enables credit institutions with a registered seat in any EU Member State to merge their interests within the EU. At the same time, we do not expect large retail banks to turn into branches, as, in addition to a number of other advantages, relatively costly branch transformations are primarily motivated by capital optimisation aspects (e.g. large exposure limit).

**Chart 1**

Market share of foreign subsidiaries and branch offices in the banking sectors of CEE countries

**Chart 2**

Profitability of CEE banking markets and the home countries of parent banks (2007)

---

1 For the purposes of this paper, the term ‘market share’ refers to ratios calculated from balance sheet totals.
2 It should be noted that Chart 1 includes banks owned by a non-resident credit institution only; due to listed credit institutions and indirect foreign ownership, the actual foreign capital invested may in fact be considerably larger than indicated.
3 Branch transformations in Hungary may be boosted by a recent legislation modification, which enables credit institutions with a registered seat in any EU Member State to merge their interests within the EU. At the same time, we do not expect large retail banks to turn into branches, as, in addition to a number of other advantages, relatively costly branch transformations are primarily motivated by capital optimisation aspects (e.g. large exposure limit).
comparative advantages (e.g. higher quality services and product selection, better risk management tools). The outstanding profitability potential is illustrated by the fact that on average CEE banks achieved almost 23 per cent return on equity in 2007, which drastically surpasses the 15 per cent average ROE achievable in the home markets of parent companies (Chart 2).

In the recent years, financial integration through banking markets has started within the region as well. Certain CEE countries have some major domestic banks which are not owned by a foreign parent company. The most prominent examples include PKO Bank, the second largest bank in the Polish market, and OTP, the largest Hungarian bank. Both are credit institutions listed directly on the stock exchange, which means that there are no foreign bank investors behind them. These banks have started to extend their operations to other countries within the region. OTP has the most outstanding cross-border activity; its Bulgarian subsidiary (DSK) is the second largest bank in Bulgaria.

Parent banks play a key role in the liquidity management of their subsidiaries. The share of foreign borrowings within the liability structure of credit institutions in the CEE region is rather significant, amounting to 10-30 per cent of external liabilities (Chart 3). A large part of foreign loans are direct parent bank loans (in Hungary their ratio is 64 per cent). This is due to the fact that parent banks can obtain financing at better terms and conditions due to their size; therefore borrowing is often centralised in banking groups. In addition, owners may have a significant role in organising financing from money markets.

**ANALYSIS OF THE PARENT BANK – SUBSIDIARY CONTAGION CHANNEL**

Contagion within a banking group, i.e. the spillover of a problem to another member of the banking group and thus to the banking market of another country may be characterised by a two-way direction. Even though subsidiaries are legal entities separate from their parent company, due to their dependence on parent banks in terms of certain functions, it is not clear whether a subsidiary can pursue its activities independently in the event of the parent bank’s failure (without public intervention or a merger/acquisition). However, not only a parent bank’s failure could be transmitted to its subsidiaries, a larger subsidiary can also infect the parent company, via either direct exposures or through a crisis of confidence spreading to the entire banking group.

Looking at the contagion channel between the parent bank and the subsidiary bank, there are several parent banks in the region whose subsidiaries have a substantial weight in the financial system of a CEE country. Table 1 shows which parent banks have subsidiaries in a country within the region with a share of around 5-10 per cent (marked in blue) or over 10 per cent (marked in claret). On this basis, we can estimate the probability of whether a problem affecting a foreign parent bank spilling over to its subsidiary could generate turbulence in another country’s financial sector. Thus, for instance, a potential problem affecting the Austrian Erste Bank may spread to other banking markets through its Czech, Slovak or Romanian subsidiaries. The large number of coloured cells in Table 1 suggests that an idiosyncratic parent bank problem might affect several subsidiaries with a significant market share.

If we look at the cross-border activity of all the banks of a given country rather than individual banking groups, we find that the interconnectedness of the banking markets of different countries is even higher (Chart 4). Since a general problem is more likely to develop in banks located in the same country, it is important to test the strength of the connection between the banking systems of two countries in order to assess the probability of cross-border contagion. (To mention one example: the Romanian subsidiaries of Greek banks have a

---

5 In addition, there are a few major listed banks or banks owned by the central government in the Bulgarian and Romanian markets. Of the Bulgarian banks, number 6, 8 and 10 are listed on the stock exchange, while number 4 of the Romanian banks is listed and number 9 is state-owned.

6 External liabilities are liabilities without capital and reserves.

7 In this respect we exclude branches, as a branch office is the same legal entity as its founder.
market share of less than 10 per cent each, while their aggregated share is 14 per cent. This implies that a problem in the Greek banking market could also have a significant impact on the Romanian market. In this context, the significance of Austrian and Italian credit institutions is very high, as they have subsidiaries with a market share of over 10 per cent in most countries in the region; thus their potential shock may indeed trigger a wave of contagion across the region.

At the same time, one-way dependence is not a characteristic of any of these countries, as the financial investors in each CEE country represent several countries (Chart 4). This is a positive factor for the financial stability of countries in the region, as diversification mitigates the risk of cross-border shocks threatening financial stability. In other words, in this case there is less dependence on the financial markets of foreign countries than if most major investors were from the same country. We should note at this point that certain factors might undermine the importance of diversification. On the one hand, the large banks of EU member states have significant exposure to each other, which may create a contagion channel among them as well. On the other hand – as is the case with the recent subprime mortgage market crisis – global problems may occur, which simultaneously generate liquidity and/or solvency problems in multiple countries.

### Analysis of the Subsidiary-Parent Bank Contagion Channel

The extent to which a shock affecting a subsidiary could generate turbulence in the home banking market of the parent bank depends on two factors: a) the significance of the subsidiary within the banking group, and b) the significance of the parent bank in its home banking market. Contagion via the subsidiary-parent bank contagion channel will be less likely if the subsidiary bank is of relatively minor significance in the consolidated balance sheet total of the banking group. On the other hand, the market share of the parent company is indicative of the extent to which a failure of the parent

### Table 1

<table>
<thead>
<tr>
<th>Parent company /subsidiary country</th>
<th>Czech Rep.</th>
<th>Hungary</th>
<th>Poland</th>
<th>Slovakia</th>
<th>Romania</th>
<th>Bulgaria</th>
<th>CEE region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erste Bank (AT)</td>
<td>18%</td>
<td>7%</td>
<td>0%</td>
<td>18%</td>
<td>25%</td>
<td>0%</td>
<td>9%</td>
</tr>
<tr>
<td>Raiffeisen (AT)</td>
<td>3%</td>
<td>8%</td>
<td>3%</td>
<td>15%</td>
<td>7%</td>
<td>10%</td>
<td>5%</td>
</tr>
<tr>
<td>Volksbank (AT)</td>
<td>1%</td>
<td>1%</td>
<td>0%</td>
<td>2%</td>
<td>5%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>KBC (BE)</td>
<td>21%</td>
<td>9%</td>
<td>3%</td>
<td>8%</td>
<td>0%</td>
<td>0%</td>
<td>8%</td>
</tr>
<tr>
<td>Commerzbank (DE)</td>
<td>0%</td>
<td>1%</td>
<td>7%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>3%</td>
</tr>
<tr>
<td>Bayerische LB (DE)</td>
<td>0%</td>
<td>8%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Societe Generale (FR)</td>
<td>14%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>17%</td>
<td>0%</td>
<td>5%</td>
</tr>
<tr>
<td>Alpha Bank (GR)</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>5%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>EFG Eurobank (GR)</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>6%</td>
<td>7%</td>
<td>1%</td>
</tr>
<tr>
<td>National Bank of Greece (GR)</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>3%</td>
<td>10%</td>
<td>1%</td>
</tr>
<tr>
<td>OTP (HU)</td>
<td>0%</td>
<td>0%</td>
<td>3%</td>
<td>1%</td>
<td>13%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Intesa (IT)</td>
<td>0%</td>
<td>8%</td>
<td>0%</td>
<td>0%</td>
<td>17%</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>Unicredit (IT)</td>
<td>7%</td>
<td>6%</td>
<td>14%</td>
<td>8%</td>
<td>4%</td>
<td>15%</td>
<td>10%</td>
</tr>
<tr>
<td>ING (NL)</td>
<td>0%</td>
<td>2%</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>3%</td>
</tr>
</tbody>
</table>

Source: BankScope, disclosed annual reports

Note: The table includes only parent banks from the sample which have a market share of over 5 per cent in at least one CEE country. Cells highlighted in blue indicate subsidiaries with a 5-10 per cent market share, while cells highlighted in claret indicate those with over 10 per cent market share.

### Chart 4

**Market share of Central and East European subsidiaries of EU credit institutions (2007)**

Source: BankScope, disclosed annual reports.
bank could generate potential turbulence in the home country or for the real economy actors it serves.

As the weight of subsidiaries in the region is typically extremely low within the banking groups, there are few subsidiaries in a situation where an idiosyncratic problem could threaten the operation of the parent banks. In our sample, there were only three subsidiaries within the region whose contribution to the consolidated balance sheet total of their own banking groups exceeded 10 per cent. If we fixed the threshold at 5 per cent, we would find nine such banks, which represents 16 per cent of our sample consisting of 56 banks. This suggests that the idiosyncratic problem of a subsidiary could seldom jeopardise the operation of the parent bank significantly. This is partly related to the fact that parent banks functioning in the region usually operate in much larger banking markets at home. For example, while the consolidated total assets of the Polish banking market – the largest in the region – were EUR 240 billion at the end of 2007, the volume of the German or the French market exceeded EUR 7000 billion.

Due to the small scale of subsidiaries, a parent bank’s willingness to help is not clear, which, in case of a subsidiary with significant market share, could pose an additional risk for the financial stability of its country. Of the subsidiaries in the region, there are several examples where a subsidiary has considerable market significance, which may even exceed 10 per cent, while its weight within the banking group does not even reach 5 per cent (points circled in red on Chart 5). Unless their liquidity status or capital position is stretched to the extreme, parent banks will most probably stand behind these subsidiaries if required. Since this would involve a relatively small fund allocation for their size, it is highly unlikely that the parent banks would be restricted by liquidity or capital limitations. Under extreme circumstances, however, they might decide to deny their subsidiary the required funds, if they are convinced that ‘letting go’ of their subsidiary would only have a minor impact on the operation of the banking group as a whole.

However, when we examine the region as a whole, we find that some parent banks do in fact have combined exposures which could jeopardise their operations if a shock affecting the entire region occurred. Due to the relatively high level of interconnectedness between the countries of the region, the probability of a regional level shock is higher (e.g. global liquidity tightening, regional level capital withdrawal/exchange rate deterioration); therefore we also need to examine the region’s banking markets and parent bank exposures to the region collectively. If the parent banks have interests in several countries within the region, their combined interests can represent such exposure which in the event of a regional problem may jeopardise the operations of the parent bank. Looking at aggregate presence in the region, there are five banking groups with significant presence for which the consolidated balance sheet total of their members operating in the CEE region represents at least 10 per cent of their consolidated balance sheet total (Erste, Raiffeisen, Volksbank, OTP, KBC). Of all five banking groups, the OTP group is in the exceptional position of having the parent bank itself located in the region. If we lower the limit to 5 per cent, an additional five banks can be included in the list (Table 2). Therefore, looking at the region as a whole, we find that

![Chart 5: Market shares of individual subsidiaries and their weight within the group](image)

Chart 5: Market shares of individual subsidiaries and their weight within the group

**Market share of subsidiaries (per cent)**

<table>
<thead>
<tr>
<th>Subsidiary</th>
<th>Market share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erste (RO)</td>
<td>30</td>
</tr>
<tr>
<td>KBC (CZ)</td>
<td>25</td>
</tr>
<tr>
<td>OTP (BG)</td>
<td>20</td>
</tr>
<tr>
<td>Société Générale (CZ)</td>
<td>15</td>
</tr>
<tr>
<td>Intesa (SK)</td>
<td>10</td>
</tr>
<tr>
<td>Raiffeisen (SK)</td>
<td>5</td>
</tr>
<tr>
<td>Erste (SK)</td>
<td>5</td>
</tr>
<tr>
<td>OTP (BG)</td>
<td>5</td>
</tr>
<tr>
<td>Société Générale (CZ)</td>
<td>5</td>
</tr>
</tbody>
</table>

Sources: BankScope, disclosed annual reports.

Note: the market share shown on axis y indicates the subsidiary’s market share as per its balance sheet total, while axis x indicates the subsidiary’s balance sheet total in proportion to the consolidated balance sheet total of the whole banking group.

