MNB BULLETIN
February 2012

MAGYAR NEMZETI BANK

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

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Contents

Summary 5

Norbert Kiss M. and Zoltán Molnár: How do FX market participants affect the forint exchange rate? 7

Katrin Rabitsch: 10th Annual Macroeconomic Research Workshop at MNB: Fiscal Rebalancing, Public Debt, and its National and Global Implications 18

Gábor Szigel and Péter Fáykiss: The effect of indebtedness on the financial and income position of Hungarian households 27

Appendix 43

Summary

DEAR READER,

The Magyar Nemzeti Bank attaches great importance to making central bank analyses on various current economic and financial trends of general interest available to the wider public. The February 2012 issue of the MNB Bulletin contains three topical articles, in which the authors present the effects of foreign exchange market participants on the exchange rate, give an account of the 10th Annual Macroeconomic Research Workshop and discuss the impact of indebtedness on the financial and income position of Hungarian households.

The article by Norbert Kiss M. and Zoltán Molnár presents and compares the indicators regularly used in money market monitoring to identify the positions of foreign exchange market participants, where co-movement with the forint exchange rate is most commonly observed. The exchange rate position of participants shifts as a result of the trading strategies described in the article, the effect of which is also reflected in movements in exchange rates. Position changes of FX market participants allowed the authors to derive their expectations related to fundamentals and hence changes in the required risk premium. The article documents strong co-movement with the exchange rate in relation to each of the indicators; and a significant correlation can be observed within the short-term dynamics.

The Magyar Nemzeti Bank hosted the 10th Annual Macroeconomic Research Workshop on 15–16 September 2011 in Budapest. For the fourth time, the workshop was co-organised with the Centre for Economic Policy Research (CEPR). The title of the workshop was Fiscal Rebalancing, Public Debt, and Its National and Global Implications. The account of the workshop proceedings, written by Katrin Rabitsch, focuses on the keynote speeches by two renowned economics professors, Eric M. Leeper (Indiana University) and Carlos A. Végh (University of Maryland). In addition to professors Leeper and Végh, a great selection of presenters and discussants contributed to a wide array of topics, including the macroeconomic effects of fiscal shocks, the size of fiscal multipliers, linkages between fiscal policy variables and the financial cycle, sovereign default and default risk premia on public debt, or the role of fiscal uncertainty on economic activity.

The article by Gábor Szigel and Péter Fáykiss shows that during the credit boom prior to 2008, substantial amounts of cash flowed from the banking sector to Hungarian households. However, with the emergence of the crisis, these cash flows reversed, due to a loan flow-related factor and an income-related factor. In terms of loan flows, households turned from net borrowers to net credit repayers. But there is a second, less often analysed component of the process: the volume of interest payable also increased as a result of the strong growth of credit in the pre-crisis years. This was further aggravated by the effect of the appreciation of the Swiss franc on franc-denominated loans, and, to a lesser extent, by unilateral interest rate increases after 2008. As a consequence, the net interest balance of households deteriorated sharply, reducing both their disposable income and consumption. As a further novel aspect of the analysis, the authors also carried out an EU-wide comparison of the interest burden on households. This has revealed that although the ratio of (bank-related) household credit to GDP is relatively low in Hungary in comparison to other European countries, the related interest-to-GDP ratio is high.

The Editorial Board

Norbert Kiss M. and Zoltán Molnár: How do FX market participants affect the forint exchange rate?

In our analysis, we describe and compare indicators regularly used in the course of money market monitoring, identifying the positions of FX market participants where co-movement with the forint exchange rate is most commonly observed. The correlation between the exchange rate and quantity indicators may be attributed on the one hand to the fact that market participants' directly unobservable exchange rate expectations are reflected in transactions and positions. On the other hand, these indicators are also determined by factors that are less affected by participants' expectations, or are linked to one-off liquidity shocks, yet they may affect the exchange rate through demand-supply effects.

The exchange rate position of participants shifts in reaction to trading strategies described in the analysis (spot or swap FX conversions related to the purchase/sale of HUF-denominated instruments, taking or hedging of exchange rate exposure, balance of payments items, etc.), and the domestic banking sector, as a participant vis-à-vis the initiating party, must transfer this position to another participant if it does not wish to assume exchange rate exposure. The effect of taken up and transferred positions is also reflected in exchange rate changes; the degree of change is basically determined by the heterogeneity of expectations. Position changes of FX market participants allow us to derive their expectations related to fundamentals and hence changes in the expected risk premium.

We attempt to identify changes in the risk premium in positions determined by participants' expectations of with quantity indicators used in the course of money market monitoring. Among the individual sectors, it is primarily non-residents, as initiators of the transactions, that are the quickest to change their behaviour in response to changes in the risk perception of Hungary, while resident non-bank participants adjust through the intermediation of the domestic banking sector. We observed substantial co-movement with the exchange rate in relation to all indicators; significant correlation can be identified within the short-term dynamics. The reaction of the exchange rate is most sensitive to the adoption of speculative money market positions and least sensitive to changes in the indicator defined as the widest aggregate, which also includes derivative positions. The relationship between indicators and the exchange rate may change in reaction to shocks; instability over time and structural breaks in the relationship may provide information as to the nature and effect of the shocks.

On the basis of our results, the adoption of a speculative long forint money market position by non-residents in the value of HUF 100 billion results in a 2.89 per cent appreciation of the exchange rate. This same coefficient is 1.42 per cent in relation to spot transactions and 1.15 per cent for the total forint position. In addition to the above, a bidirectional correlation is observed in relation to the forward stock of resident corporate participants: first, changes in the forward stock produce a tangible effect on the exchange rate, and second, changes in the exchange rate significantly affect companies' hedging activity.

MOTIVATION

In money market monitoring, changes in the HUF/EUR exchange rate are considered to be one of the key indicators. Accordingly, all market participants concerned pay special attention to variables which show noticeable co-movement with the exchange rate. Our experience suggests that the so-called "quantity" indicators, expressing the effect of money market participants' transactions and positions in the FX market, and the short-

term dynamics of the exchange rate very frequently show a similar picture.

The aim of the analysis is to (1) describe and compare indicators expressing the exchange rate exposure of FX market participants, where co-movement with the forint exchange rate is most common, (2) review theoretical foundations of the correlation between indicators and the exchange rate, and empirically examine the degree of correlation between the variables at various times in the past.

In the analysis, we first examine the linkage that determines similarity between the short-term dynamics of the exchange rate and of the quantity indicators, then review FX market strategies, position taking possibilities that are most likely to affect the analysed indicators. Thereafter, in addition to the descriptive review and comparison of quantity indicators, we analyse the proximity and temporal development of their co-movement with the exchange rate.

WHICH FACTORS DETERMINE THE CO-MOVEMENT OF THE EXCHANGE RATE AND QUANTITY INDICATORS?

The effect of FX market participants' transactions are expressed by the quantity variables described below. The basis of a correlation between quantity variables and the exchange rate is that the current equilibrium exchange rate of a foreign currency is determined by the balance between its demand and supply. This is not in conflict with the hypothesis that expectations generally play a key role in long-term developments in the exchange rate. Expectations of market participants cannot be directly observed, but a large proportion of FX market transactions are motivated by the exchange rate expectations of participants, therefore variables reflecting demand and supply are also predominantly determined by expectations relating to economic fundamentals. Moreover, cash flows that are less sensitive to interest rates and exchange rates also account for a substantial share of FX market transactions, thus the exchange rate is also shaped by demand-supply effects that are to a lesser extent determined by expectations (FX lending, balance of payments items, FDI flows, etc.).

Thus, the close correlation may be partly attributed to the fact that market participants' expectations – which cannot otherwise be observed directly – are reflected in the transactions and positions, on the one hand, while the effects of certain demand and supply factors, to a lesser extent determined by expectations in the short term, are also reflected in the quantity indicators, on the other.

Our experience suggests that, among the sectors, the forint position of non-residents reacts most directly to changes in the risk perception of Hungary. Non-resident participants commonly react to an improvement in risk appetite by raising their forint positions, and this results in the strengthening of the exchange rate through higher demand. Analogously, diminishing risk appetite is accompanied by decreasing positions and a weakening of the exchange rate.

We also observed that a considerable portion of transactions of resident companies (e.g. exchange rate hedging activity of foreign trade companies, balance of payments items, FDI flows, etc.) show exchange rate sensitivity, that is, the common causal link is reversed in this case – these items tend to react only to the exchange rate. Such reaction, however, typically impacts the exchange rate, as emerging forint demand may bolster the national currency and thereby dampen certain shocks, although this effect is more moderate than attributed to the role of non-residents.

It follows from the above that the role of resident credit institutions as market makers is to absorb exposure arising from positions taken by non-residents, passing it on to other participants, typically to the resident corporate and household sectors. Beyond the indices of non-residents, in the resident sector the forward stock of companies constitutes the quantity indicator that shows significant co-movement with the exchange rate; changes therein are also absorbed by resident credit institutions.

The microstructure approach to foreign exchange rates also establishes a theoretical framework for the correlation between the exchange rate and demand-supply factors. According to this approach, changes in the exchange rate are best correlated with the so-called "order flow" indicator.[1] The order flow constitutes the net balance of FX market transactions initiated by buyers and sellers, hence functioning as the indicator of buying or selling pressure weighing down on the given foreign currency. Since non-resident participants are considered the initiating party in the non-resident/resident relationship,[2] changes in the cumulated forint position of non-residents are regarded as the order flow; on the basis of our previous results, a significant correlation can be observed between the non-resident order flow and the HUF/EUR exchange rate.[3] The

[1] See Gereben et al. (2005) for details on the microstructure theory.

