



MAGYAR NEMZETI BANK

## MNB Bulletin

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The aim of the Magyar Nemzeti Bank with this publication is to inform professionals and the wider public in an easy-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 Szilárd Erhart, Gábor P. Kiss, Daniella Tóth and Balázs Zsámboki.

Authors of the articles in this publication: Katalin Bodnár, Csaba Csávás, Dániel Holló, Gergely Kiss, Márton Nagy, Balázs Párkányi and Lóránt Varga.

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# Preamble

## DEAR READER,

We are pleased to welcome you among the first readers of the MNB Bulletin!

The Magyar Nemzeti Bank assigns importance to regularly informing the experts and the wider public on current Hungarian economic trends and key economic issues in particular, which merit special attention. We hope that the Bulletin, as a new publication, will contribute to the dissemination of the most important results and conclusions of the central bank's research and analysis activity in a comprehensive form, made available to a wide readership.

I hope that the studies included in the volume offer an insight for the wider public into the research conducted at the central bank. I also hope that the analyses provide useful information to all interested readers.



A handwritten signature in black ink, which reads "Szapáry György". The signature is written in a cursive style.

*Dr. György Szapáry*  
*Deputy Governor*

# Summary

## DEAR READER,

This issue contains five studies which apply various approaches to analyse current issues related to the banking system and the financial markets, and the impact of fiscal policy on the macroeconomy.

By applying the results of a questionnaire survey, Katalin Bodnár examines the risks related to the foreign exchange indebtedness of resident small and medium-sized companies, the awareness of these companies of the assumed risks and their risk management practices. The most important conclusion of this study is that, despite rapidly growing foreign exchange indebtedness, the risk awareness of most of this sector is low, and the lack of hedging of these risks is an unfavourable phenomenon with regard to stability.

Csaba Csávás and Lóránt Varga analyse the role and trading strategy of non-residents on the foreign exchange and government bond markets. The understanding of this process is particularly important because non-residents play a determining role in the trading volume of both markets; thus their behaviour may fundamentally impact the functioning and risks of these markets. The analysis points to the fact that, in certain periods, there is a close correlation between the trading strategy of non-resident participants and the volatility of markets.

Dániel Holló and Márton Nagy analyse the banking systems of the old and new member states of the European Union on the basis of their efficiency, and, if such differences are observed in the banking systems' efficiency, how these change in time and how they influence the economic development of the individual member states. The results indicate that despite high profitability, the

Hungarian banking system holds major efficiency reserves, necessitating efficiency enhancing measures from bank executives in the future.

The analysis of Gergely Kiss discusses the lending activity of banks, attempting to determine the degree in which the dynamic expansion of lending in the Central Eastern European region is deemed to be an equilibrium trend or an excessive growth. This issue raises numerous problems with regard to financial stability; the analysis of the trend may also contribute to the better understanding of related risks. In relation to Hungary, the study concludes that, on the whole, the risk of an excessive growth in lending is not considered to be high; nevertheless, the prolonged high external borrowing requirement of the economy and the dynamic growth in household lending – particularly foreign exchange lending – may increase the risks.

The study written by Balázs Párkányi explores the degree and the channels in which a possible fiscal adjustment can affect the real economy. One of the important observations of the analysis suggests that the chosen fiscal political measures can induce different reactions from monetary policy, since the impact of specific budgetary measures on inflation may vary. The study also determines that the reaction of the private sector can partly offset the short-term effect of adjustment limiting economic growth.

We hope that the studies in this publication raise interesting issues and themes which will impress our readers and stimulate further thinking on the subject. We would welcome any suggestions or comments on the studies or this publication more generally.

*Editorial Board*

# Katalin Bodnár: Survey evidence on the exchange rate exposure of Hungarian SMEs

*During the past year, a survey was conducted among Hungarian small and medium enterprises. The results of the survey suggest that a significant ratio of companies is directly exposed to fluctuations in the exchange rate, which may affect their profitability to a large degree. The majority of surveyed companies, however, are not prepared for the potential effects of such fluctuations and do not use foreign exchange risk management tools. Indebtedness in foreign exchange could serve as the hedging against exchange rate risks, but enterprises mainly use it to minimise monthly repayment; therefore, the foreign exchange debt increases their exchange rate risks.*

## INTRODUCTION

One of the main responsibilities of the Magyar Nemzeti Bank is ensuring financial stability, including the monitoring of the whole system of financial institutions. A basic function of the banking system is to mediate funds between savers and investors. Shocks affecting the banks may limit this intermediary role, hence causing real economic costs. If, for example, credit losses rise in reaction to a shock, banks may reduce their credit supply to certain economic agents. If such actors do not receive funds from other sources, they are unable to implement their planned investments which may adversely affect economic growth and employment.

Data collected from the banks is often insufficient to enable a detailed analysis of arising risks. Currently, one of the greatest risks faced by the domestic banking sector is the expansion of foreign exchange lending. However, a detailed analysis of this issue is not possible in relation to corporate lending on the basis of data available on bank loan stocks.

We therefore conducted a survey in the autumn of 2005. In the framework of the survey, we collected information on the data and behaviour of micro, small and medium enterprises (hereinafter SMEs)<sup>1</sup> in three areas: indebtedness, exchange rate exposure and the management of exchange rate risks. The questionnaire served the objective of collecting detailed information on the sources companies use to draw foreign exchange loans, other channels through which exchange rate changes may affect the surveyed companies and how prepared they are for these effects. In general terms, we investigated the impact of possible exchange rate changes on SMEs and thereby the repayment of their debts vis-à-vis domestic banks.

## EXCHANGE RATE EXPOSURE, EXCHANGE RATE RISK, FOREIGN EXCHANGE DEBT

In an open economy, the exchange rate constitutes the most important price which directly or indirectly affects the financial position of numerous economic agents. We apply the concepts of exchange rate exposure and exchange rate risk to measure such effect. There is *exchange rate exposure (or FX exposure)* if changes in the exchange rate bear an impact on the profits and the net value of assets of economic agents. In contrast, the *exchange rate risk (or FX risk)* is the product of the probability of an exchange rate change and the exchange rate exposure.

Primarily those economic agents are exposed to the exchange rate changes which have foreign exchange revenues and expenditures, foreign exchange assets and liabilities. The weakening of the domestic currency produces a positive short-term impact on companies with positive net foreign exchange assets or foreign exchange revenue, while its strengthening has a negative effect. Such companies are exporting enterprises or those investing abroad. Contrary to the above, the strengthening of the domestic currency produces a favourable impact on companies with net foreign exchange liabilities or foreign exchange expenditures (importers, foreign exchange debtors). The effect of exchange rate shifts on competitiveness may modify these effects in the longer term.

As far as exchange rate exposure of the domestic economy is concerned, both the degree of openness and the increasing foreign exchange indebtedness imply that

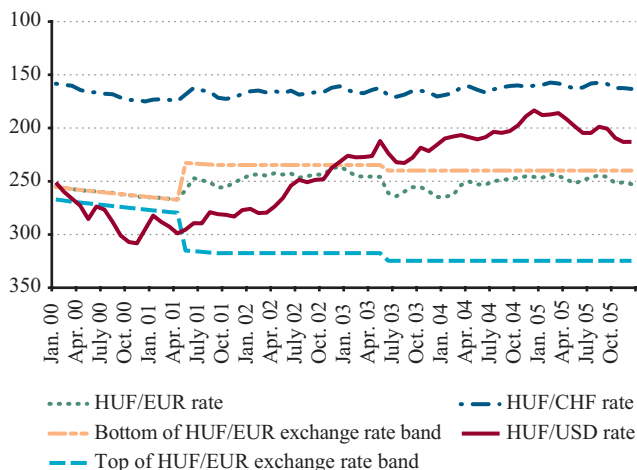
<sup>1</sup> Act XXXIV of 2004 defines small and medium enterprises (SMEs), as follows: "3. § (1) An enterprise is deemed to be an SME which a) employs a total of less than 250 employees, and b) has annual net sales revenue not exceeding the corresponding HUF amount of 50 million euro, or its balance sheet total does not exceed the corresponding HUF amount of 43 million euro. (2) Within the SME category, an enterprise is deemed to be a small enterprise which a) employs a total of less than 50 employees, and b) has annual net sales revenue or a balance sheet total not exceeding the corresponding HUF amount of 10 million euro. (3) Within the SME category, an enterprise is deemed to be a micro enterprise which a) employs a total of less than 10 employees, and b) has annual net sales revenue or a balance sheet total not exceeding the corresponding HUF amount of 2 million euro."



numerous economic agents may be directly exposed to foreign exchange developments. In the exchange rate system, the potential shift of the exchange rate is +/- 15 per cent in comparison to the central parity (see Chart 1), suggesting that the exchange rate risk is not negligible, either. This article does not analyse factors affecting the position and change of the exchange rate. Irrespective of the exchange rate system, *we analyse the effect of exchange rate shifts in any direction*. Naturally, we see a greater risk in devaluation, partly due to the rising rate of foreign exchange debt, and partly as a result of the current position of the forint in the exchange rate band. Most of the literature discussing the topic also examines the risks of devaluation, since many emerging economies have witnessed real economic losses due to devaluation.

**Chart 1**

**The HUF/EUR, HUF/USD and HUF/CHF exchange rate, 2000-2005 (monthly average rates)**



Source: MNB.

Once exchange rate risks arise, companies can elaborate various strategies to reduce these. One such method is *natural hedging*, that is, the matching of inflows and outflows, or assets and liabilities arising in the same currency. If, for example, an exporting company becomes indebted in a foreign currency, the value of both the foreign exchange debt and export sales revenues increases upon devaluation, thus the repayment of the foreign exchange debt does not pose a greater burden than in the past. In contrast, upon upward valuation, the easing of the foreign exchange debt burden may moderate the negative impact of falling sales revenue on profitability.

If natural hedging cannot be ensured, *artificial hedging instruments* are also available. Such instruments are

offered to companies by commercial banks. It is possible, for example, to sell future foreign exchange revenue to domestic currency at a prefixed exchange rate, thereby reducing or eliminating FX risks. If a company faces exchange rate risk, but underestimates it or is unable to apply hedging instruments, a shift in the exchange rate could produce unexpected effects and pose a systemic risk.

The example referred to in relation to natural hedging suggests that indebtedness in foreign exchange may be motivated by hedging purposes; in this case, foreign exchange debt reduces the exchange rate risk. The assumption of FX debt may also be motivated by its lower cost in comparison to that of debt in domestic forints. Thus, indebtedness in FX may be rational, if the foreign exchange debt is cheaper than debt in domestic currency, and this advantage is maintained, or does not change so as to frustrate repayment if there are exchange rate changes (as an example of the latter case, if the repayment of an FX loan increases to an amount, albeit not reaching the cost of debt in domestic currency, whereby the debtor, nevertheless, is unable to finance the debt).

International experience suggests that economies with a large amount of unhedged FX debt are highly sensitive to the devaluation of the domestic currency. If, namely, devaluation produces a negative impact on a given economy, the banking system will also be adversely affected. Changes in the exchange rate affect the repayment of foreign exchange loans and may also impact loans provided in domestic currency. The latter effect may in part be produced through domestic interest rates (devaluation of the exchange rate often induces an increase of domestic interest rates) or the indirect effects of changes in the exchange rate (due to the worsening competitiveness of debtors indebted in domestic currency, or, for example, if the exchange rate shift adversely affects the customers of a manufacturing company, demand may slacken, leading to the weaker solvency of the company).

Thus, upon a shift in the exchange rate, the stock of overdue or irrecoverable loans may increase. Although commercial banks generally provide collateralised (e.g. property backed) loans, the value of the collateral may fall, negatively affecting the profitability of banks and limiting their credit supply. The loan demand of unprofitable companies may slump; on the whole, less loan will be placed, investments will slow down which, in an extreme case, may even induce further negative real economic effects. If, however, an exchange rate shift has a positive effect on most companies, it will also result in positive developments for the banking sector.

Thus it is necessary to examine the characteristics of economic agents which are indebted vis-à-vis domestic banks. The analysis of borrowers drawing funds from other sources is also important, for their creditworthiness and financial position may produce an indirect impact on the banking system.

### IMPORTANCE AND CHARACTERISTICS OF THE DOMESTIC SME SECTOR

In recent years the significance of the SME sector has gradually increased, its prospects have improved, and particularly micro and small enterprises have gained in both economic weight and in relevance for the banking system. The profitability of these companies has improved, although it continues to lag behind the figures of large enterprises. The liquidity position of the sector, however, has not improved; moreover, it has worsened in certain branches in the recent period, primarily as a result of growing gridlock.

As an additional, general characteristic of the SME sector, its access to external funds is more limited than that of large enterprises. This is effectively reflected by the fact that large enterprises draw a major amount of funds from abroad, while SMEs generally rely on domestic banks. In addition, these enterprises are more sensitive to monthly repayments than large enterprises, which is why they prefer FX loans to domestic currency debt. For this same reason, however, they are more exposed to shifts in the exchange rate.

In recent years, as a result of a rise in loan demand and supply, the stock of resident bank loans to SMEs has

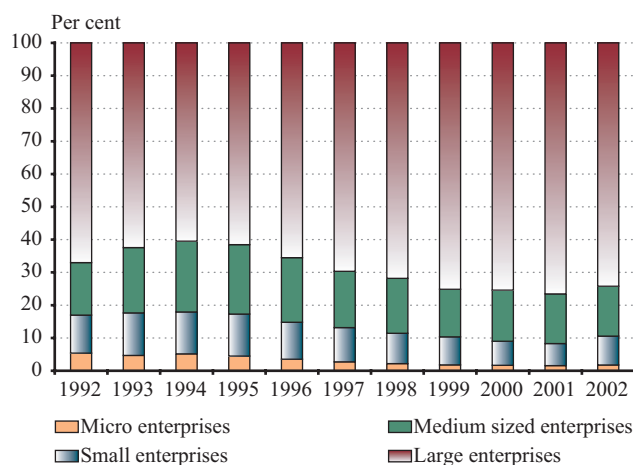
increased significantly, currently exceeding that of large enterprises. An increasing proportion of loans, however, are granted in foreign exchange, while the share of SMEs in exports is quite low (see Chart 2). The above implies that although easier access to loans reflects a positive development, growing foreign exchange lending has led to a considerable exchange rate exposure of SMEs.

### RESULTS OF THE SURVEY

Data used for the analysis was collected in the course of a survey conducted in the period between September and October 2005; the questions are related to 2004 data and developments. The questionnaire was filled in by resident, predominantly privately owned non-financial corporations, which had been in operation in the course of 2004 or for at least one financial year prior to the survey, had external funds and kept double-entry accounting. Data was recorded by pollsters in the form of personal interviews. The willingness to reply was quite low, roughly 20-25 per cent.

The final database contains answers of 580 SMEs. The data were reweighed in order that its distribution fit that of the macroeconomy on the basis of company size and sector. The questionnaire contained questions on the accounting exchange rate exposure, the opinion of companies on their own exchange rate exposure and the exchange rate risk hedging techniques used. We attempted both to collect missing, micro-level data and analyse the behaviour of companies.

**Chart 2**  
Share of micro, small and medium size enterprises and large enterprises in exports



Source: MNB, APEH (Tax Authority) data, not including enterprises employing less than 5 employees.

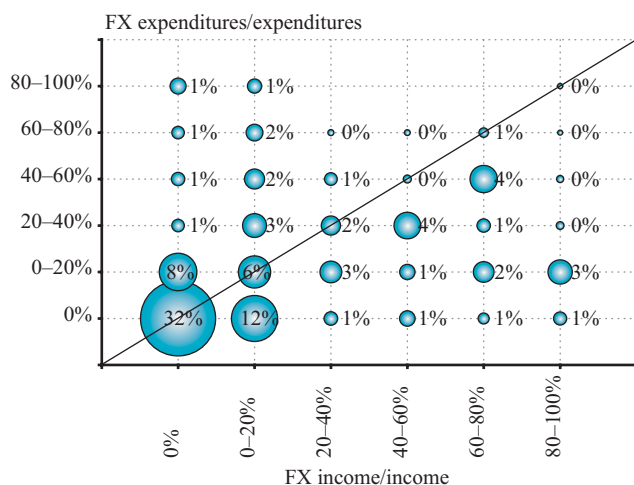
### Exchange rate exposure and expected effects

On the basis of the questionnaire, a considerable ratio of SMEs (approximately 60 per cent according to the share of the balance sheet total) is directly exposed to changes of the exchange rate, and more enterprises would be negatively affected by the weakening of the exchange rate than by its strengthening. This holds true in relation to both net foreign exchange assets and net foreign exchange revenues (see Chart 3), although the net position of companies is more varied in relation to the latter.