![Chart 6: Significance of parent banks in their home banking market vs. their presence in the CEE region](image)

Chart 6: Significance of parent banks in their home banking market vs. their presence in the CEE region

**Weight of CEE subsidiaries within the banking group (per cent)**

<table>
<thead>
<tr>
<th>Bank</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erste (AT)</td>
<td>35</td>
</tr>
<tr>
<td>Raiffeisen (AT)</td>
<td>30</td>
</tr>
<tr>
<td>OTP (HU)</td>
<td>25</td>
</tr>
<tr>
<td>KBC (BE)</td>
<td>20</td>
</tr>
<tr>
<td>Société Générale (GR)</td>
<td>15</td>
</tr>
<tr>
<td>Intesa (GR)</td>
<td>10</td>
</tr>
<tr>
<td>Alpha Bank (GR)</td>
<td>5</td>
</tr>
<tr>
<td>Volksbank (AT)</td>
<td>5</td>
</tr>
<tr>
<td>National Bank of Greece (GR)</td>
<td>5</td>
</tr>
<tr>
<td>EFG Eurobank (GR)</td>
<td>5</td>
</tr>
</tbody>
</table>

Sources: BankScope, disclosed annual reports of individual banks and banking groups.
individual parent banks do in fact have combined exposures which could jeopardise their operations in the event of a regional level shock.

Since parent banks with significant exposures in the region are key participants in their own markets as well, contagion via banking groups may be two-way. According to Chart 6, four of the five parent banks which are highly active in the region (and whose subsidiaries contribute to the consolidated balance sheet total by over 10 per cent) have a market share of over 5 per cent (banks circles in red) in their home country as well. All those parent banks whose subsidiaries contribute to the consolidated balance sheet total by 5-10 per cent have a market share of over 5 per cent in their home market. Therefore, we can conclude that parent banks – which are susceptible to contagion in the event of a regional level problem – may transmit their problems to their home financial markets.

CONCLUSIONS

Due to a high ratio of foreign ownership, countries in the Central and East European region are characterised by particularly high financial integration. Therefore, the risk of contagion is high in both directions: a problem affecting the country of a parent bank can easily spread to the countries of its subsidiaries; and likewise, a problem affecting the CEE region can spread to the home market of the parent bank. The probability and severity of contagion largely depend on the level at which the problem occurs – whether it is idiosyncratic, country-specific, regional level or a global shock.

Parent bank-subsidiary bank contagion risks are extremely high in all CEE countries. Since there are several banking groups (e.g. Erste, Unicredit) whose subsidiaries have a market share of over 10 per cent, even an idiosyncratic problem at the parent might cause grave problems in the countries of the subsidiaries. If the countries of the parent banks suffer a general shock, the implications may be even graver. Looking at the contagion channel between the subsidiary bank and the parent bank, we find that, even though an idiosyncratic subsidiary-level problem is less likely to cause turbulence in the home market of the parent bank, a regional level problem may affect many home countries (e.g. Austria).

In view of the potential magnitude of contagion, adequate capital and liquidity allocation within the banking group is crucial; in other words, continuous and safe operations must be ensured at all times for each member of the group. This represents an extremely big challenge in the current vulnerable environment, when individual authorities are striving to take measures primarily with the aim of strengthening the financial stability of their own countries, and in certain circumstances even restricting the cross-border reallocation of funds.

The growing level of financial integration poses challenges for all types of financial authorities:

- **Supervisors.** On the one hand, since different supervisory authorities are responsible for the supervision of subsidiaries and parent banks, the assessment of the

---

### Table 2

**Weight of CEE subsidiaries within individual banking groups**

<table>
<thead>
<tr>
<th>Bank Group</th>
<th>Czech Rep.</th>
<th>Hungary</th>
<th>Poland</th>
<th>Slovakia</th>
<th>Romania</th>
<th>Bulgaria</th>
<th>CEE region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erste Bank</td>
<td>12%</td>
<td>4%</td>
<td>0%</td>
<td>5%</td>
<td>9%</td>
<td>0%</td>
<td>30%</td>
</tr>
<tr>
<td>Raiffeisen</td>
<td>3%</td>
<td>6%</td>
<td>4%</td>
<td>5%</td>
<td>4%</td>
<td>2%</td>
<td>25%</td>
</tr>
<tr>
<td>Volksbank</td>
<td>2%</td>
<td>2%</td>
<td>0%</td>
<td>1%</td>
<td>5%</td>
<td>0%</td>
<td>10%</td>
</tr>
<tr>
<td>KBC</td>
<td>10%</td>
<td>3%</td>
<td>2%</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
<td>16%</td>
</tr>
<tr>
<td>Alpha Bank</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>7%</td>
<td>0%</td>
<td>7%</td>
</tr>
<tr>
<td>EFG Eurobank</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>6%</td>
<td>3%</td>
<td>9%</td>
</tr>
<tr>
<td>National Bank of Greece</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>2%</td>
<td>3%</td>
<td>6%</td>
</tr>
<tr>
<td>OTP</td>
<td>0%</td>
<td>60%</td>
<td>0%</td>
<td>4%</td>
<td>3%</td>
<td>12%</td>
<td>80%</td>
</tr>
<tr>
<td>Unicredit</td>
<td>1%</td>
<td>1%</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>6%</td>
</tr>
<tr>
<td>Millenium BCP</td>
<td>0%</td>
<td>0%</td>
<td>9%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>9%</td>
</tr>
</tbody>
</table>

Note: The table does not include data of foreign branches. The table includes only those banking groups whose subsidiaries in the region in aggregate contributed to the consolidated balance sheet total in excess of 5 per cent. Cells highlighted in blue indicate subsidiaries with a 5-10 per cent share, while cells highlighted in claret indicate those with over 10 per cent share.

Sources: BankScope, disclosed annual reports.
financial health and risk exposure of the entire banking group is an increasingly difficult task for the consolidating supervisor. On the other, as the exposures of a subsidiary are increasingly hard to assess at the individual level, it is also essential for the authorities supervising the subsidiaries to have access to banking group level information. Therefore, improving transparency and ensuring two-way information exchange between supervisory authorities is a key priority. A long-term solution could be the establishment of an EU-level or lead supervisory authority, which would be responsible for the supervision of large banking groups with significant cross-border activities. However, when developing possible solutions, it is vital that the centralisation of supervisory activities should not endanger an appropriate information base being available for the financial authorities of all those countries where the banking group has a significant presence, nor their being timely alerted in an emergency situation.

• **Central banks.** It is also important for central banks to harmonise their terms and conditions for liquidity provision (e.g. the set of eligible collateral) and ensure that individual members of banking groups can obtain central bank liquidity under the same terms and conditions in different countries. The situation is further complicated in the CEE region because even though the countries in our sample are not members of the euro area, there is significant demand for euro liquidity in order to finance foreign currency denominated loans. In the provision of these funds, subsidiaries substantially rely on their parent banks.

• **Ministries of Finance.** Due to a lack of EU-level supranational funds, the burden-sharing of a government bailout of banking groups with substantial cross-border activity is a great challenge, as bailing out the entire banking group would be too great a burden for one country alone to bear. The ongoing turmoil has drawn attention to the fact that government intervention may distort the level playing field. In order to prevent this, coordinated EU-level intervention is required, instead of unique, piecemeal, country-level solutions.

**REFERENCES**

EUROPEAN CENTRAL BANK (October 2008): EU banking structures.


INTRODUCTION

Attention has recently turned again to the vulnerability of emerging economies, due to the credit market turmoil emanating from the United States. As one of the most important underlying factors contributing to the emergence of financial crises in developing countries has been the weakness of their external balance sheets, the degree of recent developments in Hungary’s financial exposure may be of particular importance. As was discussed in detail in an article in the Spring 2008 issue of the MNB Bulletin, Hungary’s net external liabilities increased significantly over the past few years. Its external liabilities-to-GDP ratio, at above 100 per cent, is very high even by international standards (Chart 1).

There has been a rapid and sharp rise in Hungary’s net external liabilities in recent years. It may be useful, therefore, to examine whether the increase in the country’s external indebtedness is significant in international comparison, to analyse the factors contributing to the rise in the country’s external liabilities and to identify the actions necessary to reduce external liabilities as a percentage of GDP over the longer term.

First, the article provides a brief theoretical overview of the factors driving external liabilities at a longer horizon. It continues by describing, in an international context, the complex relationship between per capita GDP, one of the most important factors, and external liabilities. The article then goes on to decompose the increase in liabilities of regional countries into the effects of external financing requirement, GDP growth and other factors, and places Hungary among high-debt countries on the basis of these components. Finally, the article attempts to assess the increase in Hungary’s external liabilities and to draw some forward-looking conclusions based on the comparisons performed.

---

Péter Koroknai: Hungary’s external liabilities in international comparison

Hungary’s net external liabilities have increased significantly in recent years and its external liabilities-to-GDP ratio currently stands at a very high level by international standards. As the credit market crisis emanating from the United States has put renewed emphasis on the vulnerability of emerging economies, it may be useful to look more closely at the factors shaping developments in a country’s external liabilities in general, and those specific for the Hungarian economy in particular. A review of the academic literature sheds light on the fact that in emerging economies the increase in external debt due mainly to the gradual easing in liquidity constraints and increasing financial integration is a natural process. International comparisons appear to reinforce this view. Accordingly, similar developments have taken place in recent years in each of the newly joined EU Member States and Hungary. However, these comparisons also reveal that Hungary’s external liabilities are higher than those of countries at a comparable stage of economic development. It is also important to note that the stock of external liabilities was higher in Hungary than in other countries even in the period prior to EU accession. This implies that the outflow of income related to a country’s high external debt can by itself keep debt at a high level. Consequently, further substantial improvement in external balance and faster economic growth are required in order to reduce the external liabilities-to-GDP ratio.

---

Chart 1

External liabilities as a percentage of GDP in 2007

<table>
<thead>
<tr>
<th>Country</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norway</td>
<td>120</td>
</tr>
<tr>
<td>Japan</td>
<td>110</td>
</tr>
<tr>
<td>Belgium</td>
<td>100</td>
</tr>
<tr>
<td>France</td>
<td>90</td>
</tr>
<tr>
<td>Italy</td>
<td>80</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>70</td>
</tr>
<tr>
<td>Germany</td>
<td>60</td>
</tr>
<tr>
<td>France</td>
<td>50</td>
</tr>
<tr>
<td>USA</td>
<td>40</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>30</td>
</tr>
<tr>
<td>Austria</td>
<td>20</td>
</tr>
<tr>
<td>Netherlands</td>
<td>10</td>
</tr>
<tr>
<td>Slovenia</td>
<td>0</td>
</tr>
<tr>
<td>Hungary</td>
<td>-10</td>
</tr>
<tr>
<td>Iceland</td>
<td>-20</td>
</tr>
<tr>
<td>Croatia</td>
<td>-30</td>
</tr>
</tbody>
</table>

Sources: IFS and websites of central banks. In the case of countries marked with an asterisk (*), data are for 2006 (due to the limitations of available data).

---

The concept of net external liabilities

A country has net external liabilities if the financial liabilities of the national economy exceed its financial assets (also commonly called negative net financial wealth). Furthermore, liabilities exceeding assets significantly and at an increasing pace may reflect a deterioration in solvency and a rise in vulnerability of a given country. Two types of liabilities are distinguished within liabilities: debt liabilities (e.g., bonds and loans) and equity liabilities (e.g., FDI capital, equity).

Basically, changes in external liabilities (\(\text{Liab}_{2007} - \text{Liab}_{2006}\)) can be related to three factors: the external financing requirement of the economy (\(\text{Liab}_{2006} \times \text{return} + \text{primary balance}\)), the effect of exchange rate changes on the value of existing liabilities (\(\text{Liab}_{2006} \times \text{ERchange}\)) and other factors independent of economic fundamentals (e.g., changes in statistical methodology). External financing requirement means that a country spends more (on consumption and investment) than the income it produces over a given period, which it has to fund from external sources. The amount of capital required is recorded in the statistics in two different ways: on the one hand, as the combined balance on the current and capital accounts plus net errors and omissions, and, on the other, on the financing side, as the balance of the financial account and changes in central bank reserves. Later on, in decomposing the increase in external liabilities, we will separate income balance, related to external liabilities incurred in the past (\(\text{Liab}_{2006} \times \text{return}: \) interest paid on debt, income on equity and dividends), from the primary balance, a record of current external liabilities required for the functioning of the economy.

\[
\text{Liab}_{2007} - \text{Liab}_{2006} = \text{Liab}_{2006} \times \text{ERchange} + \text{Liab}_{2006} \times \text{return} + \text{primary balance} + \text{other revaluation external financing requirement}
\]

Chart 2
Changes in Hungary’s net external liabilities between 2006 and 2007
(HUF billions)

<table>
<thead>
<tr>
<th>1. External financing requirement (1. or 2.)</th>
<th>2. Income balance 1855</th>
<th>3. Financial account 1787</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financing (3.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current account and capital account balance 1347</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net errors and omissions 403</td>
<td>Primary balance -105</td>
<td>Change in international reserves -17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revaluation and other factors 1076</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net external liability stock in 2007</td>
<td>23,962</td>
<td>26,789</td>
</tr>
</tbody>
</table>

THEORIES OF EXTERNAL LIABILITIES

The level of external liabilities is strongly influenced by the potential growth rate of a given country and increasing global financial integration. Therefore, although it may seem high at first sight, it is not useful examining Hungary’s external liabilities in isolation, as the size of the country’s external liabilities may be affected by a variety of factors. Analysing these factors may also help to find out whether the level of a country’s external liabilities actually poses a risk to the economy. The academic literature recognises several factors which may influence the size of a country’s external liabilities (Benhima and Havrylchyk, 2006, gives a good summary of this subject).