[2] It is difficult to clearly identify the initiating party; it may change for each transaction even between the two same partners. It follows that identification of initiating and market maker roles is made under simplified assumptions.

[3] See Gereben et al. (2006) for details on results.

microstructure theory, however, is not in conflict with theories, according to which the exchange rate is determined by expectations related thereto, as the order flow is only considered to be a type of intermediate link between expectations and the exchange rate; views of market participants on the equilibrium exchange rate level are first manifested through the indicators.

WHICH TRADING STRATEGIES ARE MOST LIKELY TO AFFECT QUANTITY INDICATORS?

Below, we briefly outline trading techniques that are most likely to affect forint position indicators analysed below.

1. *Spot foreign exchange conversion and buying/selling of HUF-denominated assets.* FX buying/selling through spot transactions represents one of the most basic FX market activities. In this case, the main motivation of non-residents is to buy HUF-denominated assets and sell forint liquidity resulting from the reduction of HUF-denominated assets. (In terms of non-residents' demand, government securities and central bank bills are the most important HUF-denominated assets; significant changes are seldom in their share stock, while the activity of non-residents is typically minimal in relation to corporate bonds, mortgage bonds, etc.). In this case, the non-resident participant assumes the exchange rate risk; as a result of the forint purchase (forint sale), the long forint position of non-residents increases (decreases).

2. *Purchase of HUF-denominated assets with FX swap financing.* If the investor does not wish to assume exchange rate risk, it can finance the asset purchase with an FX swap transaction. The non-resident participant uses the forints acquired at the initial leg of the FX swap transaction to purchase the HUF-denominated assets (commonly government securities), while the forward leg of the FX swap transaction automatically hedges the exchange rate risk of the asset. Thus, in this case, the participant does not have exchange rate exposure; its strategy may be motivated by taking up an interest rate position. Although the implied yield (paid interest rate spread) of the FX swap transaction is offset against the net yield (received interest rate spread) of the purchased asset, the maturity of the financing FX swap transaction commonly varies from that of the forint instrument, therefore a shift in the yield curve may result in a profit/loss resulting from the varying interest rate sensitivity on the assets and liabilities side.

3. *Taking up of FX position through the parallel use of FX swap and spot transactions.* Within a generally speculative strategy, the participant wishing to take up a FX position establishes a so-called synthetic forward position by applying a spot transaction and a FX swap transaction in the opposite direction. Where a short position is taken in the given foreign currency, for example, the given participant finances the spot market sale with a FX swap transaction in the opposite direction (at the initial leg), that is, the foreign currency borrowed through the FX swap is immediately sold in the spot FX market. Thus, there is no net cash flow on the initial leg; the total net FX position is assumed on the forward leg of the FX swap transaction, and its direction corresponds to that of the spot transaction. Therefore, the direction of the desired position is determined by the spot transaction. It is possible that transactions on the final demand side are linked to a forward position of a non-resident bank's client, and the non-resident bank hedges only this forward transaction of the client with the above synthetic transaction, but it favours the combined position over a forward transaction in the interbank market. This is attributed to the fact that the spot and FX swap markets are significantly more liquid than the forward market, thus both the use of the desired strategy and the closing of the position are more flexible in this manner.

4. *Conclusion of forward transaction for hedging purposes.* Typically, resident non-bank companies are active in the forward market, which hedge their risk arising from foreign trade activities. As a common trend, the volume of exporting companies' forward domestic foreign exchange purchase transactions increases in response to a weakening of the exchange rate, as they use these transactions with a more favourable forward exchange rate level to hedge their potential exchange losses resulting from the future recovery of the exchange rate. Increased hedging activity – and forward forint purchases – can also function as a type of automatic support for the national currency if exchange rate expectations in the resident corporate sector vary from those of other market participants to an appropriate degree.

+1. *"Miscellaneous".* In addition to the above, it is essential to note factors that cannot be regarded as trading strategies in a traditional sense, but may have (had) a role in determining quantity indicators and the exchange rate. One of the most important such factor in Hungary is (was) **FX lending.**[4] Foreign exchange conversions linked to rising FX lending did not produce a pronounced

[4] Although the role of this factor has diminished substantially with the significant decline in FX lending, it has remained relevant in the long term, owing to normal instalments, while the one-off effect of early repayment scheme is observed for a short period, but in a concentrated form.

impact in terms of daily exchange rate dynamics, but the taking up of moderate but continuous one directional positions on a daily basis causes a major change in quantity indicators. The accumulation of small changes on a daily basis, where the resident private sector assumes a substantial long forint position, plays a significant role in the long-term trend of the exchange rate. The **foreign trade balance, a permanent surplus/deficit on the current account and the rechanneling of government FX revenues onto the market** can be similarly important factors, which may modify demand/supply factors in one direction in the longer term. These factors or one directional trends, however, are also regarded as fundamentals in the long term, whose effects may contribute to shaping expectations.

On the basis of the trading strategies described above, the exchange rate position of participants shifts, and the resident banking sector as the participant vis-à-vis the initiating party must transfer this position to another participant, provided it does not wish to take up the position. The taking up and transfer of such positions also has an effect on changes in the exchange rate. The strength of the link mostly depends on the heterogeneity of participants' (i.e. non-residents, resident companies and resident households) expectations, the degree of certain participants' propensity to assume the position at the price of a changing exchange rate. Owing to the above, we are mainly attempting to identify variables that can be linked to the aforementioned FX market strategies and are capable of identifying changes in the positions of participants, who are typically the initiating party.

WHICH INDICATORS CAN IDENTIFY CHANGES IN FORINT EXPOSURE?

In terms of the analysis, in an ideal scenario, we would be able to generate quantity indicators which exclusively reflect positions dependent on expectations of participants, as these would be optimal to support the monitoring of changes in risk premia. Since we are unable to measure the exchange rate and yield sensitivity of certain transactions, we can approximate changes in risk tolerance, the effects of which bear down on positions, as well, only through wider aggregates. Indicators we regard as most relevant:[5, 6]

Chart 1
Cash flows of a participant taking up a long forint position, corresponding to a synthetic forward forint purchase

	Near leg		Far leg	
	Forex	HUF	Forex	HUF
Spot deal	↓	↑	–	–
Swap deal	↑	↓	↓	↑
Net	0	0	↓	↑

A. *Long / short forint positions of non-residents aggregated per participant*. With this indicator, we aggregate speculative long and short forint money market positions built through spot and FX swap transactions between non-residents and resident banks (see the Annex for details on the calculation of the indicator.) The cumulated development of the indicator shows substantial co-movement with the HUF/EUR exchange rate.

According to the strategy (3) outlined above, the non-resident participant takes up a profitable position upon the strengthening of the forint exchange rate, if it buys the national currency and lends it on the same value date in the form of an FX swap transaction. Similarly, non-residents take up a short forint position if they borrow forints and sell on the same value date. The sale-purchase is transacted in the spot FX market, while lending/borrowing is conducted in the FX swap market.

The simultaneous conclusion of a spot transaction and a swap transaction in an opposite direction corresponds to a synthetic forward transaction. On the date of the initial leg of the swap transaction, there is no cash flow in a net sense, due to the opposite direction of the two transactions. There is cash flow, however, on the date of the forward leg, when the partners change back their foreign currencies, therefore this corresponds to a forward transaction (Chart 1).

By identifying the non-resident partners, in the indicator we aggregate the quantity and direction of spot and swap transactions concluded by a given non-resident on a given day, i.e. the change in its spot and swap position.

[5] The described quantity indicators are calculated on the basis of the daily operational FX market report of resident banks (so-called D01 report) which contains all transactions – of a considerable volume – of resident commercial banks in Hungary. The report contains the transaction's deal date, value date, name of reporting bank, type of transaction, foreign currency bought and sold, its quantity and the type of partner (resident/non-resident, bank/other). These data enable the calculation of daily aggregate turnover and stock data for each type of partner.

[6] We believe that changes in the exchange rate position of the household sector is also important, but we do not have available reliable time series with a daily frequency in this regard.

We aggregate changes in individual positions of *each non-resident participant,* thus these allow us to clearly identify the money market strategy of the given participant as opposed to aggregate indicators measured on a systemic level. Transactions concluded between non-residents, however, are excluded from collected data, as we do not have information available on these. This is not a disadvantage in relation to the other – next – indicator measuring the position of non-residents, as we are analysing the combined position of the total non-resident sector. In this case, however, we measure the individual transactions of the given non-resident participants in accordance with the defined rule. Owing to its nature, this indicator also reveals the closest link to short-term developments in the risk premium.

B. *Cumulated net spot forint purchases of non-resident participants.* The variable expresses the aggregation of the spot market transactions of non-residents, based on their direction. The indicator does not mean an actual stock-type measure (participants typically do not "keep" the acquired forints), but reveals the net resultant of the cumulated spot forint purchases and sales of non-residents from a given date. The variable basically reflects the effect of the two aforementioned strategies – (1) HUF-denominated asset purchases while taking up of exchange rate risk and (3) taking up of foreign exchange position through parallel use of FX swap and spot transactions. This indicator is relatively effective in measuring quantity effects on the exchange rate through non-resident participants, as non-residents commonly apply these two methods to open a forint position, and the indicator also shows the effect of position closings.