The majority of companies interviewed are not prepared for changes in the exchange rate. On the basis of their answers, most SMEs with exchange rate exposure do not assess their exchange rate exposure or deal with its magnitude, and generally believe that they have no exchange rate exposure, or it is of a negligible rate. Accordingly, the vast majority (50-75%) of respondents maintain the view that changes in the exchange rate do not affect their finan-

**Chart 3**

**Foreign exchange revenues and foreign exchange expenditures of companies**



Note: the size of circles indicates the rate of the balance sheet total of companies belonging to the given category within the total sample.

cial position or competitiveness.<sup>2</sup> Among those who believe that shifts in the exchange rate bear an impact on them, there are more who judge a weakening rate to be negative, rather than a strengthening one.

Foreign exchange debt is a determining factor of exchange rate exposure. Approximately a quarter (27 per cent) of the total debt of companies examined is denominated in foreign exchange. Foreign loans (corresponding to 13 per cent of total debt) are almost exclusively denominated in euro. The forint is dominant in relation to domestic debt, but the surveyed companies also draw loans from financial institutions denominated in euro and Swiss francs. A sharp difference is observed among companies with foreign exchange debts: exclusively foreign trade companies and companies in foreign ownership draw loans abroad, while this does not apply to many enterprises raising FX debt from domestic sources. Thus, foreign trade companies or foreign owned companies have easier access to funds from abroad. In addition, enterprises usually do not combine loans in various denominations (in different currencies), that is, most of their debts arise in the same foreign exchange.

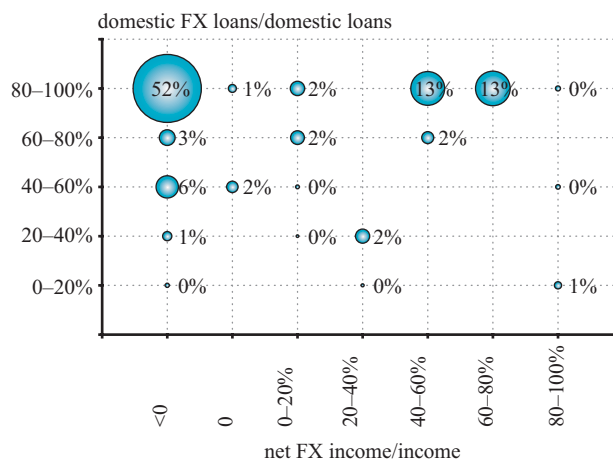
As noted above, foreign exchange debt, as a means of natural hedging, may reduce exchange rate exposure, but if foreign exchange indebtedness is motivated by the reduction of costs (i.e. payment of lower interest rates upon borrowing, for example), the exchange rate exposure of the enterprise will grow. Our analysis implies that foreign

exchange debt among the surveyed companies is rarely motivated by the hedging of foreign exchange revenues. Half of foreign exchange debt is held by companies with FX revenues, while the other half arises in relation to companies without positive net FX revenues. By limiting the examination to resident (mainly bank) foreign exchange debt, the rate of naturally unhedged debt is even higher, reaching two-thirds of the stock of debt (Chart 4). Thus, nothing would set off the negative impact of the exchange rate on foreign exchange debt in relation to the above rate of foreign exchange debt and foreign exchange debtor companies. We also observed that many companies have positive net foreign exchange revenues, suggesting that they would be better off with debts in foreign exchange than forints, yet they do not make use of this opportunity.

A large number of companies with foreign exchange debt disregard the potential effects of exchange rate shifts. This is supported by the fact that 70-80 per cent of companies with foreign exchange debts claim that an exchange rate shift would not affect their debt burdens. The rate is similar in relation to companies only with debts in domestic currency. Thus, the denomination of debt does not account for any variation in assessing the expected impact of exchange rate changes.

**Chart 4**

**Rate of domestic foreign exchange debt within domestic debt and natural hedging**



Note: the size of the circles indicates the rate of foreign exchange debt of companies belonging to the given category within total foreign exchange debt.

**Analysis of exchange rate sensitivity**

Under stringent assumptions and irrespective of the current exchange rate system, we attempted to numerically determine the effects of a possible exchange rate shock

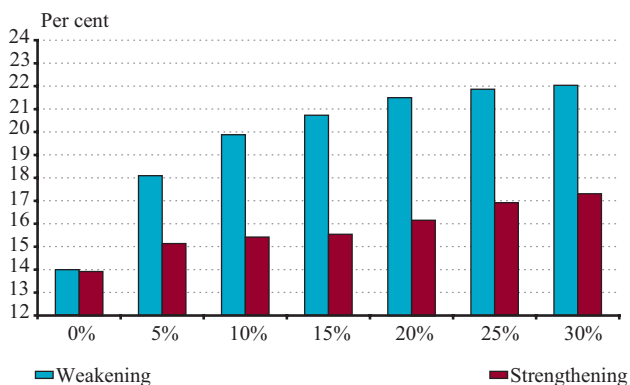
<sup>2</sup> We requested the companies to consider a change in the exchange rate which they consider to be significant, and examine the impact of a change of a similar rate in relation to strengthening and weakening.

with the data. Our analysis aimed at determining the ratio of companies participating in the survey which would incur losses as a result of exchange rate shifts of various degrees and direction, that is, cases in which the expenditures would exceed the revenues.

Since net foreign exchange revenue is a negative value for the whole sample, the possible weakening of the forint would affect negatively more companies than its strengthening. The expectations of companies and the calculations also support this premise. In the basic state, 14 per cent of the surveyed companies were unprofitable; this rate increased upon both the strengthening and the weakening of the rate, yet the weakening of the exchange rate led to losses in the case of more enterprises than a strengthening rate. It is noteworthy that the effect of the exchange rate change is non-linear – a relatively larger jump was observed upon a smaller (5, 10 per cent) shift in the exchange rate, than was the case upon additional changes in the exchange rate. In other words, a larger number of companies would become unprofitable upon a 5 per cent shift in the exchange rate than those which would produce losses upon a further 5 per cent shift in the rate.

**Chart 5**

**Ratio of sample enterprises producing losses upon different changes of the exchange rate**



We also analysed exchange rate sensitivity with the above method in relation to the sub-group of foreign exchange debtors. In this case, the variation between foreign exchange debtors with natural hedging and non-hedged debtors could be well distinguished. In relation to companies with no foreign exchange revenue, the negative impact of a weakened exchange rate was clearly established, while companies with natural hedging were favourably affected by the weakened rate.

It must be highlighted, however, that these calculations and the assertions derived from them are conditional. The companies' reactions, their bargaining position and

the rescheduling of their debt is not taken into account, furthermore it is ignored that the foreign exchange revenues and expenditures, and the repayment of the foreign exchange debt is in some cases not fully repriced in reaction to the change in the exchange rate. In addition, we did not consider modifications in the hedging activity. Therefore, the calculations overestimate exchange rate sensitivity. We also ignored the impact of the changing exchange rate on competitiveness, as this can modify the above results in either direction, and the possible effect of shifts in the exchange rate on domestic yields, producing a negative effect on forint debtors. For the above reasons, actual exchange rate sensitivity may vary in either direction from the rates calculated for the sample.

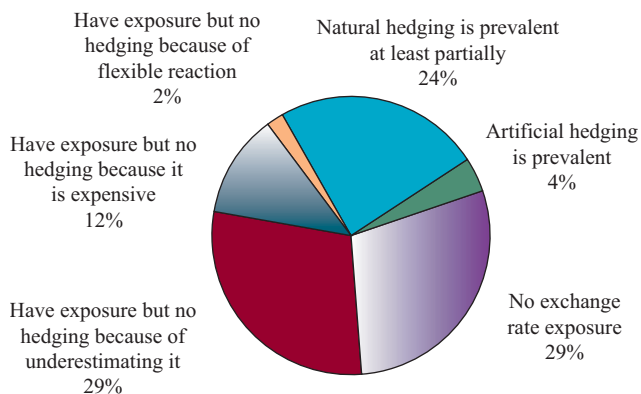
**Management of exchange rate risk**

The answers imply that most companies exposed to exchange rate changes do not apply either natural or artificial hedging instruments. Most of these companies believe they face no or only negligible exchange rate risks. Much fewer companies maintain the view that the hedging of the exchange rate risk is too costly compared to the expected profit, while others believe they could react to a shift in the exchange rate in a flexible manner.

When analysing natural hedging activity, it is important to distinguish conscious and unconscious hedging. Many companies, which have both revenues and expenditures in foreign exchange, replied to the questionnaire that they do not apply any hedging techniques. These answers may imply that the companies are unaware that

**Chart 6**

**Characteristics of companies based on exchange rate exposure and hedging activity**



*Note: on the basis of share in the balance sheet total.*

this can be a form of natural hedging. In many cases, the scheduling of inflows and outflows varies, and for liquidity reasons the companies are indeed unable to apply natural hedging instruments. On the above grounds, in such cases we considered the answers of the companies to hold true, that is, we classified the respondents among non-hedgers.

The SMEs apply artificial hedging even to a lesser extent than natural hedging instruments. On the basis of the share in the balance sheet total, 4 per cent of companies applied artificial hedging instruments. This result is in line with the results of surveys conducted in other countries. This can to a large extent be explained by the composition of the sample, for in relation to most SMEs the size of the company or the degree of exposure does not reach a level at which it is reasonable to invest in FX risk management methods or the establishment of organisation units dealing with these.

## CONCLUSIONS

In the autumn of 2005, we conducted a questionnaire survey on the SME sector serving the detailed, micro-level analysis of the potential risks deriving from increasing FX lending of domestic banks and, in parallel, the risks of increased lending to SMEs. On the basis of survey data, we analysed the characteristics of the indebtedness, exchange rate exposure and exchange rate risk management of SMEs. When examining indebtedness, the dependence on domestic funds and bank sources may be established, and owner financing related to foreign owned companies also reached a high rate. We analysed two factors motivating indebtedness in foreign exchange: hedging of foreign exchange revenues and cost reduction through the use of interest rate differences. The results of the questionnaire suggest that foreign exchange debt rarely functions as a hedging instrument, and few companies are aware of the impact of the exchange rate on foreign exchange loans.

When analysing exchange rate exposure, we examined net foreign exchange assets and net foreign exchange revenues in numbers and their sensitivity to exchange rate shocks, as well as the expectations of companies. We observed that on the basis of all aspects of analysis, the weakening of the domestic exchange rate would produce a negative effect as a whole, while its strengthening would produce a positive effect. Comparing the answers, we concluded that a large number of respondents underestimate their exposure to the exchange rate, or disregard such risks, which can be explained by their limited sources available for these purposes. However, the stability of the

exchange rate in the period preceding the survey is likely to have played a role in determining the results.

A significant number of companies examined have a direct foreign exchange exposure, but only few of these are aware of the risk or provide hedging for exchange rate exposure. Although natural hedging would be available in many cases, companies generally do not apply it consciously. Artificial hedging instruments are only applied in a few cases. The hedging of foreign exchange debt is also quite rare, particularly if we limit the analysis to foreign exchange debt granted by domestic banks. Most companies with foreign exchange debts from abroad are naturally hedged.

The credit risk of the banking system may be indirectly derived from the above results. The survey indicated that a shift in the exchange rate can produce an unexpected effect on domestic SMEs through two channels: directly through foreign exchange debt and indirectly through other foreign exchange items. The majority of companies underestimate their foreign exchange exposure and do not apply any conscious risk management techniques. This holds true particularly in relation to companies which are indebted in foreign exchange vis-à-vis resident banks. The analyses did confirm, however, that the possible weakening of the exchange rate would generally adversely affect the SME sector. In addition to the rising credit loss of the banking system, this would likely result in a significant fall in aggregate credit demand and demand for foreign exchange loans.

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# Csaba Csávás and Lóránt Varga: Main characteristics of non-residents' trading on the foreign exchange and government bond markets

*Our article analyses the behaviour of non-resident participants on domestic financial markets, which are important from the point of view of monetary policy. Due to the determining role played by foreign investors, understanding their behaviour is essential for understanding the main functioning mechanism of the markets. Among domestic markets, we will examine the foreign exchange market, which has particular relevance to monetary policy, owing to the role played by the exchange rate in the economy. We will also review the domestic government bond market, which is important for the central bank in relation to its role played in the transmission of interest rate policy and with regard to the assessment of the credibility of economic policy.<sup>1</sup>*

## INTRODUCTION

The domestic foreign exchange market takes place on the interbank foreign exchange market, which may be divided into several market segments. We discuss below the spot foreign exchange market, where trading is conducted at current exchange rates<sup>2</sup>, in contrast to forward foreign exchange transactions, where transactions are performed at prefixed forward rates. Despite its name, not only banks trade with each other on the interbank foreign exchange market, but banks also mediate the transactions of companies and institutional investors.

Domestic market maker banks play an important role in the functioning of the foreign exchange market. They regularly provide buying and selling quotes for a given amount of foreign currency. Domestic banks, however, typically undertake so-called open positions only to a limited degree, i.e. positions sensitive to exchange rate movements. Accordingly, if, for example, market makers experience a major euro selling ( forint buying) pressure from their customers, they must shift their quotes in the direction of a weaker euro, so that other customers are willing to buy euro from them at the new exchange rate. Thus, due to their considerable capital strength and risk-bearing capacity, the behaviour of non-resident customers on the foreign exchange market can have a major impact on Hungarian market maker banks and thereby on the forint exchange rate.

Government bonds are debt securities issued by the Hungarian State to finance the general government deficit. The state pays interest on the borrowed amount, which is a fixed rate of interest in the case of most gov-

ernment securities. Government bonds are issued at auctions, which are regarded as in the primary market category. At the auctions, only the primary dealers of government bonds may submit bids, these being typically domestic commercial banks which undertake certain obligations in exchange for the opportunity to take part in the auction (the most important such obligation is regular quoting in an appropriate amount). Primary dealers, however, enable their customers, including foreign partners, to submit bids to government bond auctions through them.

Trading in already issued government bonds is conducted on the secondary market which, similarly to the foreign exchange market, is dominated by the interbank government bond market. The government bonds are mediated mostly by primary dealer banks, although non-primary dealer market makers (e.g. non-resident investment banks) are also present on the secondary market. These financial intermediaries are continuously available with their quotes to their customers who invest in government bonds, whether wishing to sell or buy these. Resident and non-resident investment, pension and other funds, resident insurance companies, local government authorities and, to a lesser extent, resident companies and households buy government bonds for investment purposes. The Hungarian government bonds are listed on the Budapest Stock Exchange; the primary dealers are continuously available with their quotes at the exchange, as well. The stock market turnover in government bonds, however, is negligible compared to turnover on the interbank government bond market, because market participants prefer over-the-counter trading based on direct transaction.

<sup>1</sup> The article is based on the MNB Occasional Paper by Csávás-Kóczán-Varga [2006].

<sup>2</sup> Although deals are made at spot rates, the foreign currencies are generally transferred 2 working days after the transaction (T+2 day settlement).

## IMPORTANCE OF NON-RESIDENTS ON THE FOREIGN EXCHANGE AND GOVERNMENT BOND MARKETS

In the past year, the average daily turnover of the domestic (spot) foreign exchange market amounted to HUF 160 billion. The amount of turnover is prominent in view of the fact that in the whole of 2005, the total value of foreign exchange market transactions corresponded to double the amount of the Hungarian GDP, moderately exceeding rates of other currencies in the region (Polish zloty, Czech and Slovak koruna).

Of turnover transacted by resident banks, the share of non-resident banks currently exceeds 50 per cent. We may thus state that non-residents play a determining role on the domestic foreign exchange market. Nearly half of the above 50 per cent figure is linked to the transactions of London banks, which is not surprising since the City of London represents one of the major centres of the global foreign exchange market. The remaining 50 per cent is divided by half, respectively, into turnover transacted between domestic banks and between banks and companies.