In cross-sectional comparisons, per capita GDP is one of the most important factors determining the level of a country’s external liabilities: according to theory, relatively poor countries have the highest level of liabilities. However, there is one channel through which per capita GDP, an indicator of countries’ relative wealth, may influence the level of external liabilities: relatively poorer countries are likely to produce higher growth rates than wealthier countries in the future, as a consequence of economic convergence. There are a number of approaches to illustrate the effect of this process on the level of external liabilities. First, from the perspective of the financing requirement, economic agents tend to save less in relatively poorer countries registering faster growth, as their expected permanent income is higher than their current income, as suggested by the classical growth models. Second, one reason why foreign funds may flow into lower-income countries is that invested capital pays off at a significant profit during times of faster income growth generated by higher productivity. This argumentation is based on the notion that non-residents are only willing to fund a country’s financing requirement if future productivity growth in a given country provides coverage for the repayment of outstanding liabilities. And, in turn, it derives from the positive correlation between income and saving that net external assets of lower-income countries will be lower, i.e. their net external liabilities will be higher.

However, a number of studies argue that, in the case of the less developed, emerging countries, changes in external liabilities reflect an opposite effect than that which is revealed by cross-sectional analyses: economic progress entails a rise
in the ratio of external liabilities to GDP. According to one argument, increasing integration in global goods and financial markets makes it easier for less developed countries to finance their current account deficits, and ultimately causes savings to fall and investment to rise, which, in turn, leads to a rise in their external liabilities (Blanchard and Giavazzi, 2002). According to another argument, an increase in income or wealth may lead to a higher level of indebtedness through an easing in liquidity constraints, which is also reflected in a rise in external liabilities (Lane and Milesi-Ferretti, 2001).

Demographic conditions may also influence external liabilities through the potential growth channel: a higher percentage share of young people within the total population may lead to a higher level of external liabilities over the longer term. Under the permanent income hypothesis, young people’s actual income lags behind expected future levels, which, together with consumption smoothing behaviour, foreshadows lower savings and higher external indebtedness.1

Increasing financial integration has made it possible for countries to finance higher-than-earlier levels of government debt. Theory suggests that a higher stock of government debt increases the probability of higher net external liabilities building up. In addition to an increase in government debt, growth in private sector savings will lag behind growth in government debt, even assuming that economic agents are perfectly forward-looking, which once again presages an increase in external liabilities. It is argued that the sum of tax increases due to a higher government debt is likely to be spread over a longer period, and the current generation is only partly affected by it, i.e. they will have to save less. Nonetheless, a higher government debt may result in technically higher net external liabilities: a portion of government debt is financed by non-residents, and because higher interest payments pertain to a higher debt, this, by itself, may lead to higher external liabilities.

INTERNATIONAL COMPARISON

In view of the above discussion, it may be useful to examine more closely Hungary’s net external liabilities in international comparison. The reason is that the extent to which external liabilities pose a threat to the Hungarian economy cannot be decided by focusing exclusively on the absolute level of liabilities. Past levels of liabilities of countries in the same risk group or neighbouring with Hungary may be a useful guide to assess the risks to which the economy is exposed. Thus, in the following we will attempt to view Hungarian data in an international context and analyse the relationship between Hungary’s exposure arising from the size of its net external liabilities and the imbalances in other countries’ external balance sheets. We will compare Hungary’s external liabilities primarily with data for selected EU Member States, in order to be able to examine broadly homogenous countries in terms of economic systems. The analysis covers all the emerging economies of Central and Eastern Europe.

Available data are consistent with the picture suggested by theory: with the increase in income (or per capita GDP), the net external liabilities of countries falls, and above a certain income level we find those countries that extend lending to indebted nations (Chart 3). Based on this relationship and the Chart, it is therefore not surprising that Hungary, a relatively poorer country, has a substantial amount of external liabilities. It is also true, however, that, based on the set of points of countries, a 60–70 per cent external liabilities-to-GDP ratio would be in line with Hungary’s level of

![Chart 3](chart.png)

**Net external assets as a percentage of GDP and per capita GDP in 2007**

Sources: IFS, Eurostat and websites of central banks. In the case of countries marked with an asterisk (*), data are for 2006 (due to the limitations of available data).

---

1 It is important to note that a higher proportion of older generations may also lead to higher external liabilities, as there is greater probability that the given age cohort will run down its assets accumulated earlier.

2 Although based on the Chart it may seem that there is a significant imbalance, looking at all the countries (the number of countries with higher net liabilities is much higher than that of those with net external assets), two things are worth mentioning. First, a number of net creditor countries are not plotted on the Chart (e.g. Japan, Arab states). Second, due to the GDP proportionate values, it may happen that, for example, loans from Germany expressed in billion euros covers external liabilities of several debtor countries.
The paper by Benhima and Havrylchyk (2006) also demonstrates that the size of Hungary’s external liabilities exceeds the equilibrium level significantly, based on the economic development.

In order to test the theory proposing that emerging countries’ external liabilities will increase as the economies continue to progress, we compared the correlation between the external liabilities-to-GDP ratio and per capita GDP in 1999 and 2007. The shift in the position of individual countries reinforces the view that economic progress in emerging economies is accompanied by an increase in external liabilities: there was a shift towards higher external liabilities in Hungary, in addition to the Baltic states and the euro area peripheral countries, with the linear regression fitted on the set of points of all countries ‘shifting’ lower (Chart 4). In contrast, net external assets as a percentage of GDP of the relatively wealthier countries (e.g. Germany, France and Norway) increased further – or their external liabilities fell. This is consistent with the theory predicting a fall in external liabilities in response to economic growth.

**Chart 4**

Net external assets as a percentage of GDP and per capita GDP in 1999 and 2007

An examination of the relationship between external liabilities and the level of economic development throws light on another important issue – Hungary’s high external liabilities partly originates from the past. More specifically, Hungary had higher external liabilities in the early 1990s, due to its position in the period prior to political transition, which continued to grow gradually as time passed. That is, the country’s liabilities-to-GDP ratio, at 100 per cent in 2007, is in part a feature stemming from the legacy of the Hungarian economy (the next section will discuss in more detail the upward effects on liabilities of interest paid on outstanding debt).

**COMPONENTS OF THE INCREASE IN EXTERNAL LIABILITIES**

In the above discussion, we compared the levels of external liabilities in a cross-sectional analysis. In the following, we will look more closely at the components of the increase in a given country’s external liabilities. We will seek to measure the extent to which the increase in the liabilities-to-GDP ratio can be linked to income payable on outstanding liabilities and the contribution of external funding to current economic developments (for a discussion of the factors shaping changes in external liabilities, see the Box at the beginning of the article).

Increases in a country’s stock of external liabilities are mainly driven by developments in its external financing requirement. Two variables are distinguished within the financing requirement. It is worthwhile treating the income balance separately, as this item is mainly determined by external liabilities accumulated in the past. In contrast, the primary balance, i.e. the part of the external financing requirement excluding the income balance, is mainly related to economic processes taking place in a given period. If liabilities denominated in foreign currency accounts for a significant share within external liabilities, asset price or exchange rate movements may also be an important factor. For example, during a period of exchange rate weakening, foreign currency-denominated liabilities rise in domestic currency terms even if a country does not undertake new borrowing. Given that generally it is the liabilities-to-GDP ratio which is examined, growth in GDP naturally reduces external liabilities. It is also worthwhile distinguishing actual growth of the economy from the increase in the price level within the effect of GDP growth, as a 7 per cent GDP growth rate may equally result from 5 per cent real growth and 2 per cent inflation, and from 2 per cent growth and 5 per cent inflation.

Despite the fact that Hungary’s liabilities as a percentage of GDP was one of the highest in 2007, over the past eight years...
• On the one hand, we would reasonably expect that the contribution from the deficit on the income balance of a country with a higher initial stock of external liabilities is greater, as the economy is likely to face higher interest/dividend payments on its higher existing debt/FDI. A comparison of countries’ income balance is broadly consistent with this assumption – the contribution to the increase in external liabilities of the income balance of countries with increasingly higher initial liabilities is progressively higher (Chart 5). Within the countries examined, the contribution of income balance to the increase in external liabilities was highest in Hungary.

• The increase in external liabilities, deriving from the primary balance, was one of the lowest in Hungary, and was associated with a large deficit in income balance. This means that the external liabilities of the Hungarian economy can be related in large part to the outflow of income on liabilities accumulated in the past, and the other items of the external financing requirement – primarily net trade – have only slightly contributed to the increase in the country’s external liabilities in recent years compared with other countries.

• The effects arising from the revaluation of outstanding stocks and from other items increased external liabilities in all the countries examined. Currencies of the emerging, newly-joined EU Member States typically appreciated against the euro, which, in turn, caused a fall in foreign currency liabilities valued in local currency. In addition, however, there were also changes in the valuation of the various equity liabilities, and because the prices of these items have also risen sharply in recent years, the resulting stock of external liabilities has increased significantly. As the amount of equity liabilities is much higher than that of debt liabilities (foreign currency liabilities in particular), movements in exchange rates and asset prices has led to an increase in external liabilities.

• Nominal GDP growth reduced significantly the value of external liabilities as a percentage of GDP. It is important to note that the downward effect on liabilities was smaller in the old member countries and much greater in countries that joined the EU later. Moreover, in the case of CEE countries, higher average growth was coupled with higher inflation. Consequently, the effect of both factors of GDP growth was a slower increase in liabilities than in the old members. The Chart also reveals that, in comparison with, for example, the Baltic states, the contribution of higher inflation in Hungary to the strong downward effect on liabilities was greater, while the downward effect of economic growth was smaller.

**SUMMARY**

The fall in global willingness to take risk due to the effects of the sub-prime mortgage market crisis has drawn attention to Hungary’s external liabilities-to-GDP ratio, which has been growing fast to reach high levels by international standards.

---

1 Naturally, the income account is also shaped by interest paid on liabilities, in addition to the existing liabilities stock. Expected return is higher in more risky countries, which may explain, for example, the greater contribution of the income account in Croatia.

2 Due to the limitations of available data (external liabilities in a breakdown by currency denomination is not available for the majority of countries), the effect of exchange rate movements could not be isolated from the effect of other volume changes (methodological changes, etc.).

3 It is very difficult to measure the revaluation of equity-type external liabilities (e.g. FDI capital), and a number of problems may arise in relation to pricing non-marketable assets and liabilities (for more detail see: Svavarsson and Sigurdsson, 2007). Naturally, this problem only causes uncertainty about the reliability of the stock data within balance of payments statistics and it does not affect flow data.

4 It is important to note that inflation not only has a downward effect on liabilities (through higher nominal GDP), but, due to interest paid on existing domestic currency-denominated foreign debt, it also increases a country’s net external liabilities, as a result of its adverse impact on the income account.
In this article, we attempted to highlight two important developments by reviewing the theories related to external indebtedness and setting the issue of Hungary’s external liabilities in an international context.

Based on a review of the academic literature, we drew the conclusion that the increase in Hungary’s external liabilities was a natural process explained in part by the initial position of the economy and in part by the gradual easing in liquidity constraints. Although external liabilities are expected to fall over the longer term along with economic progress measured by per capita GDP, it may rise in transition economies even over the short term. This hypothesis was also reinforced by international comparison – external liabilities of Hungary and the newly-joined and peripheral EU countries developed similarly.

A second lesson from our cross-country comparison is that although Hungary’s liabilities-to-GDP ratio has increased significantly in the past eight years it has lagged behind growth in liabilities of several other countries. It is important to emphasise that the increase in Hungary’s external liabilities has been due in large part to its high initial liabilities related to the outflow of income, while the primary balance, linked to the functioning of the economy, contributed only slightly to the increase in external liabilities. This is an adverse development in that, associated with an already high level of debt, the outflow of income is likely to continue to be significant, having an upward effect on external liabilities. It is worth noting, however, that the primary balance of the Hungarian economy reduced external liabilities in 2007 (Chart 2), and consequently, the country’s liabilities-to-GDP ratio is expected to fall in the coming years, despite a high deficit in its income balance. However, a further reduction in the external financing requirement, observed in recent years, is required in order for Hungary’s external liabilities to fall.

Nevertheless, faster economic growth is also needed, in addition to the improvement in the external balance, for the liabilities-to-GDP ratio to fall. The scope for an improvement in the liabilities ratio through a fall in the financing requirement is limited. But apart from that, faster economic growth can, by itself, reduce the vulnerability of the Hungarian economy resulting from its high external liabilities. The current situation, therefore, underlines the need to continue fiscal consolidation along the set path and that the main focus should be on the structural reforms of general government. The reforms, in turn, not only reduce external liabilities through a fall in the general government deficit and an improvement in external balance; they also create the conditions for long-term sustainable growth, and, moreover, would contribute to the reduction in Hungary’s external liabilities-to-GDP ratio through faster economic growth.