Although this indicator is sufficient in itself to estimate the quantity effect produced on the exchange rate, for the understanding of underlying trends and the distinction of the related two possible strategies, it should be interpreted jointly with indicators measuring non-residents' forint instruments and the net FX swap stock. The indicator has the disadvantage that it can also include cash flows related to unintended FX exposures (e.g. balance of payments items). In addition, it does not reflect the effect of transactions affecting the forint exposure of non-residents, but related to non-spot transactions (drawdown of options, settlement of forward transactions), although the sum of the latter items is not substantial in comparison to spot transactions.

C. *Total cumulated forint position of non-residents.* The total cumulated forint position of non-residents is a wider category in relation to the prior indicator. This variable measures the effect of the following transactions:

- the net **spot forint purchase** of non-residents based on deal date (this covers the prior indicator);
- cumulated value of conversions deriving from the **drawdown of option transactions** concluded with non-residents (based on value date, i.e. maturity);
- cumulated value of conversions deriving from the **settlement of forward transactions** concluded with non-residents (based on value date, i.e. maturity);
- unexpired option transactions concluded with non-resident participants, i.e. **open option position;**
- unexpired forward transactions concluded with non-resident participants, i.e. **open forward position;**

In terms of the forint position of non-residents, this indicator is regarded as a wider category than spot forint buying, as it also includes positions taken up on derivative transactions. This, however, means that changes in the exposure and actual cash flow may occasionally diverge (e.g. the period between initiation and exercise of options). We should add, however, that changes in the cumulated forint position are predominantly attributed to spot transactions, thus changes in this indicator too are mostly related to strategies (1) and (3), and only to a lesser extent to changes in the forward and option positions.

Similarly to cumulated spot forint purchases, this indicator does not mean an actual stock measure either (although it also includes stock data), thus it is primarily the direction of the indicator's change, the underlying trends, and not level values, that carry information. Similarly to the spot forint purchases of non-residents, the effect of items related to the balance of payments, FDI flows, etc., is also reflected by this indicator. This is a potential problem because changes in the indicator may suggest a higher-than-actual FX position.[7]

All of the above three indicators show the forint position of non-residents in some form; although they partly

[7] To illustrate this with an example, a non-resident participant converts dividend received in Hungary to foreign currency. In this case, his forint exposure does not change in comparison to the situation prior to dividend payment: he sold the forints received as dividend – no actual position was taken up. Notwithstanding the above, "one leg" of the conversion, i.e. a forint sale on the FX market, is immediately covered by the total forint position and spot forint position indicators of non-residents, indicating a decrease or a downsizing of the position. The "other leg" of the event, i.e. dividend payment, however, appears among the current balance of payments items only with significant delay, disabling comparison with these FX market indicators.

Table 1
Main properties of forint position indicators of non-residents

	A) Long/short HUF money market position of non-residents aggregated by market participants	B) Cumulated spot HUF purchases of non-residents	C) Total cumulated HUF position of non-residents
Which trading strategies affect the indicator?	(3) Taking up of FX position through the parallel use of FX swap and spot transactions	(1) Spot foreign exchange conversion and buying/selling of HUF-denominated assets (3) Taking up of FX position through the parallel use of FX swap and spot transactions	(1) Spot foreign exchange conversion and buying/selling of HUF-denominated assets (3) Taking up of FX position through the parallel use of FX swap and spot transactions
Possible underlying causes	Opening a speculative (synthetic forward) position	– Purchase /sale of HUF-denominated assets; – Taking up speculative positions; – Balance of payment items.	– Purchase/sale of HUF-denominated assets; – Taking up speculative positions; – Balance of payment items;
Major possible contra-side items		– HUF-denominated assets of non-residents; – Net FX-swap position of non-residents; – Balance of payments items.	– HUF-denominated assets of non-residents; – Net FX-swap position of non-residents; – Balance of payments items; – Opening or settlement of option/forward positions

contain overlapping items, they also reveal substantial differences (Table 1).

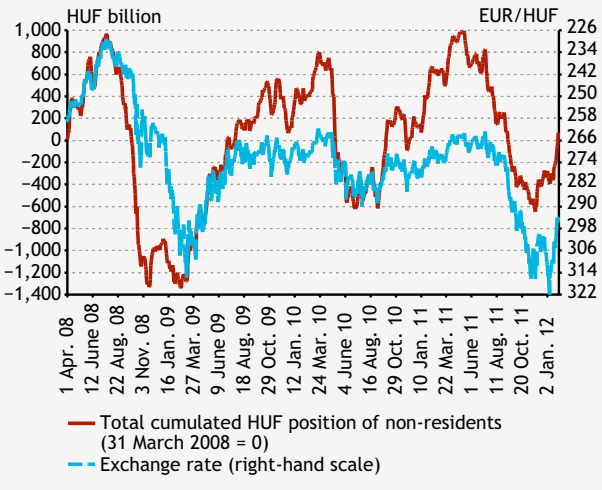
D. *Forward stock of resident non-financial participants*. The cumulated value of the unexpired forward transactions concluded by resident non-bank companies, i.e. **their open forward position** (total transactions cumulated according to the deal date, minus total expired transactions cumulated according to value date), indicates forward transactions concluded with a hedging purpose, that is, the application of strategy (4).

HOW DOES THE FORINT EXCHANGE RATE MOVE TOGETHER WITH THE POSITIONS OF FX MARKET PARTICIPANTS?

We analysed the co-movement of the listed forint position indicators with the HUF/EUR exchange rate in the period from 1 April 2008 to 31 January 2012.[8]

The long/short forint position of non-residents per participant, the cumulated spot position of non-residents and the cumulated total forint position of non-residents indicators show strong co-movement owing to the partial overlap of underlying data. Accordingly, their correlation with the exchange rate shows a similar picture. The indicators show close co-movement with the exchange rate during most of the period, although this relationship is also characterised by change and divergence at certain times, particularly in turbulent periods (Chart 2-5). Co-movement within the time series in less turbulent periods is attributable to the fact that non-residents' risk sensitivity and expectations related to the balance exchange rate changed, and this determined their transactions vis-à-vis residents.[9]

Chart 2
Total cumulated forint position of non-residents and the HUF/EUR rate



[8] In this chapter, in the description of the correlation between the indicators of non-residents and the exchange rate, we are moving from the direction of wider aggregates to narrower aggregates.

[9] As noted above, instead of applying an interpretation based on strictly defined explanatory and result variables, in this case we should rather interpret the relationship as a co-movement. For the calculation of parameters indicating the strength of the effect, however, we need to define the direction of causality; this underpins regression estimation, where we explain the short term dynamics of the exchange rate with quantity indicators. We believe that the daily frequency of data is adequate to ensure that endogeneity resulting from bidirectional causality causes negligible distortion in regression.

Chart 3
Cumulated stock of non-residents' forint spot position and the HUF/EUR rate

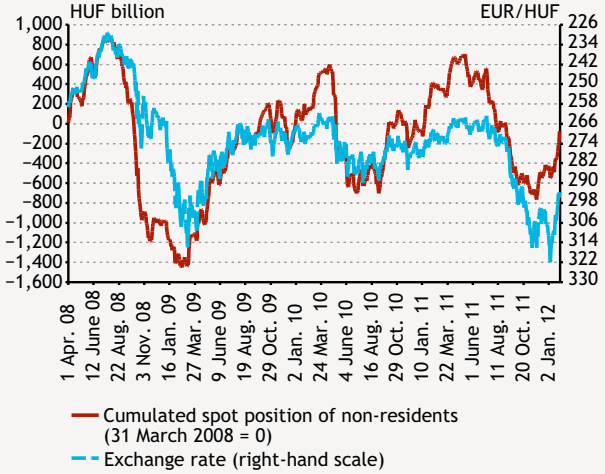


Chart 4
Cumulated stock of non-residents' short and long forint money market position per participant and the HUF/EUR rate

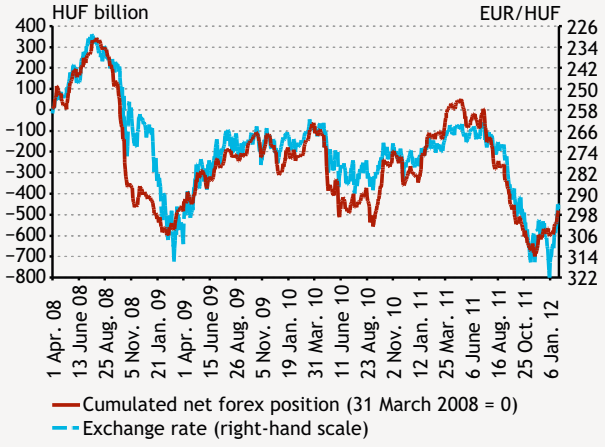
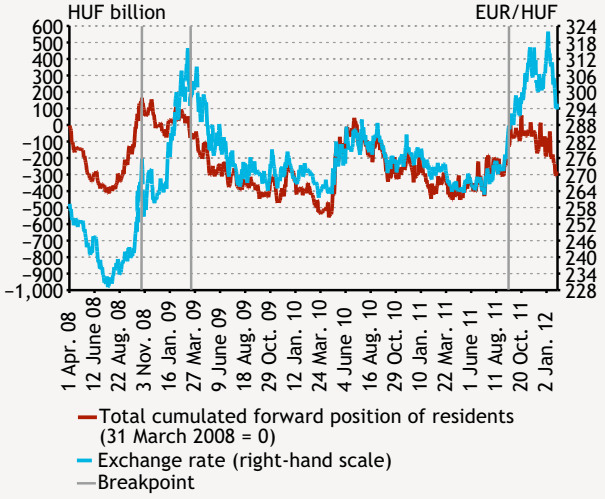


Chart 5
Total cumulated forward position of residents and the HUF/EUR rate



STABILITY OF CO-MOVEMENT

The link between the forint position indicators and the exchange rate changed several times during the analysed period. From October 2008, all three non-resident position indicators took a rapid decline, which was followed by the exchange rate only with several weeks' or months' delay. The strength of the link also weakened during this period. It is possible that traders expected a stronger equilibrium exchange rate in this period than warranted by unusually intense forint sales in themselves, and such expectations adjusted in the direction of weakening in the first months of 2009 only gradually, with a delay. The trend may have been partly attributed to the fact that forint sales in this period revealed by the indicators were generated mainly by the sharp reduction in the stock of non-residents' government securities holdings financed with spot market transactions; as a consequence, a substantial portion of the risk premium shock was reflected by rising yields in the government securities market and only partly and with a delay, by exchange rate expectations. In other words, spot market sales were attributed to the reduced government securities position and not to changes in non-residents' expectations.