In addition to the share in turnover, the significance of the individual groups of participants is revealed better by the correlation between their daily foreign exchange market turnover and total turnover. If, for example, the two groups have a similar share of turnover in the long term, but one group's share is stable in the short term while the other's fluctuates, in relation to the latter we may assert that its market activity is more important. The highest co-movement of the total turnover was recorded with non-residents' turnover in the past 5 years, indicating that the activity of non-residents is most pronounced in affecting trading on the domestic foreign exchange market (Table 1). The above confirms that the presence of non-residents on the domestic foreign exchange market is important. The corre-

lation (co-movement) between the turnover of resident banks to total turnover and the turnover of non-residents is similarly high, notwithstanding the fact that interbank turnover comprises roughly half of non-resident turnover. The above may arise from the intermediary role of resident banks on the foreign exchange market. Nevertheless, the trading of resident companies contributes much less to total turnover than non-residents, moving in one direction with the other two groups only to a limited degree. Thus, non-residents play a more prominent role on the foreign exchange market than resident companies.

When analysing the distribution of the holders of fixed interest securities, representing the vast majority of Hungarian government bonds, we may conclude that, similarly to the foreign exchange market, non-residents hold a dominant share of the government bond market.

The amount of Hungarian government bonds held by non-resident investors has been on a continuous, dynamic rise since 2001, with slackening growth recorded from early 2004; at the end of April 2006, the amount of such bonds reached the value of HUF 2,700 billion. For a brief period, the share of non-residents in the outstanding amount of fixed interest government bonds exceeded 45 per cent in early 2001, reaching 50 per cent by the end of 2002. In this period, firstly, the rise in the supply of government bonds, the favourable liquidity effect of increasingly large series, and secondly, the basically continuous large interest rate spread between euro and dollar government bonds and forint government bonds established an attractive environment for non-resident investors. Following a slumping trend lasting for nearly one and a half years, from the middle of 2004 the share of non-resident investors stabilised at approximately 40 per cent.

Among the domestic markets of debt securities, non-resident participants hold a major share of secondary market

### Table 1

#### Co-movement of the turnover of foreign exchange market participants

(January 2001 – December 2005)

	Total average daily turnover	Average daily turnover transacted with non-residents	Average daily turnover transacted with resident companies	Average daily turnover between resident banks
Total average daily turnover	1			
Average daily turnover transacted with non-residents	0.96	1		
Average daily turnover transacted with resident companies	0.52	0.32	1	
Average daily turnover between resident banks	0.89	0.79	0.33	1

Note: Correlation co-efficients between the time series in the table; value 1 indicates the closest co-movement (100 per cent).



**Table 2**

**Co-movement of the turnover of participants on the government securities market**

(January 2001 – December 2005)

	Average daily secondary market turnover	Average daily turnover transacted with residents	Average daily turnover transacted with non-residents
Average daily secondary market turnover	1		
Average daily turnover transacted with residents	0.84	1	
Average daily turnover transacted with non-residents	0.75	0.27	1

*Note: Correlation co-efficients between the time series in the table; value 1 indicates the closest co-movement (100 per cent).*

turnover only on the government bond market. From 2001, the share of transactions conducted with non-resident participants continuously rose in the turnover of primary government securities dealers on the secondary market of government bonds. From the beginning of 2004, the share of transactions conducted with non-residents fluctuated at 35-45 per cent, that is, turnover and stock data suggest that non-residents hold roughly 40 per cent of the market of forint government bonds.

Similarly to the foreign exchange market, the close co-movement between total turnover in government bonds on the secondary market and the turnover of non-residents reveals the degree of the impact of non-residents' activity on the volume of turnover on the domestic government bond market. The high correlation between the two time series means that an increase or decrease in the turnover of non-resident investors has an effect also on the development of total market turnover. The total secondary market government bond turnover conducted by primary dealers and their average daily turnover transacted with non-residents was closely correlated between 2001 and 2005; the value of the correlation co-efficient between the two time series is 0.75 (Table 2).

However, on the basis of data, it would be false to claim that only the activity of non-residents determines the total turnover of the secondary market; in this period, the correlation co-efficient between the total turnover of primary dealers on the secondary market and their turnover transacted with residents is even higher in this case, equalling 0.84. This implies that in the analysed period, the activity of both groups has a significant impact on the total turnover of the secondary market.

Following a phase of rapid growth, the share of non-residents first rose above 30 per cent in March 2003 in the turnover of the secondary market and has remained above this level. We also conducted the analysis for a narrower period, characterised by a higher share of non-residents. In this period, the co-movement between the turnover of non-residents and resident participants with the total

turnover of the secondary market was even closer (the correlation co-efficient is 0.95 for both time series). All in all, the results of the above two analyses indicate that resident and non-resident participants have a similar impact on the development of turnover on the secondary market.

**WHY DO NON-RESIDENTS TRADE ON HUNGARIAN MARKETS?**

The trading of non-resident participants on the forint market may be motivated by several factors. One such obvious factor is the government bond purchases of non-residents. If, for example, a non-resident wishes to buy government bonds issued in forints, it may acquire the necessary forints from – but not exclusively – the foreign exchange market. This relationship establishes a connection between the two markets. However, we will see below that it is rare to find periods in which the forint and government securities purchases of non-residents coincide. This is because the developed state of the domestic financial markets enables investors to separate decisions relating to undertaking exchange rate and interest rate risks.

We compared the development of the amount of government bonds held by non-resident investors with the resultant of the forint purchases and sales of non-residents vis-à-vis resident banks, aggregated from the beginning of 2003 (cumulated net spot forint purchase, net change in position). It may be observed that the two indicators generally do not move in parallel; close correlation can be seen only in a few, short periods (Chart 1). Thus, the position-taking of non-residents on the foreign exchange market is typically not linked to the sale-purchase of government bonds. Due to the weak link between the two markets, we will separately analyse below the foreign exchange and government bond markets.

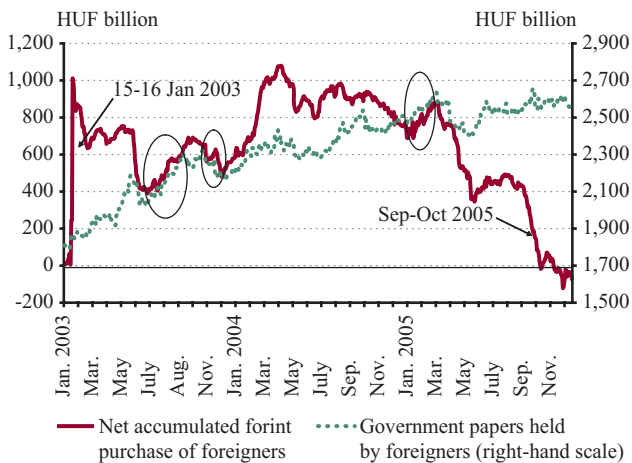
However, it is interesting to examine the periods characterised by close co-movement. Between July and September 2003, non-residents purchased forints and government bonds in a similar amount. Presumably they chose

this strategy because the interest rate increases of the central bank in June 2003 significantly increased the cost of financing the purchase of long-term government bonds with short-term forint loans. In the course of November-December 2003, non-residents sold as much forints as government bonds, but the major changes did not occur on the same days, rather the co-movement was incidental. In the first months of 2005, the two curves also moved in parallel. In this period, the currencies of neighbouring countries were appreciating, likely giving a boost to the buying interest of non-residents on the domestic market, as well.

**Chart 1**

**Government papers held by and net spot forint purchases of non-residents**

(cumulated from 1 January 2003)



Another important motivating factor prompting non-residents to trade on the foreign exchange market is short-term profit, assuming the risk of losses (speculation). A typical example of speculative activity is revealed by the chart above. In January 2003, the EUR/HUF exchange rate reached the strong edge of the intervention band maintained by the MNB.<sup>3</sup> At this point, non-residents purchased forints in large amounts from resident banks, hoping that the strong edge of the band would be eliminated and the forint could further strengthen (Barabás [2003] discusses in detail appreciation speculation). In the autumn of 2005, non-residents sold forints in larger amounts, possibly motivated by the fact that worrying news appeared about the development of the domestic general government deficit. This, however, was not accompanied by a fall in the amount of government securities held by non-residents, that is, the sale of forints was linked to the sale of other forint instruments.

The demand of non-residents on the government bond market may also be motivated by several factors, including

factors similar to those related to the foreign exchange market as well as different ones. For discussion of the above, it is useful to break down market participants into government bond dealers and government bond investors.

The market makers on the secondary market of government bonds include non-resident (primarily London-based) investment banks. These buy Hungarian government bonds (either at auctions or on the secondary market) to later resell these, that is, to trade the bonds.

Non-residents investing in government bonds include investors who purchase such securities in the framework of their long-term investment strategy. In this case, long term signifies the purchase of government bonds in major amounts, with a remaining maturity of several years. Such bonds are typically held until maturity (that is, until the Hungarian state repays its debt incorporated in the government bonds), or are held for several years and not traded actively on the secondary market. In the past five years, investors could purchase Hungarian government bonds at a lower price (with a higher yield) than similar euro or dollar government bonds issued on developed markets. This implies that if the Hungarian economy grows at a stable rate and its level of development approximates the development of west European countries (convergence), the price of Hungarian government bonds increases at a greater pace than the price of euro or dollar bonds (the yield differential narrows). This is why we define these participants as convergence investors. Thus, convergence investors anticipate favourable long-term changes in the price of government bonds and they are less interested in the daily fluctuation of prices.

However, in certain periods, the price of government bonds may fluctuate significantly in the short term, even in the course of several days. In such a case, major profits can be earned within a short time by guessing the time and direction of price changes. The non-resident participants of the government securities market include investors who apply this very same strategy, aiming to purchase bonds at the lowest possible price and sell these securities on the secondary market at a higher price within a short time. We may briefly define the above participants as aiming at short-term interest gains. Thus, these participants think in terms of much shorter periods than convergence investors, and, naturally, they are considerably more active in trading on the secondary markets.

A special strategy aiming at short-term interest gains targets the exploitation of the differential between the lower

<sup>3</sup> The exchange rate of the forint against the euro may move within a +/- 15 per cent band; if the rate reaches the strong edge of the band, the MNB must sell forints to protect the band, while it has a forint purchase obligation at the weak edge of the band.

euro or dollar interest rates and the higher forint interest rate. In this case, non-residents take euro or dollar loans for which they pay lower euro or dollar interest rates. They exchange the borrowed amount to forints and purchase government bonds with it, on which the Hungarian state pays a higher forint interest rate (carry trade strategy). This strategy, however, involves risks, since if the exchange rate of the forint weakens (less euro or dollars can be purchased with the same amount of forints), non-resident investors may even incur losses in euro or dollar terms. Since investors only assume risks in exchange of higher yields, this strategy is applied particularly if the difference between the euro and dollar interest rates and the forint interest rate is relatively large.

By comparing the outstanding amount and turnover data of the government bond market in the longer term, it may be stated that the significant, aforementioned rise in the share of non-resident investors in the turnover of the secondary market at the beginning and in the middle of 2003 may be linked to the changing behaviour of non-resident participants on the government bond market. Between the beginning of 2003 and the middle of 2005, the share of non-residents in the total outstanding amount of government bonds steadily decreased (from 50 to 40 per cent), while their share in the turnover of the secondary market increased from 25 per cent to remain stable above 35 per cent. Thus, in this period the relative activity (compared to the volume of the stock of government bonds in their holding) of non-residents increased significantly on the secondary market. This implies that within the group of non-resident participants on the government bond market, the share of convergence investors fell, while the proportion of other investors, more actively aiming at short-term interest gains on the secondary market, increased.

The trend described above may be linked to the fact that from the middle of 2003, the price of government bonds fluctuated to a greater extent than in the preceding period. For this above reason, an increasing number of non-resident participants saw an opportunity in exploiting the price fluctuations of government bonds in the short term. In addition, the dollar interest rates fell to very low levels in 2003, approximating 1 per cent. In consequence, the application of the carry trade strategy became increasingly widespread on emerging markets (including Hungary) offering higher interest rates. The rise in the share of non-resident investors targeting short-term interest gains may have both a favourable and an adverse effect on the stability of the government bond market. In the event of volatile market sentiment, these fast reacting participants can contribute to amplifying price fluctuations. Investors more active on the secondary market, however, may enhance market liq-

uidity, producing a beneficial effect on smooth trading and the development of prices.

### **ON POSITIVE AND NEGATIVE FEEDBACK TRADING STRATEGIES IN GENERAL**

The term trading strategy defines investors as deciding on the manner of trading on the basis of simple or more complex systems of rules, and they apply these for a certain period of time. With regard to the behaviour of non-residents on the foreign exchange and government bond markets, we will discuss two trading strategies in detail: positive and negative feedback trading strategy. Prior to describing their relevance to the domestic market, we briefly discuss below the main aspects of these strategies.

Positive feedback trading is followed if the investors move their position in parallel with shifts in prices. On the foreign exchange market, this means that a given market participant will buy forints if the forint has strengthened, and sell forints if the currency has weakened. Similar positive feedback trading is followed on the government bond market; on this market investors preferring positive feedback trading buy the securities following a rise in the price of government bonds, and sell these following a fall in their price. Negative feedback traders act inversely – they buy foreign currency or government bonds when their price has fallen and sell these if their price has increased.

Such trading behaviour may result from conscious investor strategies, but it may also evolve for purely technical reasons. Positive feedback trading may comprise a conscious strategy if the investors are of the view that the prices of government bonds and foreign currency will follow trends witnessed in the past. Thus, this behaviour basically corresponds to “chasing” the strengthening or weakening trend currently characterising the market, with expectations targeting the short-term continuation of the trend. In contrast, market participants engaged in negative feedback trading believe that prices will not shift in one direction in the long term, but will sooner or later return to their former value. Accordingly, they expect that a past fall in prices will be followed by a rise, and vice versa.

Positive feedback trading may also arise for technical reasons. Some participants of both the government bond market and the foreign exchange market hedge their portfolios with risk management instruments against excessive losses. The most widely used and also simplest such instruments are the so-called stop-loss limits. The stop-loss limit signifies the setting of a price significantly lower than the purchase price (on the foreign exchange market, this may

correspond to a stronger or weaker exchange rate, depending on whether forint or euro is purchased). If the price/exchange rate of the government bond/foreign currency in the portfolio of the investor falls below this prefixed level, he automatically sells his asset to avoid losses resulting from a possible further fall. Thus, a sale will follow a previous fall in prices, that is, the consequence of the application of stop-loss limits corresponds to the result of the positive feedback strategy.

Negative feedback trading may also be caused by technical factors. Certain investors may determine in advance the price level at which to close their position (profit taking). They may also authorise their bank to automatically process this transaction if the price of the government bond or the exchange rate reaches a prefixed level. In this case, upon the strengthening of the price or exchange rate, selling pressure arises at a level on the government bond market and the foreign exchange market, causing a shift in the direction of weakening.

Thus, investors following negative feedback trading stabilise the development of prices on the government bond and foreign exchange markets, for they buy following a fall in such prices or exchange rates, and due to this subsequently arising demand the fall in prices/exchange rates may slacken, halt or even an increase may follow.

In contrast, investors having a tendency to follow positive feedback trading may strengthen fluctuations in market prices, for they sell their instruments following a fall in prices, and this subsequent supply further accelerates the decrease of prices. For this reason, this strategy is also called as momentum trading. The term derives from such behaviour giving momentum to the price or exchange rate. Thus, participants following a positive feedback trading strategy may destabilise the market of government bonds and foreign exchange.

### **POSITIVE AND NEGATIVE FEEDBACK TRADING ON THE DOMESTIC MARKETS**

We analysed the presence of positive and negative feedback trading on the domestic foreign exchange market by comparing two indicators. One indicator is the daily change in the HUF/EUR rate expressed as percentage. The other indicator is basically the same as illustrated in Chart 1, that is, the total amount of forints purchased or sold by non-resident investors in one day vis-à-vis the domestic banking system. In the comparison we examined whether non-residents purchased forints if the forint strengthened on the given day before, and whether a weakening forint was followed by a sale. The

methodology applied for the analysis basically corresponds to a widely cited method (Kim-Wei, 1999).