REFERENCES


Rita Odorán and Balázs Sisak: Cash demand of the Hungarian economy – is the shadow economy still running smoothly?

In international comparison the cash demand of the Hungarian economy is high and has increased over the last two years in a manner not related to the fundamentals of the economy. We have identified two factors which may have contributed to this process. The introduction of the tax on interest in 2006 points towards increasing cash demand given the one-off change of the opportunity cost of cash, and the increased tax burdens introduced in order to reduce the budget deficit as well as other austerity measures of the tax authority also increase cash demand through the presumed expansion of the shadow economy’s cash requirement. In addition, the high cash demand characterising the Hungarian economy may also be explained by the fact that in international comparison Hungary lags behind in the use of cashless payment instruments. High cash usage is unfavourable for the whole economy from several aspects. Our article emphasizes that while in developed countries one may find several examples of measures aimed at restricting the cash usage, in Hungary we have seen only failed attempts so far.

INTRODUCTION

In 2007 the volume of the currency in circulation in Hungary exceeded not only that of the peripheral countries of the euro area prior to the introduction of the euro, but also those of Central and East European countries with similar level of economic development to Hungary. While in the former group the economy’s cash demand was stable – or even slightly decreased – in the period prior to the establishment of the euro area, during 2006-2007 the volume of the currency in circulation in Hungary increased to a larger extent than would have been explained by economic fundamentals (economic growth, inflationary process). The spread of cashless payment instruments – becoming increasingly popular with the modernisation of payment methods and involving moderate cash usage – also conflicts with the rising cash demand.

The use of cash facilitates the operation of the black economy, which affects long-term economic growth negatively. Furthermore, high cash demand – despite the increasing use of cashless payment methods – may burden the economy with additional costs. Measures aimed at restraining the use of cash and promoting alternative payment instruments have already appeared in economic policy discussions.

In this article, we first briefly describe the factors influencing cash demand, and then we examine the evolution of the Hungarian economy’s cash demand in international comparison. Afterwards, we try to identify the factors behind the use of cash by analysing the conventional factors of currency in circulation in Hungary. We touch upon the popularity of cashless payment methods in Hungary and finally we describe some measures introduced by other countries in order to restrict the use of cash.

WHICH FACTORS INFLUENCE CASH DEMAND?

The amount of (forint) currency in circulation is the total volume of coins and banknotes that economic agents wish to hold. Currency is introduced into circulation via commercial banks, which in turn obtain the required volume of currency to the debit of their account with the central bank. The majority of the currency in circulation in Hungary leaves the banking system, the larger part of it (around 90%) being held by households and the smaller part by companies.1 The remainder of the cash holdings (around 7%) stays within the banking system, forming the balance on hand required for banks’ daily operation. Similarly to retail deposits, banks are entitled to interest on their deposit accounts with the central bank, which in their case (also) represents a cost of holding cash. Therefore credit institutions hold only as much cash as strictly necessary to meet the cash demand of economic agents. Thus the currency issued entirely reflects the demand of economic agents.

1 The figures of various sectors’ cash balance can be found in the so-called financial accounts and the balance sheet of the banking system. The cash balance held by households is calculated using the residuum principle.
Cash may be held for different reasons. On the one hand, cash is required to settle purchases of goods and services (transactions demand), and on the other economic agents keep a part of their savings in the form of cash (hoarding). Several factors may influence the cash demand of an economy depending on the purpose of cash holding, of which the most important are:

- **Economic growth**: parallel to the economic growth and the increase of prices, individuals spend increasingly more on purchases of goods and services, a part of which is transacted in cash.

- **Opportunity cost of cash**: the cost of cash is the interest lost that we would have received if we kept the unspent part of our income in other interest-bearing instruments. The opportunity cost of cash changes in parallel with inflation and the interest rate environment. If an economy is characterised by a downward (upward) inflation trend, cash holding becomes cheaper (more expensive), which in turn may have an increasing (decreasing) effect on the cash demand (via hoarding).

- **Spread of cashless payment instruments**: with the modernisation of payment settlement methods, cashless payment methods – replacing the physical form of cash – (bankcards, credit cards) keep gaining ground, thereby the cash volume required for transactions may drop.

- **External demand**: foreign agents may generate significant demand – related to hoarding – for stable currencies, functioning as reserve currencies (e.g. US dollar, euro). In the case of Hungary, this factor can be ignored.

- **Cash demand of the shadow economy**: payments in the shadow economy presumably take place in cash. The anonymity of cash use and the fact that it can hardly be traced, or not at all, renders it attractive for settling transactions concluded in the shadow economy, and for hiding income. Therefore this most elusive factor may also affect the volume of currency in circulation to a large extent.

In the various analyses examining the relation between the economy’s cash demand and its influencing factors – thus in this article as well – it would be reasonable to examine transaction-based cash demand and the cash volume held for hoarding separately, since they may be influenced by different factors. Moreover, certain factors may influence these cash holding motivations in opposite directions. An example is the increase of inflation, which affects transactions demand positively through the faster increase of prices, but has a negative impact on the cash demand related to hoarding via the increase in the opportunity cost of holding cash. However, the information available to us does not allow separation of the cash volume originating from these two cash holding motives.

**HIGH DOMESTIC CASH DEMAND IN INTERNATIONAL COMPARISON**

The cash demand of the domestic economy is high in international comparison. One of the most important purposes of cash use is to settle payments in cash. Parallel to the growth of the economy, transactions related to the purchase of goods and services are also expanding, thus it is reasonable to compare the development of an economy’s cash demand with a ratio measuring economic activity. According to data available at the end of 2007, the cash balance compared to consumption expenditure was over 16% in Hungary, which may be considered high compared to the values measured in Central and East European countries and to the peripheral countries of the euro area (Spain, Portugal, Greece, Ireland) prior to the introduction of the euro (Chart 1).

**Chart 1**

Currency in circulation* in proportion to households’ consumption expenditure in the EU member states

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GR (2008)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HU (2006)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI (2006)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GR (2008)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HU (2006)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI (2006)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GR (2008)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HU (2006)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI (2006)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GR (2008)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HU (2006)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI (2006)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PT</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sources: MNB, Eurostat, central banks.

* End of period figures.

It is worth mentioning that the high cash demand of the Spanish and German economies – which is relatively high even among developed countries – may have been generated in part by the measures taken in the 1980s aimed at the taxation of capital incomes, which – through the decrease opportunity cost of cash – led to increasing cash demand. The expansion of the Spanish economy’s cash demand may have been influenced by the introduction of a value added tax, leading to tax evasion. In the case of Germany, the political and economic transformation that took place in the Central...
and East European countries at the end of the 1980s and the beginning of the 1990s may have increased cash demand further. Confidence in the German mark generated considerable external demand for the German currency from these countries, which – as a result of the stabilisation of their economies – already fell in the second half of the 1990s. The high cash demand in Austria may be explained by the fact that the use of cashless payment instruments is less widespread compared to other developed countries. However, looking at the euro area in its entirety, the volume of the currency in circulation has been continuously increasing since the introduction of the euro, which may be related to external demand for the single currency (Fischer-Köhler-Seitz, 2004).

The source of the Hungarian economy’s high cash demand should be sought in the evolution of the factors influencing it, which we will do by analysing the stylised factors concerning the volume of currency in circulation.

**CASH DEMAND IN THE HUNGARIAN ECONOMY – STYLISED FACTS**

Currency in circulation is showing an increasing trend in nominal terms in accordance with economic growth and the increase of prices. However, during the last decade there were several “strange” periods in the evolution of the volume of cash. In 1997 – as a result of the negative rumours concerning Postabank – a large volume of bank deposits was withdrawn, which resulted in a sharp increase of the cash balance. Within a few days, the balance of the currency in circulation increased by approximately HUF 70 billion. Although the economy’s cash demand generally falls following substantial year-end spending (December), the uncertainty related to the new millennium at the end of 1999 entailed further growth of the cash demand (Chart 2). At the beginning of 2004 the increasing trend of cash holdings observed previously was disrupted: following a drop at the beginning of the year and then stagnation, the amount of cash returned to the end-2003 level by the end of the year. The disruption in the development of the nominal volume of currency followed a significant increase of the basic interest rate, which took place during a relatively short period (the base rate increased altogether by 600 b.p. between June and December 2003). The simultaneous increase of the interest rate paid on bank deposits may have encouraged households – which hold the major part of the amount of currency in circulation – to reallocate their savings. During this period, the ratio of cash savings within the their financial savings dropped, and in parallel the ratio of interest-bearing assets – bank deposits and government securities – increased.

Similarly to 2004, the amount of cash issued stagnated in 2008 and the stagnation can be explained by the reorganisation of households’ liquid assets. Besides intensive accumulation of foreign exchange deposits in the period around April-July, foreign currency savings may have also increased significantly.

During the last two years the dynamics of the growth in cash demand exceeded the extent linked to the purchase of goods and services. While the economies of the euro area’s peripheral countries experienced stable or slightly decreasing cash demand in the period preceding the introduction of euro, in the Hungarian economy the cash volume compared to households’ consumption expenditure started to increase in 2006 from the former 13-14%, and by the end of 2007 it was above 16%.

The introduction of the tax on interest income generated a one-off drop in the opportunity cost of cash, which may have played a role in the increase of the cash demand. In the past, the economy’s cash demand followed the course of inflation. The acceleration (slowdown) of inflation – and the parallel increase (decrease) of the opportunity costs of cash – was followed by the decrease (increase) of economic agents’ cash demand. However, in the last two years the relation between cash demand and inflation has weakened. Inflation, which started to increase from the second half of 2006, was not accompanied by a drop in cash demand compared to consumption expenditure, but instead by a further increase after some stabilisation (Chart 3). Based on earlier observations, growing inflation alone may have reduced the

---

1. We have no direct data source concerning foreign currency savings.
The high cash demand of the Hungarian economy may also be due to the lag in the use of cashless payment instruments. Based on the per capita number of ATM\textsuperscript{3} and POS\textsuperscript{4} terminals, the level of development of the infrastructure supporting the settlement of cashless payments in Hungary significantly lags behind that of west European countries, and Hungary is not among the forerunners in regional terms either (MNB, 2007).

The relatively lower number of bankcard purchases may suggest a preference for cash use over cashless payment methods. In countries where the number of POS transactions per bankcard is lower, cash withdrawals from ATM represent a higher value within transactions (cash withdrawals, purchases by card) executed on terminals accepting bankcards (POS and ATM). At the same time, regulations prevailing in the various countries – for instance those concerning transaction fees – as well as the fact that cash withdrawal is also possible via POS equipment makes the comparability of data more difficult. However, in this connection no data was available to us.

The Hungarian figures present a mixed picture: despite the low number of purchases by bankcard, the volume of cash withdrawals from ATMs is not high either (Chart 4.). One possible explanation may be that in Hungary over 20% of cash withdrawals take place via the POS terminals installed in bank branches and in post offices, leading to a relatively smaller volume of cash withdrawal from ATMs.

Despite the fact that Hungary lags behind in the use of cashless payment methods in cross-sectional comparison, these payment methods are nevertheless gaining ground in Hungary, which in itself should indicate an opposing trend to the increasing cash demand observed in 2006-2007.

Of the previously mentioned factors influencing cash demand, we also examined the evolution of the shadow economy’s cash holdings. In our analysis, the definition of shadow economy includes not only illegal economic activities (distribution of narcotics, prostitution, smuggling), but also unreported or “partially reported” economic activities. These include all activities accompanied by tax evasion.\textsuperscript{5} As the name itself suggests, we do not have direct information about the volume of cash used in the shadow economy, however there are several approaches in the literature on methods of estimating it (e.g. Guiborg and Segendorf, 2007; Paunonen

---

\textsuperscript{3} ATM (Automated Teller Machine): equipment that allows clients equipped with a proper bankcard to withdraw cash from their bank account, initiate payments and make enquiries about their accounts.

\textsuperscript{4} POS (Point of Sale): equipment that facilitate payment by bankcard (in certain cases cash withdrawal as well) on the vendor’s premises.

\textsuperscript{5} The statistical approach to the shadow economy differs from this. The System of National Accounts does not classify activities which are not part of production (e.g. smuggling) to the shadow economy. At the same time, the statistical interpretation of the shadow economy includes legal activities subject to registration (production by households for their own consumption).
and Jyrkönén, 2002; Humphrey et al., 2000). We have not made such attempts in our article, but instead have tried to draw conclusions in relation its evolution.