At the end of 2011 and in the first days of 2012, the exchange rate depreciated significantly then recovered, accompanied by a relatively smaller change in positions. At that time, downgrades and communication relating to IMF/EU negotiations jointly changed expectations of all sectors, thus the exchange rate may have fluctuated significantly even without changes in positions.

Moreover, the cumulated total forint position and spot position temporarily diverged upward from the exchange rate between the end of 2009 and 2011 H1, that is, the increase in positions was only accompanied by a moderate strengthening of the exchange rate. This in itself is regarded as a normal phenomenon, as the exchange rate is influenced by many other factors as well.

The link between the forward stock of residents and the exchange rate changes in two cases. Between October 2008 and March 2009, at the peak of the pass-through of the international crisis, the weakening of the exchange rate was not followed by a rise in the forward stock that would have been warranted by co-movement in the past.

Table 2
Coefficients (projected to HUF 100 billion), t-statistics, adjusted R^2 indicators and Granger causality test results of regressions*

	Explanatory variables	β0 (t)	β1 (t–1)	β2 (t–2)	β3 (t–3)	Adjusted R^2	Granger causality
1	Total cumulated HUF position of non-residents with lags	–1.45 (–15.82)	not significant	0.41 (4.69)	0.17 (2.09)	38.42%	Yes
2	Total cumulated HUF position of non-residents	–1.15 (–12.04)	–	–	–	33.06%	
3	Spot HUF purchases of non-residents with lags	–1.57 (–15.93)	not significant	0.44 (4.60)	0.18 (2.10)	38.85%	Yes
4	Spot HUF purchases of non-residents	–1.42 (–14.77)	–	–	–	34.31%	
5	Long/short HUF position of non-residents with lags	–2.98 (–11.94)	–0.61 (–2.48)	0.82 (4.41)	0.57 (3.04)	30.15%	Yes
6	Long/short HUF position of non-residents	–2.89 (–12.79)	–	–	–	26.60%	
7	Spot HUF purchases of non-residents – Long/short HUF position of non-residents	–1.49 (–15.84)	not significant	not significant	not significant	36.40%	Yes
8	Forward position of resident non-financial sector with lags	1.09 (8.20)	0.20 (2.09)	not significant	not significant	13.21%	Yes. to both sides
9	Forward position of resident non-financial sector	1.11 (8.39)	–	–	–	12.89%	
10	Exchange rate changes with lags	0.12 (12.04)	0.05 (6.17)	0.04 (3.88)	not significant	16.43%	

** Daily changes are explained with daily changes for the period between 1 April 2008 and 31 January 2012. In equations 1-9, the dependent variable is percentage change in the EUR/HUF rate, while in equation 10 changes in the forward stock of resident companies. The explanatory variables are co-integrated with changes in the exchange rate. The majority of equations are heteroscedastic, therefore we adjusted the t-statistics with the White method.*

There are several possible explanations for the temporary change in the link. First, it is possible that bank partners expected lower hedgable foreign currency revenues due to declining export demand. It is possible that owing to possible losses suffered on earlier forward transactions, some companies made strategic decisions to reduce their hedging activity. Moreover, the forward transactions may have been limited by the volume of foreign trade activity, the higher volatility of the exchange rate, higher collateral levels raised by banks attributed to higher partner and market risks, and tighter price and non-price conditions. Declining turnover does not play a major role in this trend. The recovery of the exchange rate from March was again traced by the decrease in the forward stock. From this moment on, the two curves then closely moved together again until September 2011, when they diverged similarly to the end of 2008.[10]

EMPIRICAL ANALYSIS

Table 2 shows a total of 10 regression equations which mainly cover the link between forint position indicators and the HUF/EUR exchange rate.

We first analysed the correlation between quantity indicators and the exchange rate with the following regression estimate:

$$\Delta ER_t = \beta_0 * \Delta PM_t + \beta_1 * \Delta PM_{t-1} + \beta_2 * \Delta PM_{t-2} + \beta_3 * \Delta PM_{t-3} + \varepsilon_i \qquad (1)$$

where ΔER_t indicates the t daily change in the EUR/HUF exchange rate[11], ΔPM_t the change in the given position indicator between day $t–1$ and t (in HUF 100 billion), while ΔPM_{t-1}, ΔPM_{t-2} and ΔPM_{t-3}. show the value of changes, lags in the given indicator 1, 2 and 3 days earlier.

[10] A closer link between the forward stock and the exchange rate seemed to have been re-established in January 2012, although this currently remains unclear due to the low number of observance.

[11] We used the official exchange rates of the MNB. In addition to the MNB exchange rates, we also examined alternative exchange rates: the daily average of the average high frequency bid and ask quotations derived from the Reuters D2000 system and an alternative foreign currency basket representing the distribution of spot forint turnover. In this foreign currency basket, the EUR would have a weight of 79 per cent, the USD 10 and the CHF 8 per cent, while the role of other foreign currencies is negligible. The explanatory adequacy is considerably lower in the case of the exchange rate used from Reuters, while it does not show a significant difference from the MNB exchange rate in the case of the foreign currency basket. Overall, these specifications did not substantially modify the conclusions drawn, thus we consider the use of the central bank EUR/HUF exchange rate to be appropriate.

Table 3
Effect of quantity indicators on the exchange rate with different exchange rate levels*

Explanatory variables	Impact on exchange rate in per cent – [β0 (t)]	Impact on exchange rate in nominal term (HUF)		
		Exchange rate: average of full period (273,22 EUR/HUF)	Exchange rate: end of period (294,28 EUR/HUF)	Exchange rate: average of the last 5 months (300,65 EUR/HUF)
Total cumulated HUF position of non-residents	1.15%	3.14 HUF	3.38 HUF	3.46 HUF
Spot HUF purchases of non-residents	1.42%	3.88 HUF	4.18 HUF	4.27 HUF
Long/short HUF position of non-residents	2.89%	7.90 HUF	8.50 HUF	8.69 HUF
Spot HUF purchases of non-residents – Long/short HUF position of non-residents	1.49%	4.07 HUF	4.38 HUF	4.48 HUF
Forward position of resident non-financial sector	1.11%	3.03 HUF	3.27 HUF	3.34 HUF

** For the calculation we assumed a HUF 100 billion change in the given indicator.*

In regressions 1, 3, 5 and 8, we interpreted the percentage change in the exchange rate with changes in the given daily position and lags on the basis of formula (1).[12] In relation to all three indicators of non-residents, the given daily positions (and positions one day earlier, too, in case of speculative positions) show a positive correlation with changes in the exchange rate. Accordingly, the rising position is accompanied by a strengthening exchange rate, while positions two or three days earlier show a negative correlation. This implies that the exchange rate "overreacts" to the change in the position, and it is partially corrected two to three business days later. On the basis of the Granger causality test[13], all three indicators describing the positions of non-residents help to forecast the exchange rate, but this is not the case vice versa, i.e. the correlation is one directional.

Interpretation of the coefficients is limited by the fact that all four forint position indicators are autoregressive, i.e. the given daily change in position in itself significantly infers the position of the next day.[14] Since both the change in position and its lag significantly moves together with changes in the exchange rate, their effect clearly cannot be separated – the coefficients relating to them cannot be interpreted in themselves. We therefore prepared regressions 2, 4, 6 and 9 to measure the co-movement between the given daily change in position and the given daily change in the exchange rate, where we omitted the delayed explanatory variables.

Upon analysis of the β_0 coefficients, we see that the exchange rate reacts significantly more sensitively to the speculative money market position than to other indicators. While a HUF 100 billion position increase relating to the cumulated forint position and spot position of non-residents caused a 1.15 and a 1.42 per cent strengthening of the exchange rate, respectively, this value is 2.89 per cent in relation to short/long forint money market positions. At the exchange rate levels measured at the end of January 2011, these values correspond to approximately a 3.38, a 4.18 and a 8.50 forint shift (Table 3). In other words, on the basis of correlations in the past, the 1 forint change in the exchange rate at the current exchange rate level is typically attributed to a 30, 24 and 12 HUF billion change in the total forint position, spot position and speculative money market position of non-residents.