In the course of the analyses, we divided the most active non-resident participants on the domestic foreign exchange market into two groups: Anglo-Saxons (institutions based in London and New York) and non-Anglo-Saxons (based anywhere else). The division was motivated by anecdotal information, according to which Anglo-Saxon banks mediate the transactions of non-resident customers with major capital strength, capable of even impacting the development of the whole market. Also on the basis of anecdotal information, we consider it likely that real money investors, participants thinking in terms of a longer time horizon (e.g. non-resident pension funds, insurance companies adopting a more conservative investment policy), are linked to non-Anglo-Saxon banks. Thus, the behaviour of these two foreign groups may vary. (Kóczán-Mihálovits [2004] discuss in detail the various participants of the global foreign exchange and bond markets.) We will analyse the 2003-2005 period on the basis of available data. In addition to analysing the complete period, we will separately perform an analysis for the first and second half (equal in length) of the period. Based on the results, we will determine whether any changes have occurred in the market behaviour of non-residents in the meantime.

We analysed positive feedback trading with the following method. The trading days were classified into 5 groups (quintiles) of identical size, depending on the rate of change in the exchange rate of the forint against the euro on the preceding day. We then examined how many forints non-residents purchased or sold on average on days belonging to the individual groups. If, as a result, the comparison of the upper quintile (when the forint strengthens) with the lowest quintile (weakening forint) indicates that the average change in the net position of non-residents is significantly larger in the former case, we may conclude that positive feedback trading characterises a given group of non-residents.

The first row of Table 3 indicates that between January 2003 and June 2004, non-resident investors followed positive feedback trading. However, by dividing non-residents into Anglo-Saxons and non-Anglo-Saxons, we may observe that the individual groups behave differently. While Anglo-Saxon investors tended to follow positive feedback trading, this was not the case in relation to non-Anglo-Saxons. (See results in greater detail in Csávás-Kóczán-Varga [2006].) In this period the exchange rate of the forint fluctuated within a wide band; by following the strategy of momentum trading, the Anglo-Saxons were in search of a reference point relating to the future trend of the exchange rate. By virtue of its nature, positive feedback trading possibly strengthened the volatility of the exchange rate in this period.

**Table 3**

**Test results of the positive and negative feedback trading of non-residents on the foreign exchange market**

	Total non-residents	Anglo-Saxon non-residents	Non-Anglo-Saxon non-residents
January 2003–July 2004	+	+	∅
June 2004–December 2005	-	-	-
January 2003–December 2005	∅	∅	∅

*Meaning of the symbols: “+”: positive feedback; “-”: negative feedback; “∅”: no significant positive or negative feedback. We broke the time series in the middle of 2004 because this methodology requires large samples.*

**Table 4**

**Test results of the positive feedback trading of non-residents on the government bond market**

	Direction and significance of feedback
January 2001–December 2005	+
January 2001–May 2003	+
June 2003–December 2005	∅

*Meaning of the symbols: “+”: positive feedback; “∅”: no significant positive or negative feedback.*

Between July 2004 and December 2005 our results were contrary to the above. In this period, both groups of non-residents followed negative feedback trading, selling forints following a major strengthening of the rate and buying forints following a weakening of the rate. The exchange rate shifted in a narrow, 5-6 per cent band in this period, accompanied by volatility lower than earlier. The growing role of negative feedback trading is possibly related to strengthening domestic lending denominated in foreign currency in this period, likely to have stabilised exchange rate expectations. Negative feedback trading probably contributed to the relative stability of the exchange rate.

When examining the whole period (2003-2005), we did not detect positive/negative feedback trading of non-residents, owing to the fact that the varying strategies applied in the two periods neutralised each other.

Since positive feedback trading can destabilise the government bond market similarly to the foreign exchange market, it is also useful to carry out an analysis of momentum trading in relation to the government bond market. By applying the described methodology, we are looking for an answer to the question whether a change in the price of government bonds on the day before affected the government bond purchases of non-resident investors, and, if so, in which direction. Contrary to the foreign exchange market, this analysis may not encompass the study of differences between the strategies of Anglo-Saxon and non-Anglo-Saxon investors because we do not have adequate data on the government bond market for classifying non-

resident participants. On the basis of available data, however, we may conduct the analysis of a longer period, extending from the beginning of 2001 to the end of 2005.

We use changes in the MAX index to determine changes in the price of government bonds on the preceding day. The MAX index indicates the daily change in the price of an imaginary government bond portfolio. The value of the index is calculated as the weighted average of the price of government bonds in the portfolio, that is, if the price of the securities rise, the value of the index also increases, or decreases if prices fall. The composition of the imaginary portfolio, used for determining the value of the MAX index, is determined on the basis of the quantity of the outstanding amount of government bonds. Changes in the index value, therefore, well reflect the development of prices characteristic for the whole government bond market. We analyse the reaction of non-resident investors to price developments of the past through the change in the amount of government bonds in their holding, since, if such amount increases on a given day, this implies that on that day non-residents purchased more government bonds than the amount they sold. The larger the increase, the greater the certainty of concluding that the majority of non-residents were on the government bond market as buyers and to a lesser extent as sellers.

The first row of Table 4 indicates that, on the basis of our results, in the full analysed period (between January 2001 and December 2005) non-resident investors, on a group level, tended to adjust their position in parallel with shifts in

prices on the previous day. (See results in greater detail in Csávás–Kóczán–Varga [2006].)

We observed above that the behaviour of non-residents on the secondary market changed in the middle of 2003, probably owing to the fact that the share of convergence investors fell within the group of non-resident participants, while the number of investors targeting short-term interest gains and more active on the secondary market increased. We therefore divided the above five-year period into pre-change and post-change parts, and analysed the degree in which non-resident participants followed positive feedback trading between January 2001 and May 2003, and June 2003 and December 2005 (Table 4, second and third row). The results suggest that in relation to the first period, non-residents typically bought government bonds in parallel with price changes of the previous day. Thus, they demonstrated uniform behaviour on a group level, tending to follow positive feedback trading. In the period after the middle of 2003, however, it could not be proved that non-resident investors followed a positive feedback trading strategy on a group level. Thus, our results indicate that from the middle of 2003, the earlier uniform reaction of non-resident participants ceased in relation to the price changes of the previous day. This implies that, within the group of non-resident participants, investors assuming a greater role in the period of greater yield fluctuations, and more active on the secondary market, do not tend to modify their position in parallel to price changes of the previous day, that is, these include investors adopting a positive, as well as a negative feedback trading strategy.

## CONCLUSIONS

Non-resident investors play a determining role on both the foreign exchange market and the government bond market; their share of the turnover of these markets is 50 and 40 per cent, respectively. Upon analysing the daily development of turnover, we may say that non-residents play a greater role on the foreign exchange market than resident companies. On the secondary market of government bonds, resident and non-resident participants have a similar effect on turnover.

When examining the motivating factors underlying the trading of non-residents, we may conclude that both markets have participants which aim to gain profit by exploiting the short term shifts in yields and prices. There are also non-residents on both the foreign exchange and the government bond markets following longer term strategies, particularly convergence investors on the government bond market.

Between January 2003 and June 2004, non-resident investors had a tendency to follow positive feedback trading on the foreign exchange market, which likely increased the volatility of the exchange rate in this period. In contrast, our analyses suggest that negative feedback trading was followed between the middle of 2004 and the end of 2005, which is likely to have contributed to relative exchange rate stability. Between January 2001 and May 2003, non-residents typically followed positive feedback trading on the government bond market, as well. In the past two years, however, the earlier uniform reaction of non-resident participants ceased in relation to the price changes of the previous day. That is, these include investors following a positive, as well as a negative feedback trading strategy.

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# Dániel Holló and Márton Nagy: Analysis of banking system efficiency in the European Union<sup>1</sup>

*In addition to aspects related to financial stability, the cost efficiency gap observed between the banking systems of the old and the new EU member states is also unfavourable from a welfare point of view. In the majority of new member states, banks are likely to price the relatively high rate of cost efficiency losses and the oligopolistic factor linked to insufficient competition in the interest rates. The high loan and low deposit interest rates may prevent, through the volume effect, an upturn in savings and investment propensity, and thereby the implementation of a higher path of economic growth.*

*In the course of our research, we measured variations in efficiency in the member states of the European Union and attempted to explain the reasons for such differences. We evidenced on an empirical basis that the degree of differences between member states and their change through time is significantly determined by the characteristics of the operational environment and the conscious behaviour of management. The conscious behaviour of management is of exclusive relevance in the long term, for the impact of advantages and disadvantages underlying the operational environment is reduced or eliminated through the integration of financial markets and institutions and the establishment of the Single European Market.*

## INTRODUCTION

The rapid development of information technology, the appearance of new competitors exploiting opportunities offered by a global capital market and the creation of new markets linked to rapid innovations has significantly promoted the intensification of competition and accelerated the consolidation of the European banking system. The banking sectors of EU countries have faced many challenges in the past decade. With regard to old member states, the Second European Directive, regulating Banking and Financial Services, the "Single European Passport" significantly accelerated the pace of deregulation, contributing to strengthening competition and the establishment of the Single Financial Market through the reduction of market access costs. The European Monetary Union (EMU) also promoted the comprehensive elimination of the operational constraints of institutions. The introduction of the euro was determinant in accelerating the integration of money and capital markets, whereby local banks gradually lost their competitive edge to foreign banks.

The integration of the banking system into the Single Banking Market commenced in parallel with the transformation of the financial intermediary system. Economic convergence, the harmonisation of regulations and the enlargement of the EU further accelerated the consolidation and integration of the banking systems of new EU member states. Following the elimination of the command economy and the single tier banking system in the new EU

member states, money and capital market liberalisation and the privatisation of the economic sector laid the foundations of the modern financial institutional system. The high influx of foreign capital, institutional consolidation and the creation of an efficient regulatory environment contributed to the rapid transformation and development of the banking system and the market-based pricing and lending activity of banks.

Our study attempts to determine the degree of efficiency differences in different countries, resulting from the specific characteristics of the operational environment, and independently of the above, the conscious behaviour of management. For the purpose of measuring such differences, we attempt to filter impacts originating from the varying operational environment of banks. We examine the efficiency of the banking systems of European Union member states, and analyse the degree and manner in which the efficiency gap changes between old and new EU members. In addition, we shall measure the rate of efficiency convergence within individual member states of the EU and between member states.

This study applies two efficiency indicators: the so-called cost efficiency (hereinafter "cost efficiency") and the alternative profit efficiency (hereinafter "profit efficiency") indicators. The cost efficiency indicator serves to measure the adequacy or inadequacy of management in managing bank operations through cost management. In relation to profit efficiency, we investigate the manner

<sup>1</sup> A more detailed study of the topic may be accessed on the home page of the Magyar Nemzeti Bank (Working Papers 2006/3).

in which the work of management impacts the varying profitability of banks. The profit efficiency approach provides greater depth of information in comparison to the cost efficiency method, because it takes into account that, in addition to the choice of a cost structure, the management's "conscious" selection of output prices and non-price factors may also contribute to efficient operation. We deduce on an empirical basis that results produced from the measurement of cost and profit efficiency and the related conclusions may vary to a major degree without the filtering of effects originating from differing operational environments. By controlling the impacts of the operational environment, however, the conclusions drawn in relation to cost and profit efficiency reveal consistency.

Our research is distinguished by the fact that it attributes primary relevance to the conscious improvement of efficiency in relation to the stability of the banking system. There is the risk of management complacency and disregard for the need to improve efficiency in the light of high profits linked to limited competition or other market deficiencies. Only a conscious improvement of efficiency may contribute to the sustainable income producing capacity of a bank; in the long term, the operation of the Single European Banking Market will lead to the limited impact or elimination of other profit and efficiency related differences caused by market deficiencies. Importantly, the improvement in efficiency may have welfare related implications; in general terms, the "efficiency surplus" of efficient institutions reflected in pricing may firstly promote investments and consumption through a fall in loan interest rates, boosting the growth of the economy, and secondly, it may lead to a consumption surplus through the reduction of the interest burden.

### EFFICIENCY APPROACHES

In practice, the relative efficiency of banks, compared to their competitors, is most often analysed on the basis of accounting-financial indicators. In addition to accounting indicators, however, the application of the statistical approach is also warranted. With statistics-based cost efficiency indicators, for example, it is possible to determine the impact of the ability or inability (ability) of management on bank operations through cost management. "Ability differences" in management are linked to the appropriate allocation of inputs and the use of technologies. The profit efficiency approach provides greater depth of information

in comparison to the cost efficiency method because it takes into account that, in addition to the choice of a cost structure, the management's "conscious" selection of output prices and non-price factors may also contribute to efficient operation. As a result of the "conscious" efforts of management, services, for example, with varying quality may be produced, and imperfect competitive pricing behaviour may strengthen, contributing to the enhanced role of the oligopolistic factor and non-interest revenue. In the course of our research, we preferred the statistics-based, so-called parametric approach, on the assumption that the efficiency frontier may be defined with a given function.

Parametric methods are most frequently used to estimate cost efficiency, while the analysis of profit efficiency has become more common in the past few years. The measurement of cost efficiency is important because it produces the greatest impact on the pricing and profitability of banks. The term of cost efficiency was first introduced by Leibenstein (1966). He used the concept to focus on "differences in the abilities" of management among different banks. Such "differences in abilities" imply the success of managing costs, allocating inputs and using technologies. Allocative efficiency, as a component of cost efficiency, attempts to incorporate efficiency linked to the degree in which management is capable of adequately reacting to relative price changes, replacing relatively more expensive inputs with relatively cheaper ones, while the technological component of cost efficiency measures the ability of management in elaborating adequate production plans and the ability of assigning resources to plans.

The estimation of profit efficiency comprises a relatively new area in efficiency literature. On the basis of the work of Berger and Mester (1997), we define alternative profit efficiency as follows: how close is the given bank to achieving maximum profit with given output levels.

Most of the publications discussing the topic study the banking system of the USA. Relatively few European studies have been published on efficiency and the analysis of the financial systems of transition economies from an efficiency point of view has been very limited.<sup>2</sup> Comparative research analysing the efficiency of banking systems in different countries is also very scarce, possibly owing to the difficult management of problems arising from different operational environments and their impact produced on efficiency.

<sup>2</sup> As emphasised by Berger and Humphrey (1997), of the 122 efficiency studies, encompassing 21 countries, only roughly 5% of these study transition economies.



## MAIN DIFFERENCES IN THE OPERATIONAL ENVIRONMENT OF EU COUNTRIES

When comparing the banking systems of countries, one of the major challenges is to assess and analyse the main differences in the operational environment and separate the impact of these on efficiency from effects originating from the behaviour of management. We will accordingly analyse the main sources of heterogeneity in the operational environment.

### The macroeconomic environment

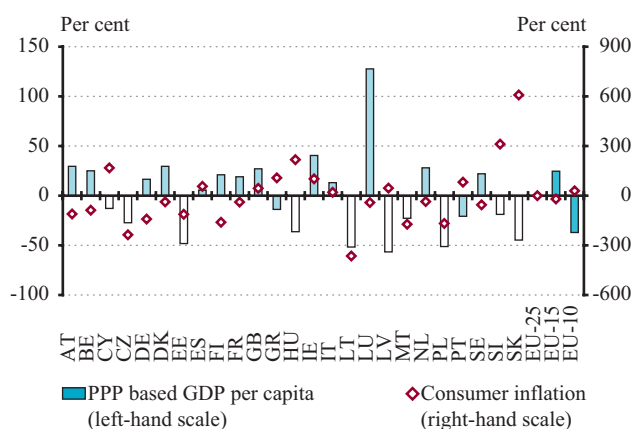
In the past decade, the macroeconomy has gained in stability in the old and new member states of the European Union. The majority of old member states fulfilled nominal convergence, the Maastricht criteria, and introduced the common currency, the euro, in 1999. In the new member states, the system of a command economy has been replaced with the market economy, promoting the commencement and acceleration of nominal convergence with the real economy of the EU and the five pillars of the EMU (exchange rate stability, price stability, balance of the budget, low level of general government debt, convergence of long-term interest rates). Despite the accomplishments, major economic differences remain, particularly between old and new member states of the European Union.