As a result of the increased tax burdens aimed at reducing the budget deficit and of the more stringent measures taken by the tax authority, the shadow economy’s cash demand may have increased, which nevertheless does not contradict the view that certain economic activities may have whitened during this period. Part of the measures introduced in the second half of 2006 aiming at a reduction of the budget deficit led to an increase of tax burdens, which in itself may have pushed economic agents towards higher tax evasion and thereby to use cash more predominantly. However, the tax increase was accompanied by stricter tax audits and an enhanced fight against feigned contracts. Beside the fact that the impact of economic whitening may be traced through the increase of wages (MNB, 2007) and certain estimations refer to a decrease in the tax base shortfall (Krekó-P. Kiss, 2008), the higher tax burdens and the more stringent tax audits may have led the players of shadow economy to holding higher cash balances in order to hide income (as opposed to the option that the ‘hidden’ income is placed in bank deposits, for instance). This could particularly be assumed among households (also including private entrepreneurs) – since the main focus of tax audits in terms of taxpayer groups shifted in 2007 towards an increase in the share of households (APEH 2007), the number of wealth audits affecting them multiplied compared to the previous period (Chart 5).

**Chart 5**

**Labour taxes and the number of wealth audits**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of wealth audits</th>
<th>Tax wedge* (right-hand scale)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>2,000</td>
<td>50.0</td>
</tr>
<tr>
<td>2005</td>
<td>4,000</td>
<td>51.0</td>
</tr>
<tr>
<td>2006</td>
<td>12,000</td>
<td>52.0</td>
</tr>
<tr>
<td>2007</td>
<td>14,000</td>
<td>53.5</td>
</tr>
</tbody>
</table>

Sources: APEH, OECD.

* Tax wedge: the personal income tax and the contributions burdening employers and employees in proportion to total labour cost.

**RESTRICTION OF CASH USE**

We can only suppose that the increase in cash volume can be linked to the expanding cash demand of the shadow economy. However, we can state that the use of cash simplifies the operation of the shadow economy. Hiding income and tax evasion entails higher tax rates, which may have a negative impact on long-term economic growth.

In addition, high cash use – as opposed to more intensive use of cashless payment methods – may burden the economy with extra costs. The literature on the costs and benefits of payment instruments (e.g. Brits-Winder, 2005) discusses the issue of choosing payment methods in detail. In short, this means that by using cash economic agents do not face direct costs like in the case of bankcard payments (e.g. transaction fees). However, at the level of the entire economy cash use is also accompanied by cost elements connected to the manufacturing, storage, transport and control of cash. Thus, what may be an optimal payment method for individual players is not necessarily beneficial for the economy as a whole.

In west European countries there are several examples of the introduction of administrative measures aimed at encouraging the use of cashless payment methods. Some of the regulations employed most frequently in international practice are aimed at tracing the route of payments and transactions and restricting the scope of the shadow economy. One example is the Belgian Royal Decree no. 56 of 1967, which obliges companies to settle payments exceeding a determined amount by cheque or bank transfer. Similarly, a French law stipulates separate limits for companies and individuals, where invoices issued for amounts exceeding these limits can only be settled by cashless instruments. According to Italian regulations, the direct handover of cash exceeding a certain limit should only take place via intermediary institutions controlled by the state. Thus the purchase of goods and services by economic agents with cash can only be performed through the intermediation system. The mediators must always record the amount, the payer, the date and the goods or services purchased. In Finland rental fees may only be paid by cashless payment instruments.

Another type of regulation tries to divert the settlement of transactions to less expensive payment methods at the level of the entire economy. This group includes regulations where the government fully excludes cash from the settlement of wage, transfer and tax payments. In Germany almost all local
The tax authority cash counters have been closed, obliging economic agents to pay their tax liabilities by bank transfer. The taxation law, the civil service law or the civil service pension law set forth regulations according to which payments by the state can be transferred by the concerned government institution only to a bank account. In Greece government payments – though only above a certain limit – can only be made by bank transfer, while in The Netherlands public institutions must give preference to cashless payment methods over other means of payment.

Attempts have been made in Hungary as well to restrict the use of cash. In the mid 1990s the taxation law was amended to facilitate the better monitoring of companies’ revenues. The essence of the law amendment was to create less favourable conditions for cash payments than for electronic payments. For example, only 80% of cash payments exceeding HUF 1 million could be accounted as costs, while in the case of electronic payments the total amount was recognisable as an expense. However, the regulation was in force for less than one year as the Constitutional Court annulled it.\(^8\) The tax on vault cash – which was planned to be introduced in 2006 – would also have restricted cash use by companies. However, it was cancelled prior to its entry into force.

**SUMMARY**

The cash demand of the Hungarian economy can be considered high in international comparison. In 2007 the volume of the currency in circulation in Hungary exceeded not only that of the peripheral countries of the euro area prior to introducing the euro, but also that of Central and East European. The restriction of cash use as part of the measures aimed at whitening the economy have also appeared in economic policy discussions.

We tried to identify the factors behind the high cash demand characterising the Hungarian economy by analysing the stylised factors of the currency in circulation. The high cash requirement developed in parallel with the increase of cash demand observed in the last two years and is not explainable by the fundamentals of the economy (economic growth, inflationary processes). In our article we came to the conclusion that the introduction of the tax on interest in 2006 led to increasing cash demand through the diminished opportunity cost of cash holding, as did the increased tax burden stemming from measures aimed at reducing the budget deficit and the more stringent measures of the tax authority through the growth of cash demand in the shadow economy. Furthermore, the relatively high demand may also be explained by the fact that in international comparison Hungary lags behind in the use of cashless payment instruments.

The use of cash simplifies the operation of the shadow economy, which is unfavourable to long-term economic growth due to hidden income and tax evasion. In addition, the high cash demand – as opposed to more intensive use of alternative payment methods – may burden the economy with additional costs. In developed countries we have seen several examples of administrative measures restricting the use of cash. These are aimed at restricting the scope of the shadow economy, or try to divert the settlement of transactions to less expensive payment methods on the level of the entire economy. Attempts have also been made in Hungary to restrict the use of cash. However, they were in effect only for a short period or did not even enter into force.

**REFERENCES**


\(^8\) According to the reasoning of the Constitutional Court, the amendments classify as the abuse of legislative authority since the restriction of cash payments cannot be the function of tax legislation.


Zoltán Reppa: Interest rate expectations and macroeconomic shocks affecting the yield curve

This study briefly presents the tools the Magyar Nemzeti Bank uses to estimate and interpret the yield curve, and to analyse the underlying reasons of yield changes. The first part of the study compares the yields of government securities and those of interbank and interest rate swap markets, and examines the reasons behind their differences. The second part sums up the dynamic model that is used to describe the interaction between the yield curve and the macroeconomy. This model enables us to examine the different macroeconomic shocks which impact the development of the yield curve; from a central bank perspective it is particularly important to gauge the impact of monetary policy shocks and monetary policy measures on long-term yields.

INTRODUCTION

Changing the base interest rate is a means used by the MNB to influence economic processes. The maturity of the base interest rate is extremely short, merely two weeks, therefore it can only impact the short-term yields of the interbank market. Macroeconomic decisions, however, typically depend on the developments of longer-term yields; thus, in order to assess how the MNB can influence these decisions, we need to examine how longer-term yields react to changes in the base interest rate.¹

This reaction depends on the reason for the base interest rate change. As we will see, long-term yields typically stem from expectations regarding short-term yields; if raising the base interest rate is unexpected or is a reaction to mounting inflation, market participants may draw different conclusions.

Therefore, there is need for a model, which can grasp the dichotomous, instantaneous and delayed correlations between macro variables and different maturity yields. Since a vast majority of macro variables become available with a monthly frequency at best, this model would not be able to explain daily yield shifts. At the same time, in order to handle its tasks related to stability, provisioning and financial market operations, the MNB needs yield curves with a daily frequency.

This study shows the data and methods with which the MNB estimates the daily yield curve, and the models it uses to examine the correlation between the yield curve and the macroeconomy.

THE YIELD CURVE

Theoretical grounds

The zero coupon yield with a maturity of \( t \) is the return on a security which matures at \( t \), and does not pay a yield until maturity. Assuming that a three-month, 1000 forint treasury bill costs 980 forints today, the value of the three-month zero coupon yield will be \( 4 \times 100 \left( \frac{1000}{980} - 1 \right) \approx 8.16 \) percentage points.² Besides treasury bills, interbank loans are considered zero coupon investments as well; their yields are expressed by BUBOR (Budapest Interbank Offer rate) yields.

The zero coupon yield curve, or simply yield curve, is a graph whose value at \( t \) corresponds to the yield of a zero coupon with maturity \( t \). Obviously, the yield curve is a theoretical construct; in practice, there is no corresponding investment for each individual maturity. The whole point of plotting the yield curve is to produce a continuous yield curve from the yields observed for existing maturities.

Such a continuous yield curve can be used for several purposes. First of all, while smoothing the yield curve, we have the opportunity to remove noise from the core data. Second, we can derive forward yields from the yield curve, which incorporate market expectations of future returns.

The way to calculate a forward yield starting at \( t \) and maturing at \( h \) is as follows:

\[
 f_{t,h} = \frac{100}{h} \times \left( \frac{1 + \frac{t+h}{100} r_{t+h}}{1 + \frac{t}{100} r_t} - 1 \right). \tag{1}
\]

¹ The role of the information obtained from financial markets in shaping Hungarian monetary policy is described in detail by Delikát (2007).
² The multiplier of 4 is needed because we use annualised yields.
Assuming that the three-month and the six-month zero coupon yields are 8% and 8.5% respectively, the three-month forward yield starting three months from now will be

\[ f_{3,3} = 4 \times 100 \times \left( \frac{1 + 0.085/2}{1 + 0.08/4} - 1 \right) \approx 8.82\% . \]

The formula derives from the following, simple consideration. There are two ways to make a six-month investment: we either buy a six-month treasury bill today, or we buy a three-month bond today, and when it matures we buy another three-month bond from the proceeds; the forward yield will be the yield which provides the same return for both strategies in six months.

By means of formula (1), a forward curve can be calculated for any maturity \( h \), which creates a link between short-term and long-term yields. In theoretical literature, studies focusing on the relationship between short-term and long-term yields can be divided into two main groups. Papers concentrating on macroeconomics typically apply the expectation hypothesis, which assumes that long-term yields are determined by expectations regarding the future changes of short-term yields, and the forward curve reflects these expectations. In contrast, the financial approach stresses the no-arbitrage theory, according to which it is impossible to realise profits risk-free in efficient markets; what is needed for this is the existence of certain relationships between yields of various maturities, of which formula (1) is one of the most basic examples.

In theory, the link between the two model frames is established by the risk premium, i.e. the difference between the expected and the observed yields, which is defined by the risk sensitivity of investors. Besides this, other distorting factors may play a role in practice, for example the maturity premium, liquidity premium and counterparty risk premium.

**DAILY YIELD CURVE**

The main objective of daily yield estimates is to assess the current status of financial markets and the expectations of market participants regarding the central bank base rate. For the latter, the objective is to assess short-term expectations regarding short-term or, as the case may be, the next rate setting decision.

The practice of the MNB in estimating daily yield curves is based on two data types: besides standard government bond market yield curves, from the spring of 2008 we have also made adjustments by using interbank yields and interest rate swap data. It is evident that the two markets are in a close relationship, which is primarily due to the hedging activities of interest swap market makers; at the same time, however, they also feature certain differences, which justify the simultaneous use of both yield curves.

**Government bond market yields**

The MNB uses secondary market yields quoted on the Budapest Stock Exchange to estimate the government bond market yield curve, because this is the only information available for investors not trading actively. However, the reliability of the information content of stock exchange quotes is highly doubtful: as Balogh and Kóczán (2008) have indicated, stock exchange contracts account for a mere one per cent of the total secondary market turnover, and according to anecdotal information, stock exchange bid-ask spreads are ten times higher than the typical spreads of OTC deals (50 and 5-10 basis points).

Another problem stems from the fact that the shortest maturity available for government bonds with a liquid market is usually three months, making the short end of the estimated yield curve a mere extrapolation depending on the functional form assumed during the curve fitting; thus the ability of the estimated yield curve to assess short-term expectations is highly limited.

Due to the presence of ‘on the run’ bonds, which have a significantly higher turnover than securities of other maturities, the liquidity of the bond market is not perfect across longer maturities either. Typically, markets whose bonds are considered by the Government Debt Management Agency to determine benchmark yields are more liquid.

This certainly does not imply that the government bond market yield curve is not necessary; besides assessing short-term expectations, the yield curve is an important tool in other areas as well, such as reserve management. In addition, since data on the relevant foreign yields are easy to access, it is practical to use government bond market yield curves for the calculation of the 5 x 5 yield spread, which is widely used in international comparison, such as in analyses discussing the expected date of the euro changeover.

---

3 The estimation methodology is discussed in Gyomai & Varsányi (2002).

4 The 5X5 forward yield is the five-year yield expected for a time horizon of five years, denoted by \( f_{5,5} \) in formula (1). This is the average value of the yield curve segment between 5 and 10 years, and is used as a measure of expected long-term yields. The 5X5 yield spread is the difference between the 5 X 5 yields derived from euro area and forint yield curves.
Interest rate swap and interbank yields

In an interest rate swap transaction, the contracting parties swap a fixed and a floating rate security. For forint swaps, the floating leg is typically the six-month BUBOR yield and the fixed leg is determined such that the net present value of the two cash flows be identical. During the estimation of the swap curve, we determine the yield curve applied by the market to calculate the net present value, which will therefore reflect the expectations of the floating leg or, in our case, the expectations of future interbank yields.