The total forint position and spot position of non-residents basically carries the same information on the basis of the R^2 indicators[15], and the difference is also small in relation to the coefficients. Changes in the position of non-residents, that are not related to the spot position (position changes related to option, forward transactions) do not contain substantial additional information. The 34-39 per cent R^2 indicators suggest a lower than average correlation between positions and the exchange rate.

In relation to short/long forint positions, the R^2 indicator is only 27-30 per cent, thus we suffer a loss of information by

[12] For example, in relation to the coefficients of regression 1, if the cumulated forint position of non-residents increases by HUF 100 billion on a given day, this in itself will lead to the 1.45 per cent strengthening of the exchange rate on the same day, and a 0.41 and 0.17 per cent weakening of the rate two and three business days later, respectively.

[13] Granger causality does not constitute genuine explanatory strength; where applied, knowledge of one variable helps to forecast the development of the other variable.

[14] In other words, the regression equations are characterised by multi-collinearity.

[15] The R^2 indicator shows what proportion of volatility of the dependent variable (daily percentage rate change in the exchange rate) is explained by explanatory variables.

regarding only the speculative transactions from position changes of non-residents. Owing to the above, in equation 7 we analysed the co-movement of the difference between spot positions and short/long forint money market positions with the exchange rate. The correlation is significant with a 36 per cent R^2 indicator, thus the co-movement of spot transactions linked to non-speculative positions with the exchange rate is also of a high level.[16]

Changes in the forward stock of resident companies are also a significant explanatory variable, albeit they show weaker co-movement with changes in the exchange rate (equations 8-9). The R^2 indicator is low and the correlation is relatively weak. This can also be evidenced intuitively: demand-supply conditions in the forward market indirectly affect the spot exchange rate through changes in the forward exchange rate, then through covered interest rate parity. The Granger causality test indicates a bidirectional correlation; the opposite direction (i.e. when the exchange rate is the explanatory variable and the forward position is the dependent variable) is stronger.

Equation 10 runs in the opposite direction, that is, it shows that the exchange rate change and its lags explain the forward position, too. The R^2 indicator is moderately higher in this case than in relation to equations 8-9. Together with the Granger test, this suggests that most residents only react to the exchange rate. Since the times series of daily changes in the exchange rate is not autoregressive[17], we can interpret the coefficients separately. In case of a one per cent weakening of the exchange rate, on the same day resident companies buy HUF 12 billion with forward transactions, an additional HUF 5 billion on the next day and an additional HUF 4 billion on the day after, thereby bolstering the exchange rate. It seems that a significant number of resident corporate traders react to exchange rate changes with a delay. The total change in stock equals HUF 21 billion for three days.

We also prepared equation 11, where we placed a dummy variable into the above regression 10, signifying the turbulent periods (October 2008–March 2009, and from September 2011), multiplied by β_0. We can thus separately calculate the coefficient of the given daily exchange rate change for turbulent and non-turbulent periods. Although the R^2 indicator did not improve significantly, the dummy variable is significant. In turbulent periods, resident companies react to a one per cent change in the exchange rate only with a HUF 9 billion change in stock, but with a HUF 13 billion change in other periods. This also confirms that the behaviour of resident companies changes significantly in turbulent periods.

The above discussion helps us in understanding why the split in the relation between the forward stock and the exchange rate (October 2008, September 2011) was accompanied by a rapid weakening of the exchange rate in the past. The depreciation may be faster and larger in periods when the resident forward stock is unable to bolster the weakening of the exchange rate.

CONCLUSIONS

On the basis of our analyses, we may draw the following conclusions:

- position changes of FX market participants allow us to derive expectations related to fundamentals and hence changes in the expected risk premium;
- a significant correlation may be identified between exchange rate position indicators and the short-term dynamics of the exchange rate;
- non-resident participants are first to react to a risk premium shock, often motivated by short-term speculation, while later resident non-bank participants commonly adjust through the intermediation of the resident banking sector;
- the relationship between indicators and the exchange rate may change in response to shocks; instability over time and breaks in the relationship may provide information about the nature and effect of the shocks;
- in the money market monitoring process, different quantity indicators should be jointly examined and analysed due to their varying information content;
- changes in non-residents' position and their stock of forint assets do not constitute a closed system, hence it is more meaningful to focus on the dynamics of changes in stock than on specific levels.

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[16] This also implies that non-resident positions are not only affected by changes in risk premia, but also by transactions not being connected with premia and exchange rate expectations (balance of payments items).

[17] In other words, the given daily change in the exchange rate does not significantly explain change on the next day.

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ANNEX: CALCULATION OF THE LONG/SHORT FORINT POSITION OF NON-RESIDENTS AGGREGATED PER PARTICIPANT

A non-resident participant takes up a profitable position in case of the strengthening of the forint exchange rate, if it buys the national currency and lends it on the same value date in the form of an FX swap transaction. Similarly, non-residents take up a short forint position if they borrow forints and sell on the same value date. The sale-purchase is transacted in the spot FX market, while lending/buying is conducted in the FX swap market.

The above method only takes into account FX swap transactions launched on the given trade date, but not maturing deals. Accordingly, the maturity of transactions would not play any role in this context, therefore the calculation should be expanded to the open FX swap stock. With a long forint money market position, the participant's forint spot position increases and its forint FX swap position decreases; with a short money market position, the participant's spot position decreases and its FX swap position increases. In relation to the spot market, the increased position covers a forint purchase, the decreased position covers a sale. In the FX swap market, the position reflects the net quantity of forints borrowed by the participant on the basis of its transactions in effect. Thus, the position increases if it borrows forints or its forint lending transaction matures, and it decreases if it lends forints or its forint borrowing transaction matures.

A given participant's spot position changes by ΔSP, its swap position changes by ΔSW on a given value date. If ΔSP>0>ΔSW, this corresponds to a long forint money market position (the given participant buys forints in the spot market with foreign currency acquired in the FX swap market). Size of the position will be:

$$min(\Delta SP, -\Delta SW)$$

Similarly, if ΔSW>0>ΔSP, this corresponds to a short forint money market position (the given participant sells forints in the spot market acquired in the FX swap market). The value of the total net position will be negative:

$$-min(-\Delta SP, \Delta SW)$$

Spot transactions are traditionally settled as t+2, i.e. the date of financial settlement follows the trade date by two business days. By contrast, swap transactions may have a settlement of t, t+1 and t+2. Primarily the spot leg of the position affects the exchange rate, therefore, the given daily money market position should be compared to exchange rate changes linked to the trade date of the spot transaction. Thus, the exchange rate moves together with the money market position aggregated for non-resident participants measured two business days later.

Chart 6
Date of the financial settlement and exchange rate effect of the spot transaction and swap transaction

	t	t+1	t+2	t+2
Spot deal	transaction			financial settlement
Swap deal	transaction	transaction	transaction	financial settlement
	↑			
	effect on exchange rate			

Katrin Rabitsch[1]: 10th Annual Macroeconomic Research Workshop at MNB: Fiscal Rebalancing, Public Debt, and its National and Global Implications

On September 15-16, 2011 the annual Macroeconomics Research Workshop took place at Magyar Nemzeti Bank, Budapest, celebrating its 10th year of existence, out of which it was organized jointly with the CEPR for the 4th time. The workshop's title and main theme was "Fiscal Rebalancing, Public Debt, and its National and Global Implications", the topicality of which could hardly be higher at times at which countries' excessive levels of public debt, and the deepening of a European debt crisis, make the headlines in newspapers around the world almost on a daily level. The keynote speakers of the event were professors Eric M. Leeper (Indiana University) and Carlos A. Végh (University of Maryland), two renowned academics and leading experts in the field. In addition a great selection of presenters and discussants contributed to a wide array of topics, such as the macroeconomic effects of fiscal shocks, the size of fiscal multipliers, linkages between fiscal policy variables and the financial cycle, sovereign default and default risk premia on public debt, or the role of fiscal uncertainty on economic activity. The workshop brought together macroeconomists from a wide background, academics and researchers from policy institutions alike. This meant that not only the audience benefited from a wide angle of perspectives, but also that the workshop was stage of quite a few of disclaimers of presenters that they are not representing their institutions. Finally, this year's workshop also featured a panel discussion that invited for a more policy-oriented exchange of thoughts, on 'Debt Problems in Europe'.

In the following, this article aims to provide a summary of some of the lessons from the workshop, focusing in particular on reviewing the contributions by the keynote speakers and the panel discussion on debt problems in Europe.

FISCAL POLICY AND THE BUSINESS CYCLE

Professor Carlos A. Végh dedicated his keynote speech to giving an overview on Fiscal Policy and the Business Cycle. The talk nicely reflected much of his research agenda and was centered around three main questions.

However, before discussing these three questions, it seems necessary to define the anticyclical and procyclical fiscal policies. A *countercyclical* fiscal policy is reflected in a public sector that runs fiscal surpluses in economic expansions, but that is able to expand and stimulate the economy in times when the economy is performing badly. A *procyclical* policy on the other hand is characterized by periods of fiscal austerity when the economy is in recession, and by fiscal expansions at times when the economy experiences a boom, when they are least needed.

The first question is, why fiscal policy in the emerging market world is typically procyclical, while for industrialized economies fiscal policy is acyclical or countercyclical. Two, if, over the course of decades, there are countries that have 'graduated', in the sense of formerly having fallen into the class of countries with procyclical fiscal policy but closing ranks with the industrialized world. And three, if and under what conditions fiscal policy can be an effective countercyclical tool?