In relation to the convergence of the real economy, we may establish that, although the growth rate of the economy and productivity is higher on an aggregate level in new EU member states, the rate of output is smaller than in old member states. The average level of development in new EU member states, measured with GDP calculated on a per capita PPP basis, corresponds to nearly two-thirds of the rate in old EU members. This level is surpassed, among acceding countries, by the Czech Republic, Cyprus, Malta and Slovenia.

With respect to nominal convergence, it is important to note that differences in the average rate of inflation between the old (EU-15) and the new (EU-10) member states are smaller than in the level of economic development, but there is a high degree of heterogeneity among the member states. Although the majority of old member states reduced the rate of inflation to a low level prior to the introduction of the euro, the relative differences remain high among these countries. With regard to new member

### Chart 1

Variation in percentage of the level of development and inflation of member states from the EU-25 average (in 2003)



Note: EU-15 denotes old EU member states, while EU-10 denotes new EU member states.

Source: Eurostat.

states, the differences arise from the fact that with the exception of Slovakia, Slovenia, Hungary and Cyprus, the majority of countries had reached levels defined by Maastricht criteria as early as 2003.

In the euro zone, common monetary policy has considerably reduced fluctuations in interest rates and increased homogeneity among countries. In relation to long-term interest rates, all new EU member states have fulfilled convergence criteria, with the exception of Hungary. Major variations are observed, however, among new member states with regard to different inflation rates and higher risk premium arising from fiscal imbalance and exchange rate fluctuations.

### The regulatory environment

Following the 1980s, the financial sector of the EU underwent a major process of liberalisation (capital flow) and deregulation (establishment and cessation of commercial banks, capital adequacy of banks). Following the adoption of the Second European Directive (1989), regulating Banking and Financial Services, the "Single European Passport" (1993) and the launching of the Financial Services Action Plan (1999), the convergence of regulatory systems was considerably accelerated.<sup>3</sup> Since the new member states had implemented the major European banking directives prior to accession, the enlargement of the EU slowed down but did not suspend the continuous harmonisation of financial regulations.<sup>4</sup>

<sup>3</sup> The largest future challenges in Europe are linked to the harmonisation of the varying regulations of mortgage lending, asset management, financial consulting and insurance activity in the different countries, the implementation of Basel II and the introduction of the euro in new EU member states.

<sup>4</sup> Many countries are yet to fully adopt European directives related to co-operatives and the deposit insurance system. Several new member states must proceed with the harmonisation of regulations related to capital regulation, bankruptcy laws and the operation of branches and affiliates.

It is important to note that, although the harmonisation of European directives reduced the level of heterogeneity in regulation in the past year, the stringency of the regulation of similar activities significantly varies among member states. Moreover, major differences may also be observed in relation to non-directive financial regulations and those going beyond so-called minimum levels. Such factors include consumer protection, the protection of minority shareholders, the quality of corporate governance and the promotion of competition and efficiency.

### Depth of financial intermediation

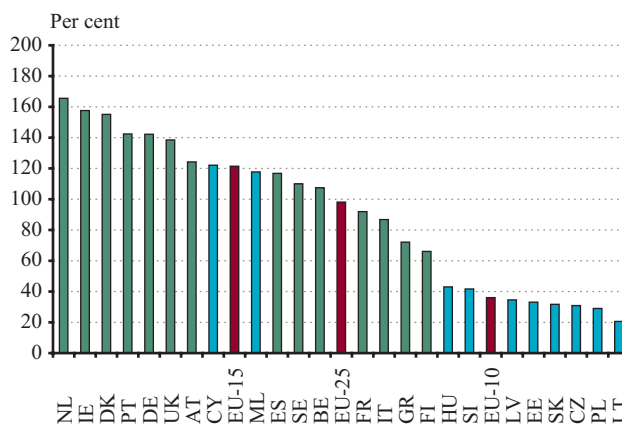
Among the major factors linked to the operational environment, the largest differences among EU member states arise in relation to financial intermediation. The average loan/GDP indicator (36%) of the banking system of new EU member states is less than one-third of the rate of old member states (125%).

The high level of divergence among new EU member states is indicated by three well definable groups of banking systems in relation to the depth of financial intermediation and its trends. The GDP-proportionate level of loans provided by the banking system to the private sector in Cyprus and Malta had reached the average rate of old EU member states as early as 2001. The rapid growth of the banks' economic role in these two countries is attributed to the early wave of privatisation, accelerated financial liberalisation and the stable growth rate of the economy. The second group includes the Czech Republic and Slovakia, where the depth of bank intermediation approximated the minimum level of old EU member states (60%) as early as 1998, as a result of the extensive financing of state-owned companies and early capital liberalisation. The GDP-proportionate rate of lending to the private sector, however, was roughly halved by 2003 (30%), due to, firstly, a high degree of portfolio rationalisation and, secondly, the firm expansion of the government's role in crediting, in parallel with the implementation of more stringent regulations. The third group includes the Baltic states (Estonia, Lithuania<sup>5</sup> and Latvia), Poland, Hungary and Slovenia, where the role of banks within the economy has been steadily gaining ground only since 1999-2000 from previously recorded low levels. Despite the rising trends, the gap between these countries has not narrowed significantly.

Finally, we should make note of the strong heterogeneity observed in old EU member states in relation to the role of

### Chart 2

The GDP-proportionate rate of lending by commercial banks of EU member states to the private sector (in 2003)



Note: We did not include Luxembourg because the GDP-proportionate rate of lending to the private sector is exceptionally high at 500%.

Source: ECB.

banks in financial intermediation. In Finland, Greece, Italy and France, the GDP-proportionate rate of bank loans to the private sector is lower than the EU-15 average, while the rate is higher in The Netherlands, Ireland, Denmark, Portugal and Germany. Differences in the depth of financial intermediation among countries is primarily caused by the varying role assigned to the capital market, the varying stringency of financial regulation and other country-specific factors.

### Market concentration

As a result of the consolidation process, the new EU member states have not only succeeded in narrowing the gap between old member states in economic, regulatory areas and financial intermediation, but also in relation to the market structure. Nevertheless, a major gap remains between the banking systems of the two regions with regard to market concentration.

Following the creation of the two-tier banking system in the new EU member states, the privatisation and recapitalisation of banks and the appearance of numerous new banks on the market contributed to the rapid dismantling of the monopolistic structures. The acquisition of most banks by foreign investors, the transfer of technology (modern risk management, corporate governance and settlement methods) and well-trained professionals greatly promoted the rise and integration of the financial sector's productivity.<sup>6</sup> In the second half of the 1990s, however, acquisitions, merg-

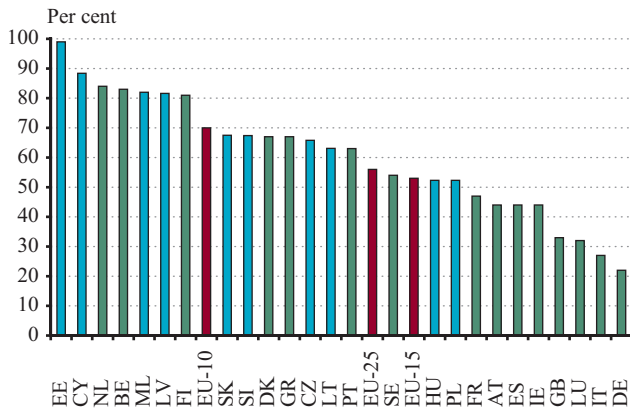
<sup>5</sup> The depth of bank intermediation is lowest in Lithuania, due, in addition to common factors, to its numerous bank crises.

<sup>6</sup> The impact of the relationship between the parent company and its affiliate on the level and development of efficiency, and the analysis of the latter, is particularly important in relation to the new member states. The analysis of this issue could represent a main direction of future research.

ers and numerous bank liquidations suspended the falling concentration of the banking system and stabilised the oligopolistic structure.

**Chart 3**

**Bank concentration in the EU member states (in 2003)**



Note: Concentration is defined as the sum of the market share of the five largest banks, based on their balance sheet total.  
Source: ECB.

By comparing the market share of the five largest banks on the basis of balance sheet total, among the new EU member states, only Poland and Hungary reveal values approximating the average rate of the old EU member states, due to the relatively large size of the markets. Partly as a result of small market size and partly due to the inherited market structure and the advanced consolidation process, the banking sectors of the other new EU member states are considered to have high concentration (the five largest banks have a 63-100% market share).

The market structure of old EU members states is also undergoing transformation. Contrary to trends in new EU member states, the low rate of market concentration in the old member states has increased at a steady rate in recent years, as a result of numerous mergers and acquisitions promoting the improvement of efficiency and/or market position. Nevertheless, the average concentration of the banking market in old EU member states (53%) remains below the rate of new EU members, and variation among countries exceeds the value of the new members (concentration of 22-84%). The latter trend is linked to the larger differences in country size among new EU member states.

**EMPIRICAL RESULTS**

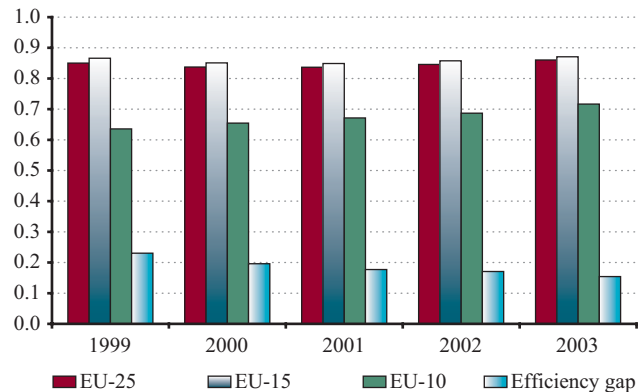
In our efficiency research, applying the statistical approach, 2459 banks in 25 member states of the European Union were analysed in the period 1999-2003. We estimated two basic equations in our research. The

first equation only analyses the input and output variables of the cost and profit function, while the second alternative equation was expanded with country-specific variables (inflation, per capita income, depth of financial intermediation, market concentration, quality of regulatory environment). We accordingly estimated the level of cost efficiency and profit efficiency for each bank and country, not controlling existing differences in the operational environment of banks, and by controlling these factors.

According to our results, irrespective of distorting factors arising from varying operational environments, a cost efficiency gap is revealed between the new and old member states, as well as a decrease of the efficiency gap through time, as a result of convergence between 1999 and 2003.

**Chart 4**

**Average cost efficiency levels in the European Union**



Note: Efficiency measures the joint effect of the operational environment and the behaviour of management.

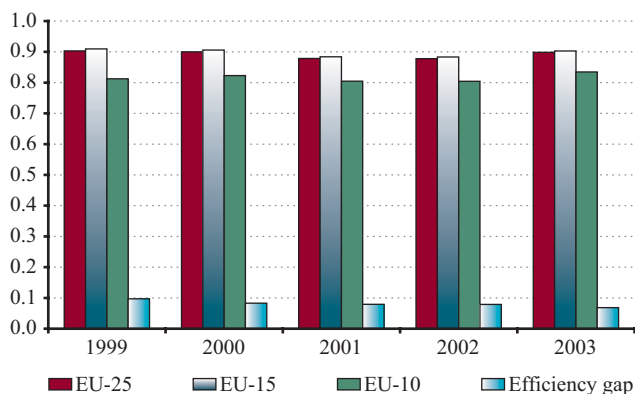
Chart 4 reveals a moderate fall in the efficiency of old member states, while the new members are closing the gap. In the analysed period, the efficiency gap between the two regions, indicating the advantage of old member states, has decreased from 23 percentage points to 15 percentage points. Chart 5, revealing the results of the alternative model, indicates that the average efficiency values of the whole EU and old member states also fell to a moderate degree in the period under review. It is noteworthy, however, that in 1999 the new member states "started" from a higher efficiency level, in comparison to the previous model, and the efficiency gap closes at a slower pace.

It is empirically evidenced that distorting factors, particularly control over inflation, the level of development and the closely linked depth of financial intermediation, as well as the regulatory environment, reduces the size of the actual gap between the old and new member states, and slows the speed of convergence. Beyond proof of convergence within the European Union, it may also be established that

the efficiency levels of banks within old and new member states are approximating each other.

### Chart 5

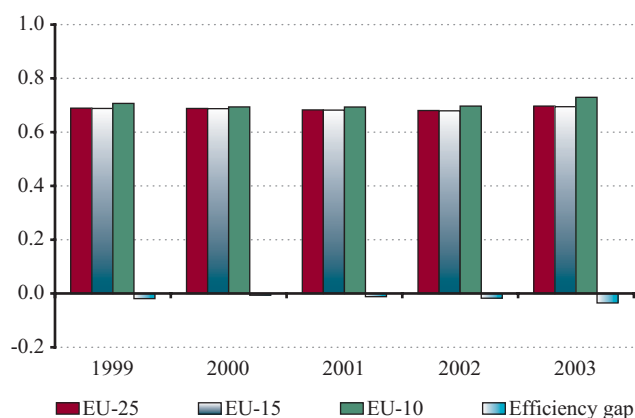
Average efficiency gap levels in the European Union



Note: Efficiency primarily measures the behaviour of management.

### Chart 6

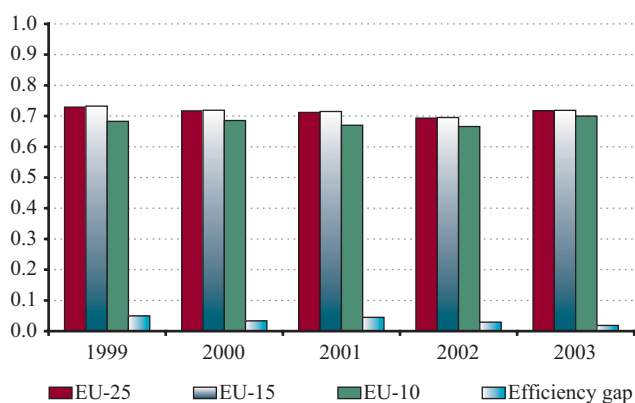
Average profit efficiency levels in the European Union



Note: We did not control differences in the operational environment.

### Chart 7

Average profit efficiency levels in the European Union



Note: We did not control differences in the operational environment.

In the course of estimating profit efficiency, a positive gap is detected between the old and new member states between 1999 and 2003, but only if we control the impact of the operational environment on profitability (Chart 7). With regard to many new member states, the special characteristics of the operational environment will likely enable banks to realise higher income, when compared to old member states. Thus a low, negative profit efficiency gap existed on the basis of the first model specification (Chart 6).

## PROSPECTS

With regard to the future, among efficiency indicators, a stable cost efficiency gap may produce an adverse impact on the long-term competitiveness of financial systems in new EU member states. The cost efficiency gap may be narrowed down through the higher internal efficiency reserves of banks in new EU member states, in comparison to old member states, linked to the behaviour of management, as a result of their low efficiency rates. There is the risk, however, that the constraint to improve cost efficiency in the banking systems of new EU member states will strengthen only to a limited degree, due to the oligopolistic market structure and the slow growth in competition. The efficiency improvement pressure may further be reduced, considering that banks of less developed countries also have high external efficiency reserves, since the gradual development and integration of the economy through the greater depth of financial intermediation results in a natural improvement in efficiency. As a limiting factor, the conscious improvement of efficiency involves higher surplus costs in the short term, producing the desired impact in the long term. Advantages and disadvantages associated with specific market characteristics in old and new member states will disappear as a result of the integration of financial markets and the financial institutional systems within the European Union. Therefore, the further narrowing of the cost efficiency gap is greatly needed.

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# Gergely Kiss: Fast credit growth: equilibrium convergence or risky indebtedness?