Although the shortest swap yields used by the MNB have a maturity of one year, the fact that the floating leg equals the BUBOR rate enables us to incorporate interbank yields directly into the estimation, thus the swap curve provides observable, reliable data for maturities as short as two weeks.

The short end of the swap curve can be further improved by taking into account the so-called forward rate agreement (in short, FRA) quotes. The FRA yield is essentially a ‘bet’ made on the future values of BUBOR: assuming that the 3 x 6 FRA yield is currently 8.5 per cent, in three months’ time the buyer will gain the difference between the then prevailing three-month BUBOR rate and 8.5 per cent. Of all observable yields, FRA yields reflect market expectations the most directly.

Differences between the yields of the two markets

A crucial difference between the two markets is the type of premia their spreads contain, and the size of the premia. Our analyses suggest that the liquidity of the interest rate swap market exceeds that of the government bond market, thus the distorting effect of liquidity premia is probably less reflected in the swap yields.

Assessing the size of counterparty risk premia is a complicated task. On the one hand, government bonds represent sovereign debt; traditionally, they are considered the safest investment in a specific country, which implies that government bond yields contain less counterparty risk premium. On the other hand, the credit rating of banks quoting interest rate swaps is often higher than the Hungarian sovereign debt rating, and we should also keep in mind that interest rate swap and FRA contracts are derivative transactions where the principal is not exchanged, which reduces counterparty risk. These arguments suggest that swap yields may in fact contain smaller counterparty risk premia.

Besides premia, the two markets also differ with respect to the range of their final investors. Non-resident investors seeking short-term profit on interest rates play a more significant role in the interest swap market. The reason for

---

1 In the case of one-year swap contracts, the floating leg equals the three-month BUBOR yield.

2 The main characteristics of the forint interest swap market and the details of swap curve estimation are discussed in Csávás et al. (2007) and Reppa (2008).
this, besides higher liquidity, is that transaction costs are lower (for example, there are no custodian management fees) and short selling is easier in the swap market. In contrast, the government bond market engages mostly domestic institutional investors and non-resident convergence investors with longer-term goals.

As noted above, the hedging activities of banks in the interest swap markets create a close link between the two markets. Nevertheless, this connection does not imply a perfect correlation between yields; according to the analysis of Csávás et al. (2007), their differences – the so-called swap spreads – could be rather significant and long lasting, as indicated by Chart 1. If that is the case, it is important to know which market is dominant; i.e. in which market new information appears first. Although our quantitative analyses to determine this did not produce affirmative results, it appears reasonable to assume that yields are priced in the more liquid swap market, which is not burdened by transaction costs.

These differences, which are observed under normal market conditions, tend to become more intense during turbulent market periods. The entire year of 2008 – particularly March and October – has been such a period in the Hungarian government bond market. As Chart 2 reveals, the three-year swap spread in March and October stood around -100 and -250 basis points respectively, and in the period following March it barely rose above -30 basis points, which was unprecedented since the end of 2003 and the beginning of 2004. The underlying reason was probably the ‘drying up’ of the government bond market, which triggered a significant growth of liquidity premia incorporated in bond prices, resulting in the failure of stock exchange bond yields to meet expectations.

MACROECONOMY AND YIELDS

Dynamic yield curve models

Although mapping market expectations is critical for monetary policy decisions, it is even more crucial to anticipate the impact of these decisions on expectations and other macroeconomic variables. Daily estimated yield curves provide only a highly superficial answer to this question: on the one hand, the effects of different structural macro shocks cannot be separated from one another; on the other, they exclude any potentially delayed impacts of the shocks.

The separation of structural shocks – also known as structural identification – may become problematic, as by definition structural shocks are unexpected shocks which are independent of each other and can impact several variables simultaneously. Looking at it from another angle, this means that changing the central bank base rate does not necessarily imply a monetary policy shock; the rate-setting decision may in fact be a reaction to a risk premium shock, or a previous (inflation altering) demand shock. The reason why identification is needed is that the effect of rate-setting decisions may differ depending on the type of shock that triggered it.

The simplest and most common method to describe the dynamic relationship between multiple time series is the application of vector autoregression (VAR) models. The foundations of the method are detailed in Hamilton (1994). In this context, ‘simple’ means that beyond the selection of the number of variables and lags, no other theoretical restrictions are required to estimate a VAR model. However, this comes at a price – a VAR model does not reveal much information on simultaneous effects.

The essence of a structural VAR model, i.e. the combination of the structural approach and the VAR approach, is that a VAR model is applied to describe dynamic relationships, while simultaneous correlations are identified by means of a possibly small number of commonly accepted theoretical restrictions. Rubio-Ramírez et al. (2008) provide a comprehensive description of the technical details of structural VAR identification.

For the calculation of swap spreads, the par yield computed from the government bond market yield curve was deducted from the swap yields.

The foundations of the method are detailed in Hamilton (1994).

Rubio-Ramírez et al. (2008) provide a comprehensive description of the technical details of structural VAR identification.
extensions – which involves the least amount of theoretical restrictions – is the dynamic Nelson-Siegel model (DNS) developed by Diebold & Li (2006) and Diebold et al. (2006). This method essentially describes the evolution of yields observed for different maturities by unobservable factors, while the relationship between the macroeconomy and yields is expressed by the VAR, which includes latent factors and macro variables.10

Shocks were identified by imposing sign restrictions.11 This method requires the least amount of theoretical restrictions to separate the shocks; there are no restrictions other than the direction of the effects. The lack of restrictions has its limitations – the computed results are mere uncertainty intervals, which may be rather wide, depending on the number of restrictions.

**Estimation results**

The macro variables incorporated in the model were inflation, industrial output, forint/euro exchange rate and the central bank base rate. We used monthly data. We identified four structural shocks: with respect to the demand and supply shocks, we assumed that they both increase industrial output in the short run, while the demand shock increases and the supply shock decreases inflation. Our assumptions were similar for the separation of monetary policy shocks and risk premium shocks – they both increase the base rate, while premium shocks weaken and monetary policy shocks strengthen the exchange rate.

Chart 4 indicates the most crucial findings from the perspective of the central bank: the effect of monetary policy shocks on forward yields. According to the chart, an unexpected, unit12 raise of the base rate increases short-term forward yields – those with a maturity of approximately 3 to 3.5 years or less – and decreases forward yields with a longer maturity spectrum. However, this effect is neither economically nor statistically significant.

The effect of a monetary policy shock is most dramatic immediately after the shock. The case is not the same for demand and supply shocks. As shown by Chart 5, these yields tend to react to the shock with a degree of lag. Chart 5 indicates the effect of the demand shock on three-month forward yields, based on the time elapsed from the occurrence of the shock. It is evident that the immediate effect is almost zero, while the biggest change is observed 5 to 7 months following the shock. The chart also suggests that this effect is statistically significant and more pronounced than the reaction to monetary policy shocks.

In order to understand the delayed reaction, it is important to see that each shock exerts its effect on the yield curve through the base rate and through the expectations regarding the base rate. It is obvious that monetary policy shocks produce the fastest and most direct effects. Chart 5 can be seen as market participants’ expectations of the monetary policy to a demand shock. Considering that the reaction of the monetary policy with respect to demand and supply shocks typically occurs simultaneously with the publication

---

10 The most frequently used yield curve models are compared by Diebold et al. (2005).
12 A unit shock equals one deviation, which is around 25 basis points for monetary policy shocks according to our estimate.
of the Quarterly Report on Inflation, and following the shock a period of time elapses until a thorough analysis can be published on its macroeconomic effects, the delayed reaction is quite natural.

This model also reveals the extent to which the forecast error of macro variables can be explained by individual structural shocks. The answer also depends on the time horizon of the error calculation. Table 1 indicates the decomposition of short-term and long-term forecast errors, showing what proportion of these errors can be attributed to the uncertainties surrounding the forecast of the structural shocks.

Evidently, with the exception of the exchange rate, the four shocks account for the majority of the variable variance (the last column of the table). Both the short-term and long-term developments of the base rate are primarily determined by risk premium shocks. The effects of monetary policy shocks are certainly significant over the short term; however, demand and supply shocks have a much more important role in the long run. Therefore, according to the model, the rate-setting decisions of the MNB in the sample period were more likely reactions to the shocks rather than unexpected actions.

This is supported by the fact that monetary policy shocks affect inflation and output only slightly. As a possible interpretation, we could conclude that monetary policy decisions, whether expected or not, have no effect on macro variables. Another possible interpretation – one that is more consistent with the analysis framework we applied – is to conclude that the monetary policy behaviour was predictable in the sample period, which was taken into account in the pricing decisions of market participants.

### Table 1

<table>
<thead>
<tr>
<th></th>
<th>(a) One month</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Premium</td>
<td>Monetary policy</td>
<td>Demand</td>
<td>Supply</td>
<td>Amount</td>
</tr>
<tr>
<td>Central bank base rate</td>
<td>44.60</td>
<td>17.26</td>
<td>18.52</td>
<td>5.84</td>
<td>86.22</td>
</tr>
<tr>
<td>Exchange rate</td>
<td>23.52</td>
<td>13.69</td>
<td>7.30</td>
<td>7.45</td>
<td>51.96</td>
</tr>
<tr>
<td>Inflation</td>
<td>1.31</td>
<td>0.79</td>
<td>54.25</td>
<td>40.61</td>
<td>96.97</td>
</tr>
<tr>
<td>Output</td>
<td>1.63</td>
<td>1.23</td>
<td>48.08</td>
<td>44.76</td>
<td>95.70</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>(b) Two years</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Premium</td>
<td>Monetary policy</td>
<td>Demand</td>
<td>Supply</td>
<td>Amount</td>
</tr>
<tr>
<td>Central bank base rate</td>
<td>35.05</td>
<td>11.15</td>
<td>21.80</td>
<td>21.93</td>
<td>89.92</td>
</tr>
<tr>
<td>Exchange rate</td>
<td>24.87</td>
<td>14.17</td>
<td>8.41</td>
<td>7.59</td>
<td>55.04</td>
</tr>
<tr>
<td>Inflation</td>
<td>4.88</td>
<td>3.56</td>
<td>48.80</td>
<td>34.38</td>
<td>91.63</td>
</tr>
<tr>
<td>Output</td>
<td>4.18</td>
<td>3.34</td>
<td>45.74</td>
<td>38.29</td>
<td>91.55</td>
</tr>
</tbody>
</table>

### Comparison with previous results

It is advisable to compare the conclusions drawn from any new model with the findings of previous analyses of the same problem. Since previous analyses mainly concentrate on the effect of monetary policy shocks, we have the same focus below.

With respect to methodology, our model is very similar to the one used in Vonnák (2005) – our basic model is also a VAR and shock identification is performed by means of the same sign restrictions. In that model, the monetary policy variable is the yield of the three-month treasury bill, and the reaction of short-term bonds is consistent with what we concluded from the DNS model. As long-term yields are excluded from the model, we cannot compare the effects made on these yields.

Rezessy examines monetary policy effects on daily data (2005). This paper also analyses the reaction of long-term, five-year and ten-year forward yields; however, it excludes delayed reactions from the analysis. Similar to the findings of the DNS model, the study finds that long-term forward yields decrease as a reaction to a base rate increase, and the size of the decrease is statistically significant. This similarity is particularly important, since the applied methodology is radically different from the one we presented above, making the described results more robust.

Kiss (2004) also focuses on daily yield data. However, the explanatory variables applied there involve macroeconomic news and communications, and the new information they contain. Again, this study focuses on short-term effects and does not find a significant relationship between unexpected rate-setting decisions and yields. However, new information
contained in inflation and GDP data does have a significant effect on yields in general, and long-term yields in particular. This is consistent with our conclusion based on the DNS model – demand and supply shocks have a significant effect.

SUMMARY

The MNB uses the yield curve for two purposes. On a daily basis, our objectives are to assess the short-term interest rate expectations of market participants and to calculate the discount rates required for collateral pricing, while we use monthly data to estimate the model applied for the analysis of the effects of monetary policy decisions.

When extracting expectations, we need to remember that the observed yields contain different kinds of premia, whose value depends, inter alia, on the risk appetite of market participants, liquidity and transaction costs. In view of these factors, we believe that the yield curve estimated from interbank yields and forint interest swap market yields can grasp expectations better.

For the analysis of the macro effects of monetary policy decisions, a model which can separate monetary policy shocks from other major structural shocks affecting the economy is required. The dynamic Nelson-Siegel model we used for our estimation meets this requirement with the least amount of theoretical restrictions.

According to our findings, monetary policy shocks increase short-term forward yields, while yields decrease across maturities of over three years. The shock has the highest impact in the period when it occurs and lasts for about one year.