Based on a data set that results from some prior work (Ilzetzki and Végh, 2008), and that comprises roughly 50 countries from both the industrialized and emerging market world, Professor Végh provided some stylized facts on the cyclical behavior of fiscal policy with the business cycle. The strong empirical finding from this dataset is that in the emerging market world fiscal policy is found to be strongly procyclical. These findings come from inspecting two

[1] Vienna University of Economics & Business Administration and Central European University. At the time of workshop MNB and CEU. The text was edited by Anna Naszódi (MNB).

Chart 1a
Correlation between GDP and government spending

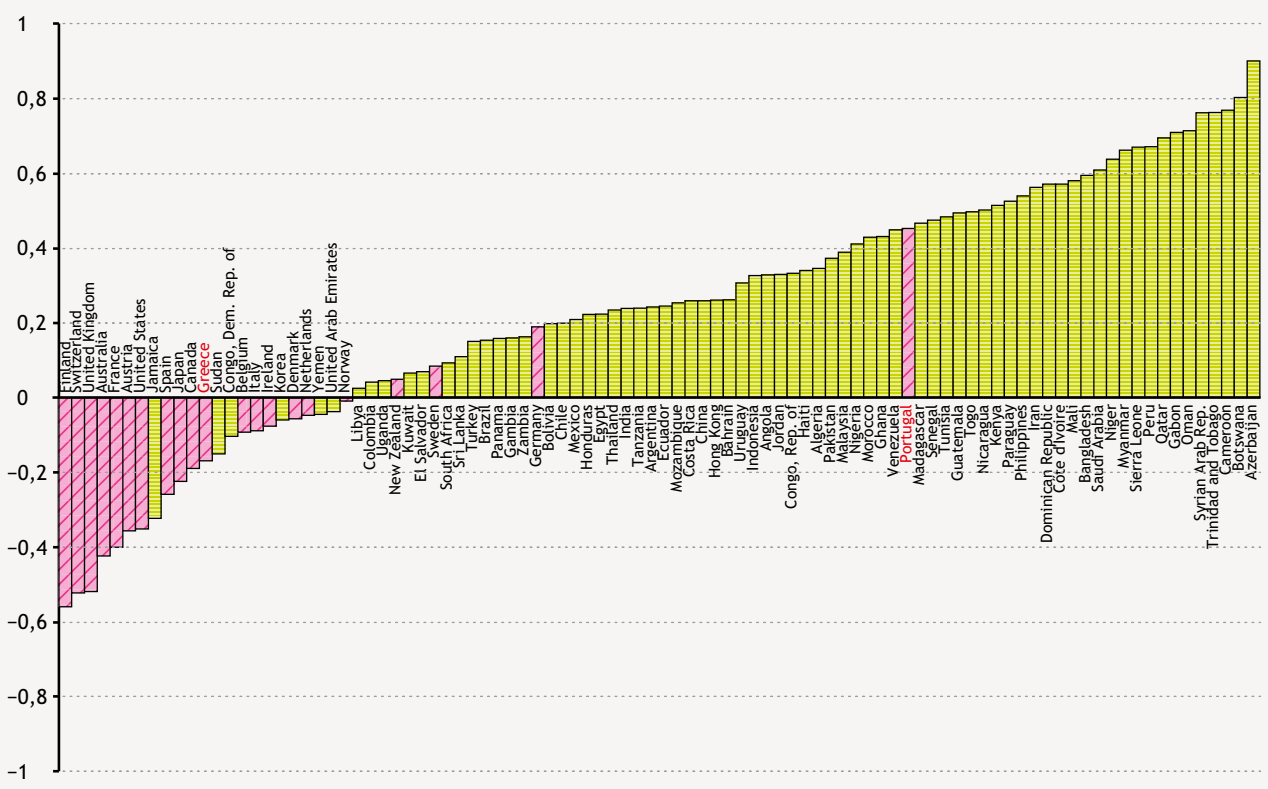
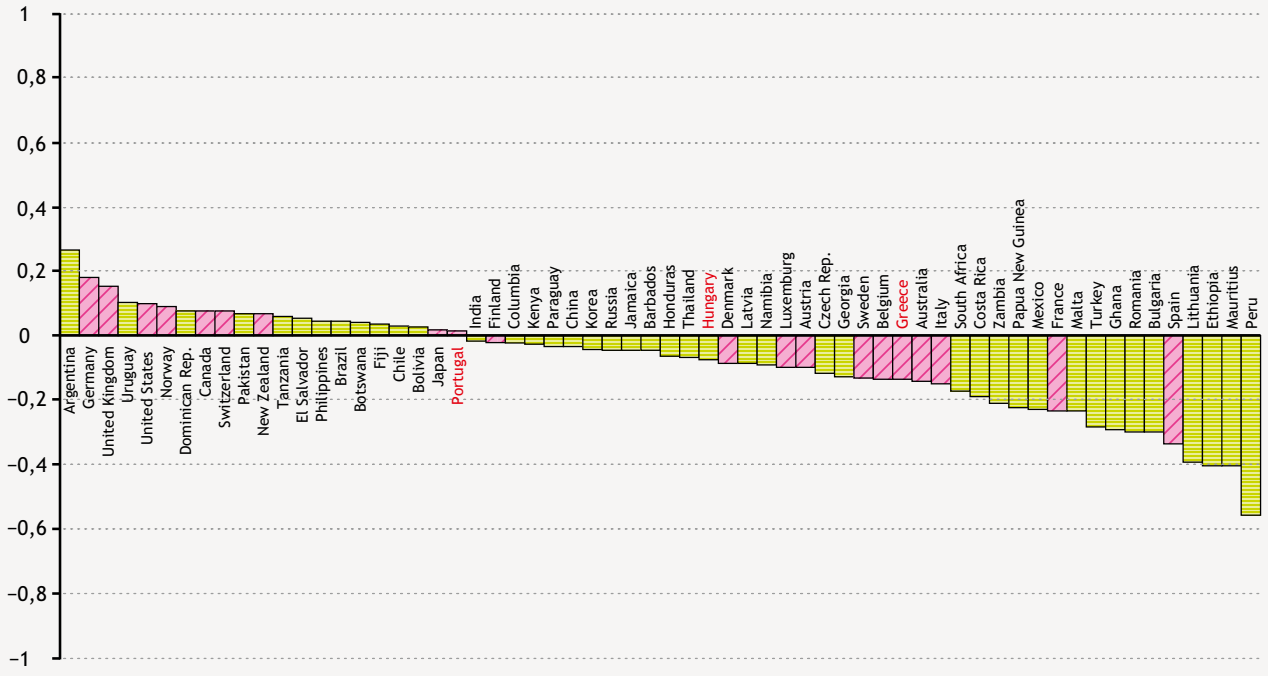


Chart 1b
Correlation between GDP and tax index

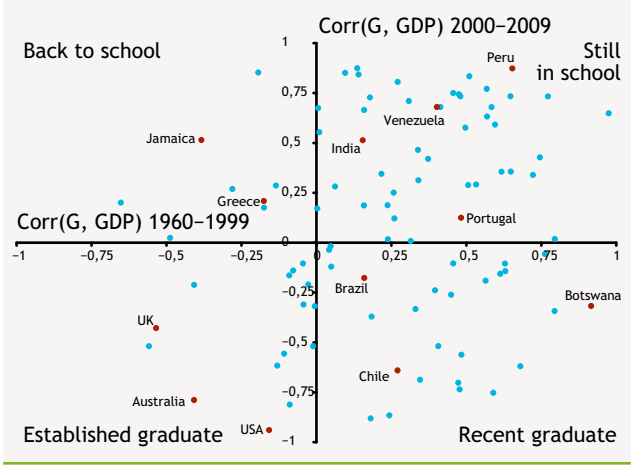


different measures to evaluate and establish procyclicality of fiscal policy: a positive correlation of a country's government expenditure with its GDP, and a negative correlation of a tax index[2] with GDP. These correlations for the two measures of cyclicality of fiscal policy, is nicely captured in the Chart 1a and 1b: it makes clear that, compared to industrialized countries, emerging economies typically reduce their spending and increase their taxes in bad times, and/or are not able to keep government expenditure low and taxes high in good times.

Among the potential explanations for the strong finding of procyclical fiscal policy in the emerging world are imperfections in the access to international capital markets – with limited access to international markets an economy can only insure partially against the shocks it faces. As a consequence, in bad times it has too little resources available, needs to cut government expenditure or increase tax rates to keep the public budget in control.[3] Political distortions in emerging economies may in addition contribute to the procyclicality through the presence of a possible 'voracity effect': the fact that it is hard to say no to pressures on the government to spend in good times (see Talvi and Végh, 2005). Professor Végh mentioned Argentina's Domingo Carvallo as an example of such voracity effect induced procyclicality, who in 1993, when the economy was in boom, publicly announced that he was reducing the tax rate to give back to households and companies because they would make better use of the money.