*This article is of relevance from an economic policy point of view – it attempts to answer a question of current economic relevance raised in many member states of the European Union. Is the fast credit growth witnessed in recent years part of an equilibrium process or rather an excessive rise in lending involving risks? The analysis prepared by the MNB suggests that in the new EU member states, the macroeconomic trends explain in great depth the rapid growth in lending witnessed since the transition to a market economy. It is important to note, however, that there are signs of excessive growth in lending in the region, particularly in the Baltic states. Stability risks may arise in Hungary in relation to the increase in household lending experienced in recent years.*

## INTRODUCTION

In economics, an observed economic process may, in many instances, be assessed with a variety of substantiated theoretical considerations, from which different conclusions may be deduced. The current fast credit growth, witnessed in most new member states of the European Union, including Hungary, is such an example. According to one argument, the rapid growth in lending, on the rise from very low levels recorded in the initial years of the transition to a market economy, is a sign of the healthy growth of the financial system, which assists these countries in implementing faster convergence with EU income levels. Others argue that if the stock of loans grows at an excessive rate, resulting in a credit boom, this may lead to major economic losses, even entailing a bank or exchange rate crisis. Many south Asian countries confronted such extremely grave problems in the 1990s, during the Asian financial crisis. In light of the above conflicting views, it comes as no surprise that the assessment of the credit boom has become an intensely debated economic policy issue throughout Europe in recent years.

With reference to an MNB study soon to be published (Kiss–Nagy–Vonnák: Credit Growth in Central and Eastern Europe: Trend, Cycle or Boom [2006]), this article aims to analyse the extent to which credit growth witnessed in recent years is to be considered part of the equilibrium, hence convergence process, and to what extent it reflects risky trends which may lead to a credit boom.

The article is structured as follows: we first summarise the most important theoretical relationships and discuss the possible economic approaches to excessive credit growth; without highlighting technical details, we then present the main empirical results of the MNB study; finally, we identify economic policy conclusions on the basis of the above.

## ECONOMIC BACKGROUND

According to the generally accepted theoretical approach, credit growth may be divided into three categories: trend, cyclical component and excessive growth, that is, boom. Trends may best be defined with macroeconomic variables, as we will see below. The cyclical nature of lending is strongly linked to the general economic cycle, which may, in the given case, be strengthened by the financial system through a change in asset prices. Excessive credit growth, a possible credit boom, is generally defined as the difference between the actual growth in lending and the balance determined by the aforementioned two components (trend and cycle).

As implied above, the definition of equilibrium credit growth is a key issue. We analyse below the explanatory variables which may play a dominant role in the equilibrium level of credit growth in the new EU member states. The most important relationship is represented by the correlation between loan stocks and the economy's level of development. In economics literature, loan stocks are often defined in proportion to GDP; this quotient is considered to be one of the most important indicators of financial depth. Economists agree that there is a strong positive correlation between financial depth and the level of economic development. In other words, in the process of convergence, not only does the stock of loans increase in proportion to GDP growth, but also at an exceeding rate; thus the credit/GDP rate is on a continuous rise. The causal link may function in both directions – a more developed economy contributes to financial depth, and deeper financial markets may accelerate the growth of the economy through the more efficient allocation of savings. On the basis of the close link between financial development levels and economic growth, international financial organisations (IMF, World Bank) recommend to emerging countries reform of the financial system and improvement of its efficiency, thereby promoting dynamic real economic growth in the longer term.

Numerous other factors may affect the depth of financial mediation. These include real interest rates, inflation and the impact of the openness of money and capital markets, and the strength of competition between banks. The effect of lower real interest rates is clear – the fall in the cost of credit increases credit demand.

High inflation may cause a decrease in credit demand through two channels. In practice, higher inflation is associated with greater inflationary uncertainty. Growing uncertainty bears an impact on the whole of the economy; due to less predictable future trends, uncertainty particularly grows in the assessment of future cash flows, which directly affects credit demand and supply. Rising inflation also results in more stringent liquidity constraints.<sup>1</sup> Due to the latter effect, the rise in inflation – through increasing monthly instalments – prevents an increasing number of households from drawing, for example, consumer or mortgage loans.

The elimination of barriers to international capital flows and the liberalisation of the financial system also promote the deepening of financial markets – they intensify competition and contribute to improving the efficiency of the financial intermediary system. Summarising these economic impacts, we may establish that economic growth, decreasing real interest rates and inflation, and the liberalisation of the financial system all increase the financial depth of an economy, contributing to the equilibrium growth of loan stocks.

## **COST OF EXCESSIVE CREDIT GROWTH, STABILITY RISKS**

Following the outline of theoretical foundations, let us summarise the main costs and risks of excessive credit growth, as examined in the literature. With regard to stability risks, one of the most important correlations is established between credit growth and the external borrowing position, the current balance of payments. Accelerating credit growth – often reflected in the worsening of the foreign trade balance – is frequently also financed with external funds, in addition to domestic savings. Thus, a credit boom is often accompanied by a high deficit in the current balance of payments. According to one of the most important conclusions drawn in a recent study of the IMF (IMF 2004), examining the whole global economy, data on recent decades indicate that 75% of credit booms witnessed in emerging countries lead to a bank crisis, and even a higher rate (85%) to an exchange rate crisis. In addition to

determining risks, the IMF study considers it important to emphasise that rapid credit growth, in itself, does not correspond to risky credit expansion; the latter is much less likely to develop in the given economies.

In the period of a credit boom, the worsening quality of bank portfolios may also be a source of additional risks. Growth in lending often implies that the range of borrowers expands and lending increases in segments considered earlier as volatile. Considering that repayment problems typically do not arise in the initial period following the extension of the credit, the quality of the credit portfolio worsens only later when the stock of risky credits has grown significantly among the banks.

## **WHEN IS THERE A CREDIT BOOM?**

Following the review of macroeconomic explanatory variables and stability risks, the question arises: how can we in practice determine equilibrium credit growth? Beyond what level is credit growth judged to be risky? Economics literature has basically formulated three answers. The simplest answer is the assumption of a fixed limit. Irrespective of the economic fundamentals, we determine a limit value, and credit growth exceeding such limit is considered to be risky. This rule is quite similar to a speed limit on the roads.

The basis of the second possible answer is provided by defining the trend with historical data. The logic of this is based on the premise that, in the given long term, the explanatory variables are fully incorporated in the loan stock. The equilibrium path of the loan may be directly observed on the basis of the long time series. Using the above illustration, in this case, the speed limit for cars is determined on the basis of speed measured in the previous period, that is, the limit has the potential for a sudden change in speed.

The third answer is linked to the development of economic fundamentals and explanatory variables. Let us examine the precise crediting dynamics warranted by the development of GDP, real interest rates, inflation and the other possible explanatory variables; this estimate is considered to be the equilibrium path. The actual rate of growth in excess of the equilibrium may involve risks. Now, the speed limit is determined according to the current condition of the engine, brakes and the chassis.

Among the three alternatives, the MNB study chose the last one. The first option is a mechanically constructed, exces-

<sup>1</sup> The liquidity constraint means that households are unable to draw loans in an amount sufficient for the optimal consumption path; that is, they are unable to appropriately smooth their consumption.

sively inflexible rule, in full disregard of macroeconomic trends, rapid economic convergence characterising new EU member states and the initially low rate of crediting. As an important, practical counter-argument against the second option, a time series of adequate length is, at this point, unavailable in relation to Hungary and the other new EU members, which would enable the reliable calculation of the equilibrium path.

The approach based on explanatory variables produces estimates through the application of econometric methods. Prior to discussing the results, we briefly outline below the econometric methodology used in the study and its economic interpretation.

### ESTIMATION METHODS

Two databases could be prepared by considering the quarterly and annual time series of explanatory variables described above in the theoretical section (GDP-purchasing power parity<sup>2</sup>, real interest rates, inflation). The first database contains aggregate data, i.e. covering the whole domestic private sector. The second database treats the two sectors separately, data on households and companies.

We will briefly discuss loan stock data and the explanatory variables. We have not yet accurately defined the loan stock – this is essential for the estimation. The consolidated balance sheet of the banking system allows easy access to data on the loan stocks of the resident non-financial private sector (households and companies). Our task is somewhat complicated by the fact that there are no barriers to capital flows in the EU and thus resident companies – primarily firms with an international background – also directly draw foreign loans. Such borrowings, however, are not included in the balance sheet of the resident banking sector. From an economic point of view, both loan stock indicators may be of relevance, therefore data containing foreign loans is more useful in relation to sectoral estimates.

Determining the average real interest rate is similarly important with regard to many new EU member states, due to the high proportion of foreign exchange loans. Foreign exchange lending is chiefly motivated by a smaller interest burden resulting from lower nominal interest rates. In relation to these loans, however, in addition to the foreign exchange real interest rate, the expected change in the rate is also relevant. Considering that a smaller foreign

exchange interest burden contributes to the easing of liquidity constraints, this effect significantly resembles the effect expected upon falling inflation.

In relation to the filtering of the trend, we have noted above that it is difficult to draw substantiated economic conclusions from the results of calculations made with too short a time series. Due to the short time elapsed since the stabilisation of market economies in the new EU member states, this remains an existing practical problem. One solution would be to analyse data on several countries in parallel, that is, perform a panel estimate. As another option, we would not produce direct estimates of the given countries, but prepare estimates with a longer time series of euro zone member states, in our case, and use the received results in relation to new EU members. This approach is particularly warranted in relation to credit, considering that as future euro zone members the new EU member states will join the single financial market in the foreseeable future and become part of the same environment. By combining the two options, the MNB study prepared panel estimates on the basis of data on current euro zone members, relating to the period 1980-2002, and used these parameters for analysing new EU member states.

The study applied the so-called pooled mean group estimator method for the econometric calculations. The essence of the method may be summed up in three points. Firstly, it assumes common long-term parameters from data on individual countries, that is, GDP, the real interest rate and inflation affect loan stocks with an identical co-efficient in all countries. Secondly, differences may arise between individual countries in the short-term dynamics and the constant. The constant defines the characteristics of particular countries; factors which are not directly expressed by the explanatory variables, such as the institutional environment, cultural and historical traditions. Thirdly, it is important to note that the method is based on an error correction model. It presumes that the loan stocks – if departing from the equilibrium level defined by the explanatory variables – in the economy will gradually return to a level of equilibrium. The speed of equilibrium convergence is determined by the adjustment parameter, which also varies per country.

### RESULTS

Table 1 indicates that we obtained statistically significant results that are in line with intuition, with both annual and quarterly data.

<sup>2</sup> The GDP-purchasing power parity filters differences arising from price variations, allowing a better comparison of specific countries' level of development.

**Table 1**

**Summary of estimation results**

	Annual data	Quarterly data
Explanatory variables		
GDP	0.51*	0.75*
Real interest rate	-1.88*	-6.4*
Inflation	-2.04*	-6.12*

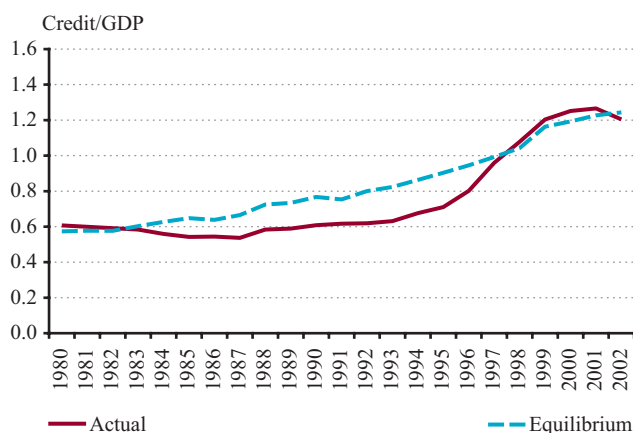
*Statistically significant variable.*

A 1 per cent rise in GDP increases the credit/GDP rate by 0.5-0.75 per cent. In both estimates, the real interest rate and the rise in inflation decreases the equilibrium loan stocks by a very similar rate, implying that the real interest rate and inflation jointly produce an impact through the nominal interest rate. In relation to the annual estimate, the 1 percentage point increase in the real interest rate and in the rate of inflation decreases the credit/GDP rate by 2 percentage points; in the quarterly estimate, this effect is triple. These results are in harmony with the results of estimates published earlier in the literature.

As an illustration, based on the results of the panel estimates, we observe below the equilibrium path of Ireland, recording one of the fastest credit growth rates, and the actual credit/GDP time series.

**Chart 1**

**Credit/GDP in Ireland: fact and estimated equilibrium**



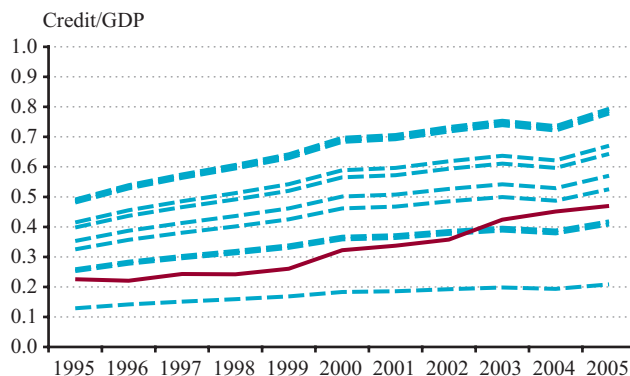
The chart reveals that the macroeconomic fundamentals – exceptionally rapid economic growth and interest convergence preceding the introduction of the euro – confirm the significant rise in the credit/GDP rate, and the actual development of lending steadily followed the equilibrium level during the more than 20 years under analysis.

**RESULTS IN THE NEW EU MEMBER STATES – AGGREGATE DATA**

As noted in the section on methodology, the estimates for the euro zone comprise only the first step in analysing the new EU member states. How can euro zone related results be used outside of the sample? The answer is simple in relation to long-term parameters: the common values obtained from the estimates and shown in Table 1, can also be used out-of-sample. In other words, GDP, the real interest rate and inflation – presuming the expansion of the single euro zone financial market – similarly affect the loan stocks in the new EU member states. It is more difficult, however, to clearly define country-specific characteristics outside of the sample which are reflected in the constant. The MNB study basically performed the calculations with all constants resulting from the estimates. This method is based on the assumption that the unique constants characterising the new members are in the – considerably wide – range received for the euro zone, and do not fall out of the range.

**Chart 2**

**Credit/GDP in Hungary: fact and estimated equilibrium levels**



It is clearly visible that the development of the Hungarian economic fundamentals in recent years warranted the significant rise in the credit/GDP rate. The increase of the equilibrium level is attributed to the stable and quite



dynamic economic growth witnessed in the past 10 years, the major fall in the rate of inflation and lower real interest rates. As revealed by the chart, the determination of the equilibrium level is compromised by uncertainty – the estimated equilibrium levels fall within a wide range. Despite this uncertainty, it would be warranted to claim that the Hungarian credit/GDP rate is not high on the basis of our estimates, since it falls in the lower part of the estimated range.

Following the assessment of the credit level, we now discuss the growth rate. The model enables us to identify signs of a credit boom not only according to the estimate of the equilibrium level, which is associated with some uncertainty as observed above, but also on the basis of credit growth and dynamics. According to this approach, credit growth is also considered to involve risks if its rate is not excessive, but its dynamics exceed that of the equilibrium.

The table below summarises the current risks in lending in the new member states of the EU, on the basis of the two possible credit boom concepts (rate and dynamics).

On the basis of the table, it may be established that, upon solely examining the levels, the credit boom risk is not high in any of the countries, although loan stocks are in the upper part of the estimated range in two Baltic states – Estonia and Latvia. The picture is somewhat different when analysing the dynamics. In the aforementioned two countries, the growth rate is significantly higher than warranted by the economic fundamentals. This implies that the current dynamics may involve risks. We may determine in relation to Lithuania, Hungary and Slovenia that growth was faster in recent years than warranted by the equilibrium. These signs, however, do not indicate major risks – rapid

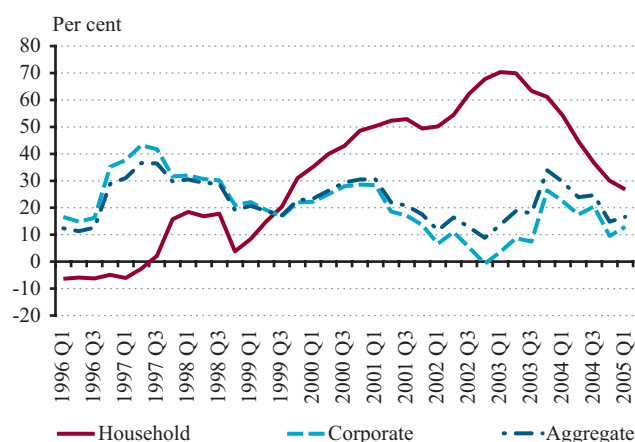
growth may be in harmony with convergence moving from lower levels.