Reaction to demand and supply shocks is slower and its full impact is delayed. The reaction of yields peaks about half a year following the shock. It is difficult to assess the macro effects of these shocks precisely, which is probably the reason behind the delayed reaction; and the reaction of the MNB to these shocks is inevitably also somewhat delayed.

According to our model, the majority of the MNB’s rate-setting decisions in the sample period were a reaction to other unexpected, structural shocks. The volatility of the risk premium played a decisive role in this, while the fluctuations of demand and supply influenced the base rate mainly over a longer time horizon.

REFERENCES


Adrien Szücs: The 200 forint denomination will be a coin

On 23 June 2008 the Monetary Council of the Magyar Nemzeti Bank decided to reissue the 200 forint coin in the first half of 2009. In this study, we shall summarise the social and technical aspects considered during the preparatory phase of the decision. The case is justified by the difference between the 'economy' of small denomination banknotes and large denomination coins. In the case of small denomination banknotes, expenditures are incurred continuously, since – due to their fast wear and tear – significant reproduction costs can be calculated. Wear and tear in the case of larger denomination coins is negligible, therefore expenses are primarily incurred from the one-off manufacturing of the initial stock, which are only supplemented by meeting the demand arising from eventual turnover expansion. Switching to coins – as a function of the year of switching over to the euro – can generate savings of 8%-13% of the cash production costs incurred until then. Since Hungarians use 200 forint banknotes as change, they are quickly damaged and the resulting high reproduction costs increase state budget expenditures, i.e. the taxpayers’ burden. Coins – replacing the easily damaged small denomination banknotes – are more durable, their handling is safer and their use is more practical in numerous cash payment situations. Another consideration was to approximate the denomination series of the forint to that of the euro, thereby accustoming the population to the larger denomination coins and converting them into conscious users. Following transition to the euro, the purchasing power of the coins will be higher than in the forint period, thus the introduction of the 200 forint coin may be considered as preparation for the euro.

Table 1 illustrates that in the case of banknotes a large volume of new notes must be manufactured every year in order to replace the volume of banknotes destroyed due to wear and tear. The manufacturing cost of 200 forint banknotes represents 17% of total banknote production costs.

### Table 1
Production and scrapping figures pertaining to 200 forint banknotes between 2001 and 2007

<table>
<thead>
<tr>
<th>Year of manufacture</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity produced (million)</td>
<td>38</td>
<td>20</td>
<td>21</td>
<td>19</td>
<td>27</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>Unfit rate (%)*</td>
<td>44</td>
<td>42</td>
<td>39</td>
<td>38</td>
<td>45</td>
<td>46</td>
<td>50</td>
</tr>
<tr>
<td>Manufacturing cost (gross, million)</td>
<td>850</td>
<td>620</td>
<td>600</td>
<td>530</td>
<td>670</td>
<td>550</td>
<td>810</td>
</tr>
</tbody>
</table>

* In relation to the quantity of banknotes delivered to and processed by the MNB.

Source: MNB.
Later, we shall describe the business case type analysis of replacing the 200 forint denomination by coins. In the first part of the analysis, we shall deal with the public sector’s aspects, i.e. the costs and savings realised by the MNB. The second sub-section will examine the private sector, describing the outcomes affecting it in connection with the replacement of the 200 forint denomination, based on available information and that revealed in the course of technical and social consultations.

COST-BENEFIT ANALYSIS

Community sector

In Charts 1 and 2, we illustrate our forecast concerning the volume of banknotes and coins to be manufactured and the total cumulated costs thereof as a function of several potential dates of transition to the euro – since the exact date of the euro’s introduction is not yet known. Accordingly, in the case of 200 forint banknotes, the volume to be manufactured each year varies based on the date of the planned introduction of the euro. In our simulation – for the sake of simplicity – we work with the same volume of banknote replacement each year. In case of the 200 forint coin, unfit replacement was not taken into account, because of the limited lifespan of coins’ usage in circulation.

Chart 1

Planned volume of the 200 forint denomination to be manufactured between 2009 and 2015*

* Assuming transition to the euro on 1 January of the year concerned. Source: MNB.

Chart 1 clearly illustrates the surplus of banknotes to be manufactured annually due to increased wear and tear affecting the cash in circulation. According to the chart, the volume of banknotes to be replaced every two years corresponds to the volume of coin stock estimated to be sufficient for 6 years (over 70 million pieces).

Chart 2 illustrates a comparison as a function of the previous volume figures and the current prices. We compared the manufacturing costs of the 200 forint banknotes and coins for the 2008-2015 period based on a preliminary price calculation agreed with Magyar Pénzverő Zrt. (Hungarian Mint Ltd.). In the case of banknotes and coins, costs are almost identical to small denomination banknotes and the coins of corresponding denomination can be produced at more or less the same cost. The relatively accurate price estimation of coins is possible due to the fact that Magyar Pénzverő Zrt. plans to manufacture a volume sufficient to meet almost six years’ demand in a single phase (in 2009). When planning the volume of coins to be produced, we have set out from the fact that the relevant expert opinions consider 2014-2015 as the earliest date of transition to the euro. An additional advantage is that a somewhat lower production price can thus be planned, due to the volume to be produced. In our analysis we assumed constant raw material prices, exchange rates and settlements with Pénzverő Zrt. at current levels.

The considerable increase of expenses derives from the extra volume of banknote production and is also reflected in the cumulated costs illustrated in Chart 2. According to this, the presence of banknotes in circulation – as opposed to coins – increases proportionately to the shift in time of euro introduction. In our simulation, we considered 2015 the latest possible date of switching to the euro. The maximum 7
years represent a very short period compared to the lifespan of coins, which is 20-30 years on average, as opposed to that of small denomination banknotes, which is only 2-3 years.

In addition to the savings on manufacturing costs, it should also be taken into account that upon withdrawal of the coins, we may later also count on revenue from the sale of raw materials (around 70%-80% of the then prevailing value of the raw material). On the other hand, costs are increased by the previously mentioned preparatory expenses of issue. The impact of these three factors is illustrated in Chart 3.

Summarising the above, in a standard situation the switchover to coins is cost-effective even if the euro is introduced as early as 2011, and the savings at present value increase in each subsequent year by over HUF 800 million.

We estimated the volume of 200 forint coins to be manufactured based on the volume of banknotes in circulation. It may occur that demand will be lower, as part of the 200 forint banknotes already in circulation for 10 years have probably been lost or taken abroad. At the same time, other factors may increase demand for this denomination (e.g. the demand for the 100 forint denomination may drop as a result of the substitution impact and the demand for the 200 forint coin may increase due to the spread of vending machines).

It should be noted that we did not consider specifically social costs, based on the presumption that the introduction and continuous use of the 200 forint coin will not generate significantly different circumstances from those of banknotes for the private sector. Later, we shall examine the possible considerations of the private sector.

**Private sector**

The issue of banknote versus coin should also be examined in terms of the other potential impacts – apart from the savings appearing in the community sector – generated by switching from banknotes to coins.

The MNB decided – in accordance with its corporate social responsibility (CSR) strategy approved in 2008, which highlights the importance of equal dialogue with all relevant parties – to initiate a large-scale process of social and professional consultation in relation to the introduction of the 200 forint coin. As part of this consultation process, the MNB wanted to discuss matters related to the decision with the most important stakeholders concerned.

The dialogue focused on two large target groups. On the one hand, the central bank was interested in the general opinion of the public, and on the other it wished to know the standpoint of professionals involved in cash usage, processing and transport.
As part of the social/population impact analysis of the 200 forint replacement, the MNB conducted a multi-step comprehensive poll using a variety of methods.

According to the representative survey conducted among the Hungarian population, the ratio of respondents who deemed the replacement of the 200 forint banknotes by coins a good idea was the same as that of those who thought it not so good, while one-fifth of respondents were uncertain. The main advantage perceived was the durability of coins, while the weight of coins was mentioned as the biggest drawback. With the fall of the forint’s purchasing power, the majority of respondents deemed it reasonable to introduce coins for the 200 forint denomination. However, based on the qualitative results, on the whole the majority of respondents did not reject the idea. Less supportive, sceptical opinions were expressed only by members of the older generation. Other age-groups can generally be convinced by rational arguments and/or they are neutral or receptive concerning the introduction of the 200 forint coin. At the end of the consultation process, two-thirds of the participants supported the introduction of the 200 forint coin.

In order to discover the opinion of professionals, the MNB initiated consultations in multiple forms, similarly to the survey of the population. On the one hand, it conducted personal interviews and discussions with representatives of authorities, government organisations and interest representatives (e.g. National Trade Association, Trade Union of Commercial Employees, Hungarian Chamber of Commerce and Industry, National Consumer Protection Union, Hungarian Society of the Blind and Partially-sighted, etc.). On the other hand, it organised special trade forums with the focus – apart from consultation – of mapping and identifying the risks deriving from the changeover. This forum was attended by representatives of the Banking Association, financial organisations, cash processing providers and – in particular – companies operating, distributing and servicing vending machines.

One of the largest trade groups concerned comprises operators of food, beverage, tobacco, etc. vending machines. According to our calculations, although refitting the machines would generate significant, albeit one-off costs for all actors of the vending machine market, an increase in turnover may be achieved with the appearance of the 200 forint coins. Cost savings would be achieved in the case of vending machines also accepting banknotes, since – as experience shows – the banknote accepting units cease and tear the 200 forint banknotes, thus upon the introduction of the new coin, regular and extremely expensive troubleshooting could be eliminated. At the same time, it would be necessary to empty the vending machines less frequently, an area where cost reduction may also be expected. Taking all this into consideration we can reasonably assume that the vending machine operators – in their own interest – will facilitate the use of higher denomination coins in their vending machines (in legal terms the usage of the 200 forint coin will be optional and not mandatory, since the currently used coins will stay in circulation).

In order to discuss the opinion of credit institutions, the Banking Association, the Hungarian Post and the three largest cash processing companies, the MNB organised a Cash Forum with the participation of these organisations. It was revealed during the consultation that the sector fears that its costs will increase. Furthermore, the Hungarian Post also mentioned that the replacement of the banknote turnover by coins will result – in terms of cash management – in a weight increase of several tens of tons. The MNB reviewed this opinion and considered it in its preparations for making a decision.

**PROCESS OF DEVELOPING THE EXTERIOR OF THE COIN**

On 23 June 2008 the Monetary Council of the MNB – having considered all points of view – decided to introduce the 200 forint coin. Following this, consultations continued in professional circles concerning the development of the technical parameters (raw material, shape, size, edge-ring) of the new coin.

MNB experts considered all options when developing the coin. They studied the present circulation coins of various countries, as well as other, unique coins, contacted the experts of other central banks working in the same domain, as well as foreign mints in order to share know-how efficiently. In the form of a preliminary questionnaire-based survey, they initiated a review among domestic cash processing organisations, operators of various vending machines, processing companies and vending machine maintenance companies, as well as with the Hungarian Association of the Blind and Partially-sighted, in order to assess the options concerning the technical aspects of the new coin. Trade consultations continued after processing of the questionnaires.

The composition of the base material plays a pivotal role in terms of identification by the public and by vending machines. However, commercially available alloys cannot be used (mainly due to the risk of counterfeiting), or only in case of smaller denominations. Thus, having involved the professional players concerned, consensus was reached in the choice of the base material from a large number of base
materials, which is essentially copper-based and in specially alloyed form, complying with the strict requirements of large denomination coins.

This was followed by determining the shape of the coin. A wide range of ideas was presented in this area as well, from the simplest round form to a polygon. As an optimal combination of feasibility and usability, the round form was selected. This coin shape is the one that meets the largest number of requirements of processing by machine and usability, and – last but not least – the refitting cost of vending machines using coins will be the lowest in this case.

After reaching agreement concerning the raw material and shape, the next step was to determine the exact size. Unfortunately, a rather narrow choice in relation to diameter was available in terms of feasibility. On the one hand, there is the current denomination series and the sizes thereof, while on the other the requirement of sufficient deviation from the coins of neighbouring countries presented itself as a further restrictive factor. Hence the only feasible solution was a coin size larger than the present 50 forint coin. However, the range of available options for the edge was wider. Accordingly, several feasible opportunities presented themselves. The reverse side of the new coin will differ from that of the present circulation coin series. The MNB wished to consider the blind and partially-sighted, thus so-called longitudinal streaks are used on the coin, and the edge (milling) will also be unique – an intermittently milled surface where the smooth and milled sections are of identical length, thereby facilitating tactile recognition.

Having incorporated the opinions expressed during the meetings and discussions and studied international experiences, the parameters meeting commercial expectations in all aspects were finally defined. Thus on 9 September 2008 the MNB decided that the new 200 forint will be a bimetal coin (bicolour, made of two different metal alloys), while in its appearance it will be the inverse image of the current 100 forint coin, round in shape with a diagonal of 28.3 mm, an edge height of 2.0 mm and a weight of 9 grams. Thus it will be easily and safely distinguishable from other coins by all parties, and with its parameters being sufficiently different from those of the present circulation coins it will not hinder cash usage.