The good news is, however, that countries suffering from fiscal procyclicality have to potential to overcome their past, and close ranks with other industrialized economies. Comparing correlations of government spending with GDP for two subperiods, the period of 1960–1999 with the period of 2000–2009, allows one to classify countries into four different groups, represented by the four quadrants of Chart 2 below. About one third of the countries that formerly, in the period of 1960–1999, were characterized by a procyclical policy, have 'graduated' to countries with a non-positive correlation of government expenditure with GDP in the sample after 1999. The poster children of this group of 'recent graduates' are, e.g., Latin America's success stars, Chile and Brasil. There are also countries that formerly were displaying a non-positive comovement of government expenditure with GDP that had to 'go back to school', that showed signs of procyclical fiscal policy in the

Chart 2
Correlation between GDP and government spending in the periods between 1960 and 1999, 2000 and 2009



period 2000–2009 – interestingly, one such example is Greece.

Professor Végh then gave an overview of what determines if a country's fiscal policy can effectively be used as a countercyclical tool. In the literature, this policy effectiveness is typically measured in terms of fiscal multipliers, that is, in terms of the quantitative effect that an additional unit of currency of government expenditure has on GDP.[4] He documented that the size of fiscal multipliers depends strongly on country characteristics such as the exchange rate regime, the degree of openness, the cyclical position, or the debt level. In particular, fiscal multipliers are generally found to be lower in emerging countries than in industrial countries. The exchange rate regime matters for the size of multipliers because it determines how monetary policy affects real rates: under flexible exchange rate regimes fiscal multipliers are close to zero, but they are positive under fixed exchange rates. Similarly, the fiscal multiplier is zero in very open economies, but positive in closed economies, it is larger in recessions than in booms, is zero or even negative in highly indebted countries compared to positive multipliers for countries with only moderate levels of debt. For a small open, high-debt country with flexible exchange rates the short run gain of fiscal stimulus may thus be rather small compared to the long-run pain inflicted. Finally, it may also be of importance what kind of public expenditure the fiscal multiplier captures: for the

[2] The tax index used is constructed from information on the top marginal personal income taxes, top corporate income taxes and value-added taxes.
[3] Some of the work in this area includes Riascos and Végh (2003) and Végh and Vuletin (2011), that focuses on normal times, or Cuadra and Sapriza (2010), that focuses on crisis times.
[4] In addition, there typically is a distinction between impact fiscal multipliers, that measure the immediate, contemporaneous effect on GDP, and cumulative fiscal multipliers, aimed at capturing the output effects over a longer term.

group of emerging markets the government investment multiplier typically looks very different from government consumption multipliers (for industrialized countries looks similar), namely, the former typically being higher.

In terms of policy lessons to take away, Professor Végh emphasized to recognize that fiscal procyclicality is a big macroeconomic problem in emerging markets, and that it is essential for fiscal authorities to be able to save in good times. A helpful means for emerging markets to achieve this objective may be the creation and implementation of fiscal rules, that would discipline them and would help them avoid the political pressure to spend in good times (voracity effect). Otherwise, as Professor Végh put it, it is as if driving a car and having one foot on the accelerator – expansionary fiscal policy, leading to an overheating the economy –, and the other foot on the brake – with tight monetary policy reacting to the fiscal expansion, leading to high interest rates cooling down the economy again.

PERCEPTIONS AND MISPERCEPTIONS OF FISCAL INFLATION

In his keynote speech, Professor Eric M. Leeper started out to note that the current Euro sovereign debt crisis has made us loose perspective of the fact that the current short-run fiscal stress is small compared to the large long-run fiscal stress we are going to face. In the long run the main cause of the enormous fiscal stress is the rapidly aging population. (This problem has been elaborated on at a later point of the presentation.) He believes that the economics profession has a narrow perception of how fiscal policy affects aggregate demand and inflation, and that this perception is based on our belief that we can treat monetary and fiscal policy separately. While in principle, monetary policy (MP) and fiscal policy (FP) have just two joint objectives – keeping inflation and keeping debt under control – the separate treatment of both is manifested in the fact that, today, most economies have set up institutions in which monetary policy is characterized by an independent central bank that follows the clear mandate of actively controlling inflation. For fiscal policy no such institutions have been created and there are no explicit mandates. Nevertheless, in normal times we expect fiscal policy to set taxes and generate surpluses in such way as to insure that the economy's debt level is stable. We expect it to take as given the price level or inflation rate that is determined through monetary policy, and to passively react by adjusting surpluses to keep debt stable. We would call this world of active monetary authority, and passive fiscal policy, regime M. As Professor Leeper emphasized, this monetary-dominant regime M, is probably the scenario that macroeconomists are most familiar with, and corresponds to our view of how the world works in 'normal times'. Much of the keynote speech then focused on the case in which this regime M breaks down, and this is particularly the case in an era of fiscal stress – in such world, fiscal policy may not set surpluses to meet debt but sets them independently of it, thus fiscal policy may give rise to (fiscal) inflation.

Undoubtedly, we are currently facing such era of fiscal stress. The current recession has led to increased deficits and large outstanding public debts in most advanced economies (though not so much in emerging economies). But while the current situation of fiscal stress is definitely worrisome, this, as the keynote speaker stressed, is the short run. The real problem is the long run and the perspective of the enormous fiscal stress that our societies are going to face through a rapidly aging population. With dependency ratios[5] for most countries more than doubling until 2050, countries are to expect huge contingent liabilities. According to projections by the Congressional Budget Office (CBO), debt-GDP ratios will rise to ranges of about 300-600 per cent until 2083. While cost increases from social security can still be contained through adjustments in retirement ages, the true factor responsible for the high debt-GDP projections is medical spending, that is projected to account for about 25 per cent of annual GDP at the end of the projection horizon in 2083.

It should be noted that, obviously, these long-run projections are sole accounting exercises and simply cannot happen, as debt cannot grow exponentially and grow faster than the rate of the economy forever. So before any economy would reach the projected 400 per cent debt-to-GDP ratios, people would long have stopped buying its government bonds; there necessarily need to be adjustments relative to the assumptions on which the CBO's projections are based. These adjustments could take on a number of different forms. One, the form of substantially higher growth than we are currently experiencing, such that economies will grow out of the deficits. Two, it could be the case that governments will just outright default on their debts. Three, fiscal policy will have to adjust surpluses such as to stabilize debt. Four, the paths of inflation that are assumed in the underlying projections will turn out to be quite different than assumed. Or, five, some combinations of these. Point one, that countries simply grow out of their deficits appears to be an overly optimistic view. Point two, outright default is onerous, governments do everything to

[5] The dependency ratio captures the fraction of the population that is over 65 years relative to that aged 15 to 64.

Chart 3a
Long-run projection of the Congressional Budget Office for the debt to GDP ratio and its components in the USA

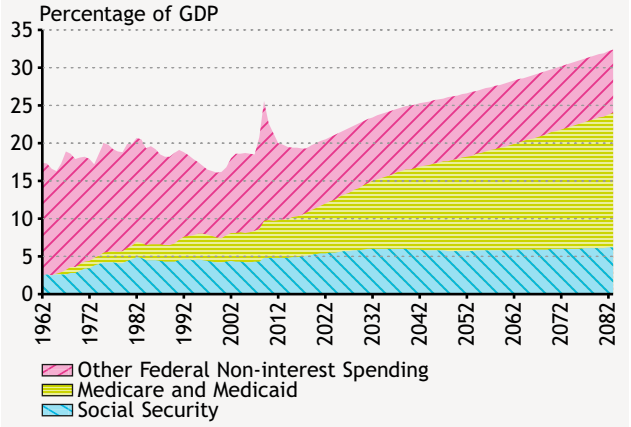
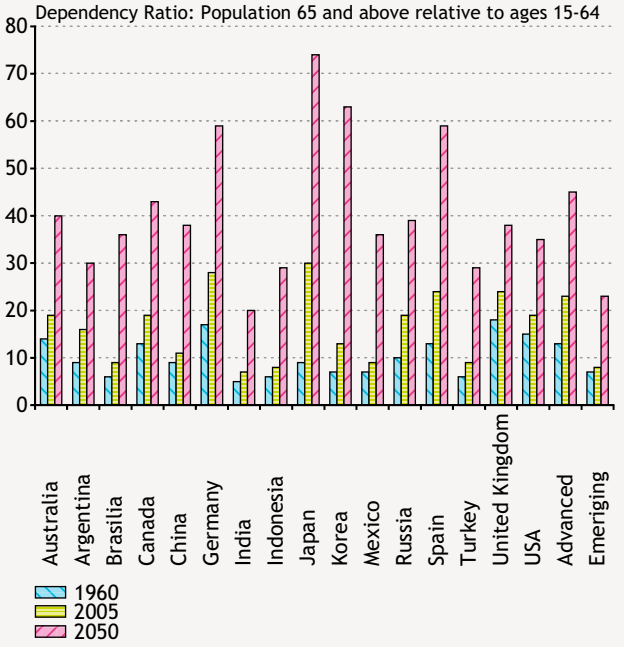


Chart 3b
The evolution of the dependency ratio and its long-run prognosis for some developed and emerging countries



avoid that. Point three is probably what most central bankers hope for, that surpluses 'magically' arise to stabilize debt, where the adjective 'magically' is consciously used in light of the dimension of the adjustments that would be required to finance the contingent liabilities stemming from population ageing. A not unlikely scenario, so the keynote speaker, is therefore point four, that the paths of inflation will turn out to be different.

How will they turn out to be different? How might unresolved fiscal stress affect inflation and aggregate demand? And, consequently, can central banks retain control of inflation and aggregate demand in the face unresolved fiscal stress?