## RESULTS IN THE NEW EU MEMBER STATES – SECTORAL DATA

Following estimates related to the whole economy, the analysis of sectoral trends may provide us with further interesting conclusions. Let us first review Hungarian data.

### Chart 3

**Credit growth in Hungary**  
(yearly rates)



With regard to aggregate data, it is important to note that the growth rate of the domestic loan stocks fluctuated between the annual rate of 10-30% in recent years. Considering that nominal GDP increased at a slower pace than the average growth rate of lending, this is roughly the same as the growth of the credit/GDP shown in Chart 2. Within the total loan stock, household lending is increasing at the fastest pace. Although the growth

### Table 2

**Risk of credit booms in the new EU member states**

	Level	Dynamics
Estonia	average	high
Latvia	average	high
Lithuania	low	average
Hungary	low	average
Slovenia	low	average
Poland	low	low
Slovakia	low	low
Czech Republic	low	low

rate of this component has been decreasing at a steady rate since the stringency measures of 2003 related to the housing subsidy system, it still approximates 30%. The growth rate of corporate lending has been significantly lower in recent years.<sup>3</sup>

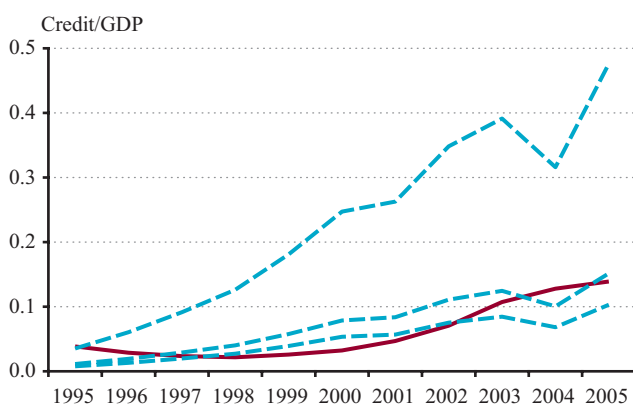
The growth in household and corporate lending in recent years in Hungary reflects a typical trend among new EU member states. Thus, the question arises: can credit booms be identified in the particular sectors? In view of the above trends, the answer may be particularly relevant in relation to households.

Similarly to aggregate data, the premise of sectoral analysis is also based on the estimation of the euro zone. According to econometric tests, estimates performed with identical explanatory variables (GDP, real interest rate, inflation), but with shorter time series, are considered to be less reliable than aggregate data.

With regard to households, the results are roughly in harmony with the aggregate estimates. The signs of the explanatory variables are identical and all three are significant, but there is variation in the level of the effect. Real interest rates and inflation play a predominant role in household crediting. The major role of inflation is not surprising, considering that liquidity constraints play a significant role in relation to households when nominal interest rates are high due to inflation.

## Chart 4

### Household lending in Hungary: fact and estimated equilibrium levels



As revealed by Chart 4, the exceptionally high growth in household lending between 2000 and 2004 – when the credit/GDP rate jumped from 3% to 13% – may not be exclusively defined as equilibrium convergence; a part of the growth involves risks. The risks are effectively illustrated by the dynamics of the median<sup>4</sup> equilibrium path. Thus, the equilibrium indebtedness of households rose from 8% in 2000 to 15% of GDP in five years. The trends took a favourable turn in 2005. The pace of growing household lending slowed down and, following a temporary inflationary shock (VAT increase) in 2004, inflation, too, decreased in Hungary to the level of long-term price stability. According to the results of calculations made for the other countries, the indebtedness of Estonian and Latvian households is considered to have risks.

With regard to corporate lending, the sign of the GDP and the real interest rate corresponded to the other estimate results, although the sign of the inflation co-efficient changed. In other words, data suggests that in this sector, higher inflation does not reduce lending, but increases it significantly in statistical terms. It is not surprising that inflation is less correlated with the liquidity constraints of companies, since these – particularly exporting companies – can finance activities with foreign exchange, without assuming exchange rate risks; thus their behaviour is partly independent of domestic nominal interest rates. Upon jointly analysing the co-efficient of the real interest rate and inflation, we may determine that their amount is negative and thus the result is in line with the expected result – a rise in the nominal interest rate among companies reduces the rate of lending. The analysis concluded that growth in corporate lending is not likely to involve risks in the new EU member states, owing mainly to the high rate of foreign exchange loans which were already popular in the previous period.<sup>5</sup> Summarising the sectoral estimates, it is important to emphasise that, despite the partly varying database and the shorter time series, conclusions very similar to aggregate results can be drawn in relation to the lending trends observed in the new member states.

## CONCLUSIONS

On the basis of rapid credit growth witnessed in the new EU member states, we may draw the following main conclusions.

<sup>3</sup> In relation to corporate loan stocks, it should again be noted that this already includes direct foreign loans, the amount of which is not recorded in the balance sheet of the banking system.

<sup>4</sup> The median path signifies an equilibrium path calculated with a euro zone constant, which is located in the centre of distribution with 11 elements (see Chart 2).

<sup>5</sup> It should be noted, however, that segments with higher risks may exist within the total stock of corporate loans which cannot be defined in this macro-economic model. The increasing foreign exchange debt of the SME sector may be referred to this category.

The rapid credit growth experienced in recent years in the region is basically considered to be equilibrium convergence, although in the Baltic states (particularly in Estonia and Latvia) several indicators suggest an excessive credit growth, especially in relation to the household sector.

Owing to a credible convergence path and the related, favourable income prospects, low inflation and further interest rate convergence, in the forthcoming years the equilibrium credit/GDP rate is expected to rise at a dynamic rate in the new EU member states.

Currently, the risk of excessive credit growth is not judged to be high in Hungary. Inflation, falling to the level of price stability, and the stable growth of the economy supports equilibrium convergence. The lasting external borrowing requirement of the economy, however, strengthens risks arising from credit expansion.

On the whole, caution is advised for Hungary. It is important for economic policy decision makers to monitor

crediting developments when assessing macroeconomic trends. This is particularly of relevance to the household sector, where we estimate that credit expansion exceeded the increase in equilibrium between 2000 and 2004.

The participants of the financial sector should also understand the risks related to excessive credit expansion in the current macroeconomic situation, and act with due diligence in lending, especially in relation to more risky segments (e.g. foreign exchange loans without natural hedging).

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# Balázs Párkányi: Myths and Maths: Macroeconomic Effects of Fiscal Adjustments in Hungary

*In the short term, the primary effects of a fiscal adjustment most frequently cause a downturn in economic output, although it may also produce stimulating, secondary effects, as well. In relation to this, with the help of an estimated model based on Hungarian data, we analysed how the macroeconomic effects of a fiscal adjustment depend on the type of measures and examined the Hungarian relevance of other effects not definable within the model. We established that in the short term the stimulating effects are not likely to fully compensate for the losses, yet their relevance may increase in the medium and long term. In most cases – depending on the structure of adjustment – the central bank has the option of loosening, but in certain cases, fiscal and monetary policies may be in conflict with each other, due to evolving inflationary pressure.*

## INTRODUCTION

In our study<sup>1</sup> we analysed fiscal policy, including the possible consequences of a fiscal adjustment. Beyond its significance from an economic policy point of view, the current relevance of the topic is prompted by the popular empirical research work conducted in recent years which has analysed the existence and preconditions of the stimulating economic effects of fiscal adjustment. The possibility of expansionary fiscal consolidation first arose in relation to the Irish (1987-1990) and Danish (1983-1986) cases, followed by numerous other case studies, such as analyses conducted among member states joining the euro zone.

Subsequently, many authors noted that, as indicated by the Irish and Danish cases, fiscal policy successfully coped with losses attributed to adjustment not on its own, but with the support of other exogenous factors or monetary policy. The debate has been going on ever since. Some argue that fiscal consolidation may be implemented without a growth sacrifice through so-called *non-Keynesian* effects, while supporters of the traditional theory claim that the above mentioned channels may moderate the losses of adjustment, but on the whole these are unable to compensate for losses.

The difference between the explanations is also attributed to the fact that the role of non-standard, stimulating effects in successful consolidation is difficult to prove on an empirical basis. This is firstly related to theoretical and econometric reasons, and secondly to statistical (measurement) problems.<sup>2</sup> This difficulty not only arises in the analysis of past adjustments, but also in relation to the analysis of the possible effects of consolidation in the current situation.

Due to the above difficulties, most studies dealing with *non-Keynesian* effects are limited to “the answer is in the question” type analyses, that is, the applied statistical data and the model framework significantly limit the range of concluded answers. For this reason, we used two approaches for analysing the Hungarian economy.

Firstly, with the help of simulations prepared with the bank’s projection model<sup>3</sup>, we determined the output and inflationary sacrifice of government consolidation based on various methods. Secondly, we stylised some features of the economy to determine the degree in which secondary channels, not contained in the traditional model framework, are capable of fully compensating for output losses appearing in the simulations.

<sup>1</sup> Horváth Á., P. Kiss G., Jakab M. Z. and Párkányi B.: Myths and Maths: Macroeconomic Effects of Fiscal Adjustments in Hungary, *MNB Occasional Papers* 2006/52 (only in English).

<sup>2</sup> Among theoretical reasons, we could argue that certain behaviour of economic actors is difficult to formalise in a theory. The foresight of people is one such example. The non-Keynesian effects are often bound to the expectations of actors, the incorporation of which in the models is certainly imperfect. On the other hand, the positive effects of adjustment are often characterised by the increasing rate of economic growth, which could be misleading, since growth almost always increases (due to the low base) following an immediate and significant fall in production, even though output has not reached earlier levels. In econometric terms, the distinction of many simultaneous effects and thus the quantification of non-standard effects is what poses the difficulty. We discuss later on problems arising from the statistics used.

<sup>3</sup> The Quarterly Projection Model (NEM) is the forecasting model of the bank estimated on Hungarian data, characterised by sticky prices in the short term and a rigid supply curve in the long term, hence containing both neo-Keynesian and neo-classical features. Benk et al. (2006) provide a detailed description of the NEM model.

## THEORETICAL BACKGROUND

In consideration of the fact that in the background to the debate over the existence or relevance of so-called *non-Keynesian* effects, two prominent theories (building on different assumptions and different conclusions) clash, we believe it is important to understand the terms and the historical-theoretical background.

It is necessary to define the term fiscal effect or fiscal multiplier. The fiscal multiplier shows the change in the gross domestic product (GDP) caused by changing a fiscal variable by one unit. If two variables move in the same direction (i.e. loosening is followed by an upturn), the multiplier is said to be positive. Effects whose short-term multiplier is negative are termed *non-Keynesian* effects.

Let us now turn to the role of government in the economy and to the implied instruments at its disposal. Firstly, the government appears on the demand side of the commodity market, as government consumption and investment are directly reflected in the usage of the GDP. Secondly, it creates goods and services which it sells at a regulated price or provides to the citizens as contribution in kind. It is also present on the labour market by hiring government employees; and naturally, it also collects taxes and provides transfers.

At this point, we should note that in the absence of markets (and market prices), the contribution of the government to the production of the GDP cannot be measured; therefore, the statistics consider incurred costs as a basis.

It is also obvious that instruments vary in the way they produce effects; thus it is useful to separately examine partial effects realised through certain channels and the full effect, arising as the result of these. The calculation of the full effect is not possible, however, because in many instances this would assume that the model contains channels which are defined with conflicting theories. Before we discuss certain mechanisms in detail, let us summarise how certain theoretical trends approach fiscal policy.

The Keynesian model places emphasis on the role of government in aggregate demand and assigns significance to the secondary effect (so-called multiplier effect) arising through income. The new representatives of the theory modify the picture to the extent that they allow the slow adaptation of prices and wages (so-called sticky nominal variables); thus, the fiscal effect remains positive, but is less than one.

According to the classical school – which prefers to analyse the role of government in the production of GDP – the government sector is not efficient; it produces services with excessive costs and losses. Moreover, the facts (statistics) do not provide any help in resolving this dilemma because, as noted above, in the absence of adequate markets, most of the government's activities can only be measured indirectly, on the basis of costs or the price of similar services on the market. Furthermore, the transfers provided and the collected taxes produce only indirect effects, which are thereby even more uncertain.

Given the two different approaches, the consequences of cuts in government spending are also assessed differently. While the Keynesian theory argues that this causes a major downturn, in classical thought, this could improve efficiency or even increase output.

As a result of the technical (statistical) effect, however, a fiscal adjustment is directly reflected in government output and thus in GDP, even if the measure targeted the avoidance of losses and the improvement of efficiency. For the above reason, too, it is difficult to categorise fiscal effects, since the measurement error can even affect the sign of the multiplier.

Thus, it is not surprising that channels found in the research of *non-Keynesian* effects fit the classical approach. Advocates of *non-Keynesian* effects believe that these channels are strong enough to render the full effect negative; that is, directly following the fiscal package fiscal adjustment is followed by an upturn, while loosening is followed by a downturn.

Notwithstanding the fact that there is still no theory confirmed by data and with a consensus view of fiscal measures, the most widely accepted view argues that, in the short term, the economy functions in accordance with the Keynesian theory due to the slow adaptation of the nominal variables. In the long term, however, the markets are capable of adjusting perfectly, underlining the conclusions of the classical school.

Overall, while Keynesian theories argue that the government operates with market efficiency<sup>4</sup>, thereby directly contributing to the performance of the economy, the classical approach claims that the government is less efficient, hence the larger the government, the smaller the output of the economy; in an extreme case, the government only produces losses, only negatively contributing to produc-

<sup>4</sup>Naturally, there are public goods produced by the government because the market could not produce them with a profit. There is no point in discussing inefficiency in relation to these.

tion. Most probably, the truth lies between the two extreme views. The problem is aggravated by the fact that cost-based statistics tend to strengthen the Keynesian approach. Therefore, theories representing other approaches are difficult to support with the given statistics.

With regard to the size of the effect of fiscal measures, it is important to note that in an environment of expanding international trade, the effectiveness of fiscal policy has been clearly reduced. Thus, in the past decades, only smaller fiscal effects were found relative to the greater-than-one multiplier, suggested by the Keynesian theory for a closed economy. The openness of an economy, therefore, reduces the effectiveness of fiscal policy, partly as a result of the import content of government consumption and investment, and partly by weakening (through imports) the secondary effect arising through household consumption. On the above grounds, without considering the openness of the economy, substantive conclusions may not be drawn as to the size of the full effect in relation to *non-Keynesian* channels.

## CERTAIN ECONOMIC CHARACTERISTICS OF HUNGARY

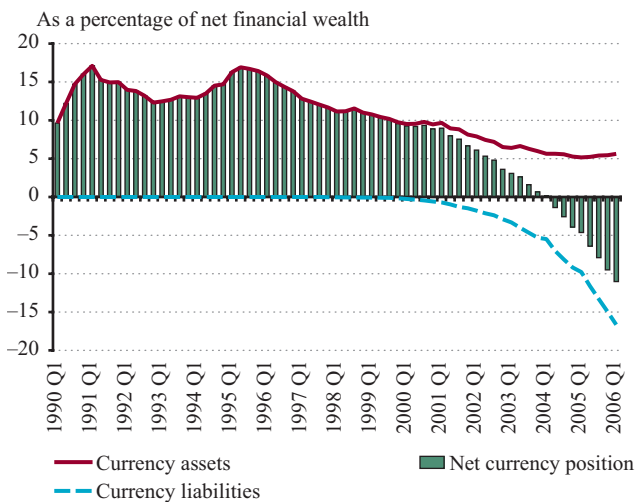
The majority of *non-Keynesian* effects cannot be defined and expressed in numbers within the framework of the traditional model. For this reason, we will provide a qualitative analysis on the domestic relevance of these channels in the next chapter, in parallel with standard effects. In this chapter, we will review the characteristics of the Hungarian economy which are relevant in relation to the above.

Trends of the past decade have, on the one hand, been characterised by a major influx of foreign capital and the deepening of the financial sector, and, in parallel, the expansion of consumer credits. On the other hand, we can also observe an increase in external and internal imbalances (balance of payments and government deficit). Accordingly, the assessment of the economy as a whole is not free from contradiction.