The MNB wished to provide the public with a further opportunity to express its opinion concerning the image on the 200 forint coin; therefore in October 2008 it launched a two-week public voting campaign conducted over the Internet and by phone. There were several reasons for this. On the one hand, in the case of cash subjective acceptance
plays an important role and involvement and the ability to choose facilitates later acceptance. On the other, the MNB can demonstrate its efforts to reach social consensus and make the population gradually aware that the new coin will appear soon; thus upon its issue the coin, familiar to all and – more importantly – selected by the majority, will have a positive reception. The final front side could be selected from the following six image designs during the voting: a white stork, a woodpecker, a bear’s ear, draba lasiocarpa, the Chain Bridge or the new Megyer Bridge. Based on the choice of more than half of the almost 200,000 voters, the front side of the new 200 forint coin will display the Chain Bridge.

We consider it very important to emphasise that for the first time a coin will be created based on consensus, where the final coin image was selected by active users – i.e. the population – and which will be made with technical parameters which, in the opinion of the professional sector, are suitable in all aspects. This broad consultation process was exemplary according to the unanimous opinion of participants, and also strengthened understanding and cooperation between the central bank, the general public and professional organisations.

INTERNATIONAL AND DOMESTIC EXPERIENCES IN BANKNOTE-COIN REPLACEMENT

In order to ensure the successful introduction of the 200 forint coin next year, the MNB examined several benchmarks and integrated the findings into its plans. The experiences of countries that have made (successful or failed) attempts to replace an existing banknote by coin were analysed.

Experiences with the 1 dollar coin (USA)

In the United States, the 1 dollar coin has been in existence – in addition to the traditional 1 dollar banknote – since the 1970s. During the last 25 years, even two 1 dollar coins – with different designs – were issued in the US, but neither of them could fulfil their role successfully in cash circulation. On the other hand, banknote-coin replacements of similar value, or even of values over 3 dollars, were implemented successfully in other countries (Canada, Japan, Great-Britain). American experts initiated a broad survey in 1990 to discover why the introduction of the coin had not been successful. In their research comparisons were made with the participation of several countries’ experts to identify the necessary conditions for the successful implementation of a large denomination coin. The following countries were reviewed (the date of replacement in brackets): Canada (1987), France (1970, 1975), The Netherlands (1988), Norway (1964, 1984), Spain (1982, 1986, 1988), Switzerland, Great-Britain (1983) and the Federal Republic of Germany. In the survey, interviewees mentioned the following factors as the key to successful implementation (in order of importance, the number of states/number of states inspected in brackets):

- banknotes must be withdrawn and destroyed (6/8)
- the public must be informed of the change (5/8)
- the negative attitude of a part of the population must be taken into consideration; enough lead time must be allowed for the exchange of the banknotes (4/8)
- the required volume of coins must be available (4/8)
- the parties concerned and professional representatives must be consulted in advance (3/8)
- the new coins should be accepted by the various vending machines (2/8)
- the population must be informed that the reason for replacement of the denomination is cost saving (2/8)
- the coins should be neither too big, nor too small (2/8)
- the coin should represent a national symbol (1/8)
- the coins should not be mistakable for coins of neighbouring countries (1/8)

Why is it essential to withdraw banknotes?

The Cleveland study entitled The Fate of One-Dollar Coins in the U.S. provides a comprehensive answer to this question. It was demonstrated in the case of the 1 dollar that switching from banknote to coin would bring significant national economy advantages overall. However, even the extremely convincing figures were not sufficient to make those using cash the most often to prefer banknotes less than coins of the same denomination. Thus one of the most important criteria of successful replacement is to make a decision on the withdrawal of the same denomination banknotes. The length of the so-called parallel period – when banknotes and coins of the same denomination are in circulation simultaneously – varied as a function of several factors. On the one hand, sufficient time must be provided to the parties for transition and familiarisation. On the other, the handling of double denominations burdens economic agents with extra work; therefore this period should be sufficient, but suitably short. According to international experience, a period from 3
months to 2 years is the maximum that still meets the expectations, obviously also depending on the size of the economy concerned. However, in the case of the 1 dollar coin, the deadline for withdrawing the banknotes was not set on either occasion, thus the issue failed.

**Experiences of European countries**

We are aware that several European countries (Lithuania, Estonia, Slovenia, the Czech Republic, Bulgaria, Sweden, Cyprus) were dealing with the issue, or have already replaced their low denomination banknotes by coins.

For example, successful replacement took place in 1988 in The Netherlands (5 gulden), in 1991 in Cyprus (1 pound) and in Sweden (10 crowns), where the banknotes of these denominations were replaced by coins. In 2003 Slovenia (merely 4 years before the introduction of the euro) issued two new coins that already existed in a banknote version (20 and 50 tolar). On 31 August 2008 the Czech Republic withdrew banknotes of 20 crown denomination – which denomination existed in the form of banknotes and coins – and since then only the coin is in circulation.

**Domestic experiences**

In Hungary, there have been several examples of a well-tested banknote denomination being issued by the MNB in the form of a coin. In the past, 10, 20, 500 and 100 forint banknotes also existed, but when replacement became necessary (the 10 and 20 forint banknotes were in circulation until 1992, the 50 forint notes until 1995, and the 100 forint notes until 1998), they were replaced by coins. The replacements usually met a lack of public confidence, since generally people prefer banknotes to coins.

The finding that coins with identical denominations as banknotes could only spread in circulation and fulfil their tasks if the date of withdrawal of the banknotes was set in a foreseeable future, and the available banknotes started to run low proved to be true in Hungary as well. This is why the 100 forint coin issued in 1993 could not operate successfully, since the banknotes remained in circulation and due to parallel distribution, only a negligible volume of coins left the central bank.

Another important argument against parallel distribution is the significant extra workload generated by the parallel handling of banknotes and coins. This requires economic agents to keep double records and provide extra room and inventory management. It is therefore understandable that for the sake of simplicity, only the more convenient form of the denomination is used.

For these reasons, the introduction of the present bicolour 100 forint coin was already a successful replacement, as after the co-existence of banknotes and coins for a little over one year the banknotes were withdrawn. Ever since the 100 forint coins have been one of the most popular coins in payment circulation.

**SUMMARY**

One of the primary tasks of the Magyar Nemzeti Bank is to regularly provide the population with high-quality, safe cash of appropriate denomination breakdown. Accordingly, the central bank continuously reviews its distribution activity and adjusts it to the needs of the population and the national economy. Demonstrating an exemplary attitude by a public institution, the MNB initiated broad consultation aimed at the utmost possible satisfaction of these needs.

The MNB – as a responsible institution – must bear in mind the efficient utilisation of public funds in the course of its operation and business management. The lifespan of coins compared to that of small denomination banknotes could be up to tenfold, since their mutilation is negligible. Creased, torn and damaged banknotes, unfit for payment, must be destroyed by the MNB and new ones must be manufactured. With coins such damage cannot occur, thus their replacement requirement is minimal. The 200 forint coin can allow the country to save billions of forints.

An advantage for the private sector is that vending machines take coins more easily than creased banknotes. The population does not have to make extra visits to the post office or commercial banks with the torn banknotes, since coins are more durable and do not get torn or creased. A practical aspect is that the coin to be issued will be well-distinguishable from other coins due to its size and unique appearance. When parking or purchasing from vending machines, people can pay higher amounts and as a result – with the joint impact of the former withdrawal of 1 and 2 forint coins – will overall presumably need to carry fewer coins than in the past. The new coin is not expected to generate extra costs for merchants, as space was freed in the cash-box compartments with the withdrawal of the 1-2 forint coins, thus there will be room for the new coins.

A smooth transition will be ensured by a temporary period during which the 200 forint banknotes will stay in circulation for a short while. The new coins will presumably be issued in the second quarter of 2009, while the 200 forint banknote will remain legal tender until the end of 2009. The planned parallel period of around seven months will generate an extra burden for economic agents for a short period only, while
providing sufficient time for safe transition and familiarisation with the new coin.

Last but not least, a further consideration of the MNB was that currently the 1 and 2 euro coins are worth approximately HUF 250-500. The new denomination structure, including the 200 forint coin, may facilitate transition to the euro, since it corresponds to that of the euro area.

REFERENCES


Appendix

MNB BULLETIN ARTICLES (2006–2008)

3rd year, issue 3 (December 2008)

ÉVA FISCHER (2008): Challenges of financial integration in the Central and East European region

PÉTER KOROKNAI (2008): Hungary’s external liabilities in international comparison

RITA ODORÁN AND BALÁZS SISAK (2008): Cash demand of the Hungarian economy – is the shadow economy still running smoothly?

ZOLTÁN REPPA (2008): Interest rate expectations and macroeconomic shocks affecting the yield curve

ADRIEN SZÜCS (2008): The 200 forint denomination will be a coin

3rd year, issue 2 (September 2008)

FERENC KARVALITS (2008): Challenges of monetary policy – a global perspective and the Hungarian situation

SÁNDOR DÁVID (2008): The Single Euro Payments Area

DÁNIEL HOMOLYA AND GÁBOR SZIGEL (2008): Lending to local governments: Risks and behaviour of Hungarian banks

RÉKA JUHÁSZ (2008): The optimal rate of inflation and the inflation target: international experience and the Hungarian perspective

3rd year, issue 1 (April 2008)


KOMÁROMI, ANDRÁS: The structure of external financing: Is there a reason to worry about financing through debt?

KEKŐ, JUDIT AND GÁBOR P. KISS (2008): Tax evasion and tax changes in Hungary

NAGY, MÁRTON AND VIKTOR E. SZABÓ (2008): The sub-prime crisis and its impact on the Hungarian banking sector

PÁLES, JUDIT AND LŐRÁNT VARGA (2008): Trends in the liquidity of Hungarian financial markets – What does the MNB’s new liquidity index show?

2nd year, issue 2 (November 2007)

CSERMELY, ÁGNES AND ANDRÁS REZESSY (2007): The theory and practice of interest rate smoothing

DELIKÁT, ANNA (2007): Role of financial markets in monetary policy

HOLLÓ, DÁNIEL (2007): Household indebtedness and financial stability: Reasons to be afraid?

SÁNTA, LIVIA (2007): The role of central banks in crisis management – how do financial crisis simulation exercises help?

TÓTH, MÁTÉ BARNABÁS (2007): Monetary policy rules and a normative approach to the central bank’s objective function

ZSÁMBOKI, BALÁZS (2007): Impacts of financial regulation on the cyclicality of banks’ capital requirements and on financial stability

2nd year, issue 1 (June 2007)

BALÁS, TAMÁS AND CSABA MÓRÉ (2007): How resilient are Hungarian banks to liquidity shocks?

GÁL, PÉTER (2007): Unfavourable investment data – risks to economic growth?

KISS M., NORBERT AND KLÁRA PINTÉR (2007): How do macroeconomic announcements and FX market transactions affect exchange rates?

KOMÁROMI, ANDRÁS (2007): The effect of the monetary base on money supply – Does the quantity of central bank money carry any information?

1st year, issue 2 (December 2006)

GÁBRIEL, PÉTER AND KLÁRA PINTÉR (2006): Whom should we believe? Information content of the yield curve and analysts’ expectations

GÁBRIEL, PÉTER AND ÁDÁM REIFF (2006): The effect of the change in VAT rates on the consumer price index


MNB WORKING PAPERS 2007–2008


MNB Working Papers communicate the results of academic research within the central bank and present new, substantive scientific achievements. The series is published only in English from year 2005.

WP 2007/2. BENZŰR, PÉTER–ISTVÁN KÓNYA: Convergence, capital accumulation and the nominal exchange rate

WP 2007/3. VONNÁK, BALÁZS: The Hungarian Monetary Transmission Mechanism: an Assessment


WP 2007/5. BENK, SZILÁRD–MAX GILLMAN–MICHAL KEJAK: Money Velocity in an Endogenous Growth Business Cycle with Credit Shocks


WP 2008/1. NASZÓDI, ANNA: Are the exchange rates of EMU candidate countries anchored by their expected euro locking rates?

WP 2008/2. VALENTINYI-ENDRÉSZ, MARIANNA–ZOLTÁN VASÁRI: Macro stress testing with sector specific bankruptcy models

WP 2008/3. CSÁVÁS, CSABA: Density forecast evaluation and the effect of risk-neutral central moments on the currency risk premium: tests based on EUR/HUF option-implied densities

WP 2008/4. ATTILA CSAJBÓK: The use of staff policy recommendations in central banks

WP 2008/5. ALESSIA CAMPOLMI: Oil price shocks: Demand vs Supply in a two-country model

WP 2008/6. KÁTAY, GÁBOR AND ZOLTÁN WOLF: Driving Factors of Growth in Hungary – a Decomposition Exercise


WP 2008/9. ZOLTÁN M. JAKAB–BALÁZS VILÁGI: An estimated DSGE model of the Hungarian economy