With the credit boom and the government housing subsidies, the proportion of private consumption to income increased to a high level on an international scale, while the rate of household savings fell dramatically at the same time.<sup>5</sup> This trend is increasingly observable in the foreign exchange denominated financial position, where households have become net borrowers from net savers.

Chart 1

### Foreign exchange position of households



Although outstanding loans in other countries of the region also increased, Hungary is definitely ranked high when considering the rate of growth, albeit the outstanding loans lag considerably behind the figures of developed countries. For this reason, as well as intensifying competition in the financial sector, issuing of new credit is likely to further increase, but slowdown is also possible due to high instalment to income ratios.

The assessment of the above trend is also determined by the fact that a large share of households project expected income in the future only on the basis of past income. This is also reflected by the fact that the inflationary expectations of households were slow in conforming to the gradually decreasing rate of inflation witnessed in recent years, and that wage inflation followed falling inflation only with delay. In general terms, Hungarian wages are slower than prices in reacting to changes in the inflationary environment.

Up to now, the Hungarian labour market has been characterised by a rigid labour supply. This is attributed in the literature to mainly two factors. Firstly, existing qualifications have lost value with the transition to a market economy, and consequently a large proportion of the work force was forced off the labour market. Secondly, in correlation with the above development, education was incapable of adequately adapting to changing labour demand; thus the market could not immediately absorb new entrants on the labour market. In the recent period, however, the conflict between demand and supply is likely to have eased to a significant degree, owing to low employment and growing

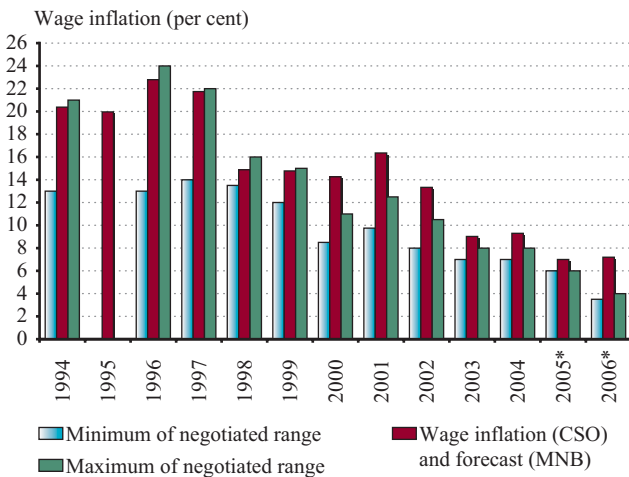
<sup>5</sup> This trend seems to be turning around in recent months, even though this does not essentially change the proportion of consumption and savings to income.

unemployment, but for the time being it is not possible to provide an accurate picture of the above trend.

Poor interest reconciliation also characterises the Hungarian labour market, as in recent years actual wage inflation did not reflect the results of wage agreements (Chart 2). International experience suggests, however, that in the event of a crisis or major fiscal tightening, possible welfare losses can be significantly reduced if the employers and employees manage to reach an agreement and do not leave it to the market to establish the new equilibrium.

**Chart 2**

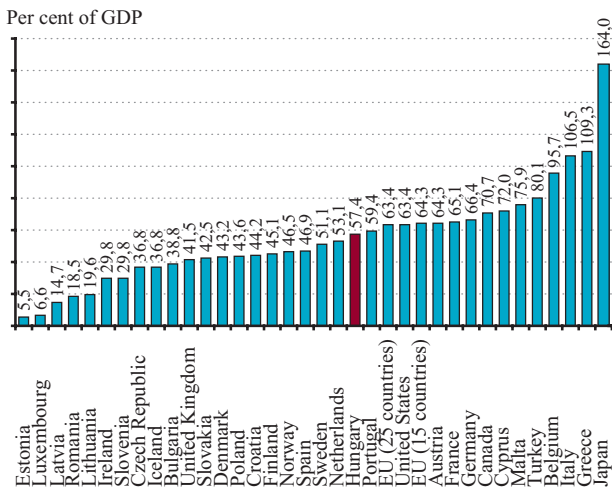
**Wage increases determined in wage agreements and actual wage inflation**



In addition to a vulnerable labour market, the size of the budget deficit and government debt adds to the uncertainty. Although the debt figure is not exceptionally high in the

**Chart 3**

**General government consolidated gross debt in 2004**



Source: Eurostat.

most recent international comparison, it is among the highest among the emerging economies. Similarly to households, in order to satisfy its growing financing needs, the general government has been increasingly relying on foreign exchange loans.

As a result of the above developments, Hungary is characterised by a medium-high average risk premium which, of course, may change according to the risk appetite prevailing on the international money markets, thereby modifying the cost of financing the primary deficit, as well as the size and conditions of an occurring fiscal adjustment.

**FISCAL MECHANISMS**

As noted above, by virtue of its role in the economy, the government holds numerous instruments capable of affecting the condition of the economy. We discuss below how the economic effects of consolidation depend on the structure of consolidation. In the process, we will make use of the outlined characterisation of the Hungarian economy in the previous chapter to focus on the Hungarian relevance of *non-Keynesian* channels arising in relation to the given type of measure.

On the basis of our analyses, we may conclude that, although crucial differences may arise between fiscal effects, depending on the specific measure used for adjustment, no *non-Keynesian* effects are expected within one year following consolidation. In the middle and long term, however, upon changes in the expectations of economic actors and the credibility of fiscal policy, channels may significantly strengthen which promote renewed economic growth.

*Non-Keynesian* effects, in addition to significantly affecting the success of consolidation, may also reverse the appropriate reaction of the central bank if these appear within 2-3 years, the horizon relevant to monetary policy. In this case, it is possible that an adjustment also triggers unexpected inflationary pressure by promoting production, although given a Keynesian effect the GDP would probably fall, accompanied by disinflation.

We used the simulations, performed with the Quarterly Projection Model of the MNB, to illustrate the effects of adjustment implemented with various fiscal instruments. In addition to reliably presenting the effects of possible fiscal consolidation within standard economic concepts, this model is in disregard of numerous channels and theories due to unavoidable abstraction and simplification in the process of constructing the model. For this reason, with our second method, we also took those effects which cannot be

incorporated into our models, and attempted to rank these according to their relevance to the Hungarian economy.

The most direct channel through which adjustment may be implemented is government consumption and investment, since these comprise part of aggregate demand and are thereby part of the gross domestic product. Through a direct relationship – it is no coincidence that these two instruments incorporate fiscal policy in the Keynesian sense – these produce an immediate and major impact on GDP, although in the case of investment this effect may be somewhat smaller due to its higher import content. In the short term, however, their effect on prices is moderate and disinflationary due to the stickiness of the nominal variables, in accordance with the neo-Keynesian theory. Due to wage reactions being slower than price adjustments, the secondary (income) effect of initially rising real wages weakens the effect of these shocks on the real economy.

The model simulation is the most reliable in characterising the effects acting through the commodity market, due to its strong Keynesian nature; nevertheless, there may be other effects arising from the improving creditworthiness of fiscal policy, which may push the full effect into a *non-Keynesian* direction. With regard to the frequently expressed view that the curbing of government consumption is the most appropriate instrument for setting the government budget back on a sustainable path, an adjustment made through the commodity market channel would very likely lead to an improvement in the credibility of fiscal policy and the strengthening of the domestic currency. Given, however, the large (and growing) foreign exchange debt of Hungarian households, this would positively affect assets, accompanied by the unexpected fall in inflation due to decreasing import prices which, in turn, would induce growing consumption. Since the deepening of the financial sector and the expansion of consumer lending is still an ongoing process in Hungary, the *non-Keynesian* channel may arise even in the short term, although the effect of the initially strong Keynesian adjustment would probably suppress this effect.

The next analysed fiscal mechanism originates from the redistribution role of the government. Consolidation may be implemented by redistribution between the income of current and future generations, that is, when the budget deficit is reduced with a tax increase. We presumed an increase in personal income tax to simulate an adjustment through the income channel. Similarly to the two previous

channels, we found a relatively strong reaction in the real economy, but this arose as prolonged, due to the consumption smoothing behaviour of households.<sup>6</sup> This adjustment also reduced inflation.

Most models, and hence simulations, lack an element which would be capable of addressing the expectations of economic actors. However, one of the most frequently mentioned *non-Keynesian* channels acts through the expectations of forward-looking agents. According to the theory, consolidation projects a healthier budget, and this would necessitate lower tax revenue in the future. This, however, would mean a higher disposable income, some of which households would spend already in the present. Thus, according to the *non-Keynesian* theory, adjustment is followed by increasing consumption. The relevance of this plus effect with regard to Hungary is that it is not significant due to economic actors being predominantly backward-looking.

In addition to the fact that fiscal measures affecting income naturally also bear an adverse effect on labour supply, the government may affect the performance of the economy by regulating labour costs and with direct presence on the labour market. To illustrate this we prepared two additional simulations, in one of which the position of the budget is resolved through laying off government employees, while in the other through increasing the social security contribution. Naturally, the former – due to the rise in unemployment – also directly modifies household incomes, thereby producing a relatively fast impact on the commodity market, as well, while the latter primarily affects the equilibrium of the labour market. The development of inflation also varies in reaction to the two measures, for layoffs reduce prices through a fall in consumption. In contrast, the increase of labour costs propagates further through the production chain and exerts inflationary pressure in the long term as well.

These measures may in part or fully be offset by other effects. The propagation of the rise in labour costs and the commencement of a price-wage spiral can be prevented with a wage agreement concluded by social consensus. Most studies which managed to reveal non-Keynesian effects define such social consensus as the most important factor in offsetting the output costs of the adjustment. As noted in the previous chapter, the interest enforcement ability of the relevant organisations is insufficient to substantively affect wage processes. Thus, this non-

<sup>6</sup> According to theories on consumption, with the exception of low income levels, upon an unexpected and uncertain income surplus, the consumer does not consume the whole surplus, but only gradually raises actual consumption and sets aside (saves) the remaining part as he/she may not receive such extra income in the future.



**Table 1**

**Possible non-Keynesian effects of a fiscal consolidation in Hungary**

Model assumptions	Fiscal prerequisites/relevance for Hungary	Increase the probability of non-Keynesian effects
Exchange rate and credibility	Possible strengthening, but rate uncertain	Potentially, through consumption
Decreasing interest premium and credibility	Medium-high government debt, relatively , high interest premium	Slightly, through fiscal interest payments
Social consensus, effective wage agreements	Poor interest reconciliation	Not likely
Widespread consumer lending, forward-looking households, decreasing future taxes	Less forward-looking households, but expanding lending	Slightly
Favourable profit prospects	Few forward-looking companies	Potentially, through foreign investments

Keynesian channel, extremely strong in other countries (e.g. Ireland), would presumably not be able to actually moderate the effects of adjustment.

In addition to social consensus, structural reforms on the supply side arise frequently in *non-Keynesian* literature, as the token of successful consolidation. These reforms are meant to enhance the flexibility of the labour market, which would, for example, assist laid off public administration workers in quickly finding jobs in the private sector, thereby significantly moderating the negative effects of adjustment. The reshaping of the education and labour market regulations would most likely improve the otherwise inflexible domestic labour supply, thereby significantly reducing the burden of the consolidation implemented through reduction in government staff. Nevertheless, such a reform probably would not produce a beneficial impact in the short term; therefore, we attribute relevance to this non-Keynesian channel only in the longer term.

Finally, by setting the price for government services and distorting market prices, the government is also capable of indirectly affecting the performance of the economy. We simulated fiscal adjustments through prices with an increase of regulated prices and value added tax. Of course, in relation to these measures the price-increasing effect was decisive – only a secondary and more moderate effect was typical for output.

The vast majority of *non-Keynesian* effects produce an impact through the credibility of economic policy and the expectations of economic actors (Table 1). Among these, we have mentioned the appreciation of the domestic currency in reaction to an adjustment, and future tax cuts. Additional, non-standard effects, relevant with regard to the Hungarian economy, may originate from risk premium decreasing in reaction to the improved assessment of fis-

cal policy and the possible increase in the influx of foreign capital resulting from improving profit prospects.

The fall in the interest premium may exercise a positive effect through several channels. Firstly, it reduces the debt service; secondly, lower interest rates stimulate investment and also positively affect consumption due to higher discounted asset values. Considering the current size of the risk premium and its beneficial effect in several directions, this is the channel through which *non-Keynesian* effects can show up even in the short term.

Although the identification of various effects is not easy, experience related to the 1995-1996 adjustment suggests that, in addition to effects bound to the risk premium in Hungary, the stimulating effect of the foreign direct investment could also be considerable.

With regard to monetary policy, it is important to note that it greatly depends on the structure of fiscal consolidation. As discussed above, simulations, which basically ignore *non-Keynesian* effects, imply that in all cases the adjustment leads to falling production, and in most cases a fall in inflation. However, in cases where the measures directly increased labour costs (social security contribution) or prices (regulated prices),<sup>7</sup> output and inflation moved in opposite directions.

The above description of fiscal instruments and mechanisms clearly implies that a correct monetary policy reaction can not be derived solely from the fact of adjustment. The structure of consolidation, that is the instruments to be used and the strength of the secondary channels, must be considered when taking the appropriate steps.

In view of the simulations, in the most common cases, when both the real economy and inflation are slowing

<sup>7</sup> The increase of value added tax prompts a rise in inflation only temporarily, and in the system of inflation targeting it does not lead to monetary policy measures.

down, a monetary loosening may reduce losses threatening to meet the inflation target. However, in cases where the adjustment produces an inflationary effect, the central bank must take into account that a more stringent monetary policy, required for curbing inflation, will result in a further GDP sacrifice.

As noted above, in the *non-Keynesian* case, when the fiscal multiplier is already negative in the short term, the fiscal adjustment would most probably be accompanied by monetary tightening. Since, however, monetary policy can only affect the economy in the medium term (due to inflexible monetary variables), it should only react to fiscal measures relevant over such a time horizon, that is those affecting potential output.

### CONCLUSION

In our study, we analysed the possible instruments of fiscal adjustment and their effect on the real economy and inflation. The issue is of relevance in part because many case studies argue that consolidation may have a non-Keynesian effect, contrary to the traditional theory. Moreover, due to the effect exercised on prices, it is essentially important to understand the mechanisms of the various fiscal instruments for devising an appropriate monetary policy.

We based our conclusions on simulations consistent with standard theories, supplementing these with a stylising analysis of the Hungarian economy, which helped us in understanding the importance of secondary channels.

As described above, the success of consolidation and its macroeconomic effects depend on the fiscal instrument, thus the fact of adjustment, or its size, is insufficient for deducing the appropriate monetary policy.

On the whole, the dominance of *non-Keynesian* effects, which are most often related to fiscal credibility and the expectations of the private sector, is not likely in the short term, but the medium and long-term role of these secondary effects may be considerable.

In summary, we discussed three significantly different courses of fiscal adjustment. The first of these is consolidation through the commodity market. In this case, the majority of measures directly affect the expenditure side of the

budget and the disposable income of households. The fiscal effect is large and direct on GDP and relatively small on nominal variables.

Such an adjustment would very likely contribute to the strong improvement of the credibility of fiscal policy which, in turn, would lead to appreciation of the domestic currency and a decrease in risk premium. The former increases consumption, due to the foreign exchange position of households and falling imported inflation, while the latter increases the influx of foreign capital and investments through favourable profit prospects and falling interest rates.

According to the second scenario, consolidation is primarily performed through labour market channels. The immediate effect of fiscal policy, arising indirectly through the labour market, is smaller than in the previous case, but the losses may be significant in the longer term.

If these measures are accompanied by structural reform and wage agreements based on social consensus, the prospects are much better for quickly eliminating the losses. However, the implementation of structural reforms linked to the labour market requires time, therefore a negative fiscal multiplier will not arise in the short term.

Finally, the third category could be consolidation performed through prices. In this case, the effect on the real economy is negligible compared to the pressure on inflation.

In this third case, the primary objective of the central bank could be endangered, leading to stringency measures, in contrast to the most common case in which a more loose monetary policy can also moderate the losses of the adjustment.

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