In this regard, Professor Leeper again mentioned the problem of treating monetary & fiscal policy asymmetrically and having put them into two separate boxes. While the separate treatment can be understood in terms of historical reasons, treating monetary and fiscal policy asymmetrically denies the intrinsic economic symmetry between the policies, in that their main joint objectives consist of essentially two tasks: (1) they have to determine the price level/ control inflation; and (2) they have to insure that the debt-to-GDP ratio is stable, that debt does not explode. As he notes, there are two different policy mixes that can accomplish these tasks, the one most economists are familiar with, which previously was labeled Regime M (monetary). This constitutes the 'conventional' assignment where MP targets inflation and FP targets real debt (called active MP/passive FP). In principle, an alternative assignment could, however, also deliver the two objectives, one in which FP controls inflation and MP maintains value of debt (called passive MP/active FP). This is labeled Regime F. While the normal state of affairs is that we reside in regime M, regime F can arise in an era of fiscal stress, when fiscal policy sets surpluses independently of targeting debt. In such times, the possibility that the economy may hit its fiscal limit[6] rises. The policy mix that generates this, so the keynote speaker, is precisely the policy mix that we have seen the past 3 to 4 years. In the US interest rates have been (and are likely to still remain) close to zero for some time, while at the same time, there were incidents of political gridlock, fiscal policy could not agree on anything to generate adjust surpluses, so was not responding to targeting debt. Similar things can be observed in Europe now, where the European Central Bank (ECB) keeps interest rates low and at the same time we are not seeing all the fiscal adjustments that are required to be in regime M.

There are essentially two ways in which Regime F can arise in an era of fiscal stress: one is Sargent and Wallace (1981)'s *unpleasant monetarist arithmetic,* and, two, the *fiscal theory of the price level*. Sargent and Wallace's unpleasant monetarist arithmetic is probably the concept we are most familiar with, and corresponds to the common perception of fiscal inflation. This is the classical example from Latin

[6] The fiscal limit is defined as the point at which, for either economic or political reasons, surpluses can no longer adjust to stabilize debt.

America: the economy hits the fiscal limit, for some reason surpluses are no longer responsive to debt, the government then puts pressure on the central bank to run the printing presses and create seignorage revenues, which ends up producing high and volatile inflation. If we believe that the sole mechanism through which fiscal policy can affect inflation is through unpleasant arithmetic, then having created the (asymmetric) institutional structure of an independent central bank that commits to price stability leaves no room for inflation to bail out fiscal policy, then we would not need to worry about fiscal inflation. This is, however, as Professor Leeper puts it, a deeply ingrained misperception coming from the view that – with an inflation targeting independent central bank – inflation is completely insulated from FP, and stems from beliefs that MP reform can force FP reform.

The point is that there is indeed another channel through which fiscal policy can affect inflation and aggregate demand, and that is the second way in which regime F can arise, the fiscal theory of the price level (FTPL). What the FTPL plays off of is the fact that governments issue mostly nominal (non-indexed, local currency) bonds, which is the case for the largest part of government in advanced economies (and increasingly so in the emerging world).[7] With outstanding debt in nominal terms, an increase in the price level also increases the nominal backing of government debt, in the sense that more nominal debt can be supported with no change in surpluses or seigniorage. It is important to note that while unpleasant arithmetic is about seignorage, the fiscal theory is not. What happens under the fiscal theory in Regime F is that FP sets primary surpluses independently of debt, which shuts down the feedback from debt to fiscal instruments. This means lower current or future expected surpluses. MP then must choose compatible interest rate policy, that is, prevent interest payments on debt from exploding, thus revaluing nominal debt to align its value with expected surpluses. With the news of lower future expected surpluses, the value of debt is reduced and people then want get out of debt, shifting into consumption, which raises aggregate demand and inflation. In a fiscal theory equilibrium, it is thus FP that controls what is happens to the present value of inflation, or the (long-run) inflation rate.[8]

Professor Leeper provided a couple of illustrative examples of ways in which MP can loose control of inflation. In one example he explicitly introduced the idea of a fiscal limit and showed that in the long run inflation is determined fiscally. Even if the world starts in 'normal times' (that is, with a regime M policy of active MP/passive FP) if agents begin to doubt that the necessary fiscal adjustments will be forthcoming and believe that at future date T, the economy hits the fiscal limit and Regime F is adopted, then inflation is determined by fiscal expectations, as forward-looking agents bring those effects into period before the fiscal limit is actually hit. The long run is being pinned down by expectations that the economy ends up in regime F, and inappropriate or uncertain FP makes MP unable to anchor inflation expectations.

In another example, monetary policy's control of inflation may get undermined through risk of default on sovereign debt, as the expected default rate induces deviations of inflation from its target. Or, in yet another example, in a two country model of a monetary union, in which one of the countries sets to keep debt stable and one of the countries sets surpluses independent of debt, he shows that the union wide inflation rate is determined by the latter country. News about surpluses in that country will affect union-wide inflation and therefore the value of debt in both countries, which then feeds into requiring surpluses even in country 1. This example shows that having sovereignty over fiscal policies in Europe, but in any equilibrium there are necessarily interactions going on between what happens in country 1 and 2. Important to study these interactions if you seriously want to think about a fiscal union.

In his concluding words Professor Leeper emphasized that empirically it may be harder to tell at first sight if a country is in a fiscal-dominant world, i.e. regime F, or a monetary-dominant, i.e. regime M, world, as it neither needs to be the case that regime F is necessarily combined with high inflation rates, nor is it the case that regime M brings about inflation rates are low and stable. The conventional perceptions of inflation miss a channel for fiscal inflation, a channel that channel may be become particularly important in times of fiscal stress. As the existing monetary-fiscal frameworks are largely silent on how tensions get resolved, which needs resolution – and therefore a lot of research in this area – before the big fiscal stress hits.

PANEL DISCUSSION OF DEBT PROBLEMS IN EUROPE

The second day of the workshop featured a more policy oriented event on the workshop program, a panel discussion focusing on debt problems in Europe. The discussion was

[7] 90 per cent of U.S. debt, 80 per cent of U.K. debt, and 95 per cent of Euro-area debt is issued in nominal (non-indexed, local currency) bonds.

[8] While MP is not impotent, while it does not loose its ability to control any kind of inflation, it cannot control both actual and expected inflation, and looses its ability to control long run inflation. In regime F, the anchoring of expected inflation is really driven by FP, MP only determines timing.

moderated by MNB Vice-Gouvernor Julia Kiraly, and included keynote speaker Eric M. Leeper (Indiana University), Professor Philip Lane (Trinity College Dublin), and Ludovit Odor (advisor to the prime minister of Slovakia) as panelists. The topics of the panel were Sovereign Debt Problems in Europe, the management of current crises as well as their prevention in the future. Questions addressed concerned the institutions – at national, international, EU and/or Eurozone level – that can manage the current sovereign debt crises and contain contagion effects. How debt crises can best be managed: how to design of austerity packages, how to best restructure debt, to allow (partial) default, what the trade-offs of official lending sources versus creating incentives for private investors are. Or, what institutions – either existing today or institutions that will have to be created – can help prevent sovereign debt crises in the future?

Ludovit Odor's position was that, as we stand now, all three pillars of the Eurozone are ruined. These pillars were set up as firm Euro institutions ment to avoid free-riding and moral hazards, and included a no-bailout clause, the Stability and Growth Pact (SGP), and the independence of central banks. The no-bail out clause has, in crisis times, largely been rewritten to a no-default clause, the SGP has been seriously compromised several times, and the ECB, because of the lack of any crisis resolution mechanisms, had to several times deviate from its core mandate and, e.g., step in to purchase government bonds.

Mr. Odor sees three possible solutions to respond to the ruin of pillars: one, the simplest but most dangerous and least wanted: a break up. Two, to go back to old principles; going back to old principles would, however, not mean to go back to old pillars, but would require having to build new institutions. Among these would be the need of a new SGP with implementation of strong fiscal rules (possibly constitutional) and independent fiscal councils. Three, to embrace fiscal federalism as a long-term goal, instead of the current system of (big) fiscal transfers.

While working out the precise setup and features of such system of fiscal federalism, there are several measures needed in the short run. For the short run, replacing the current no-bail out rule, that has become incredible, with an more powerful version of the European Financial Stability Facility (EFSF) and/or the creation of a European Stability Mechanism (ESM) seems necessary, that allows managed default for countries whose problem clearly is not one of lack of liquidity but lack of solvency, and that has explicit exit rules. Also needed would be to allow for flexible use of the funds within the facility, such as the issue of recapitalization of the banking system.

In his opening statement Irish economist Professor Philip R. Lane compared the current situation in Europe to Ireland since it is in crisis since autumn 2007. He emphasizes the interplay between the banking sector (banking crisis) and the sovereign (current debt crisis), emphasizing that sovereign debt crisis becomes way more complex with a weak banking sector. The challenge in such situation is therefore how to simultaneously solve the two. The question of what the right analytical framework is needs revision and leaves much work to be done for researchers in the field. The search for a better framework to analyze these questions is also an active research area of a group of macroeconomists and finance professors, of which Professor Lane forms part, which all have different local experiences, and whose goal is to try to come up with new analysis and new sets of policy recommendations.[9]

Professor Lane sees an only narrow role for increased fiscal federalism in Europe, namely that of a common fiscal backing of the banking system. As it is now, the national banking system typically holds way too much of its national bonds, and is thereby too exposed to the local economy. If the economy experiences trouble and the fiscal deficit goes up, this in turn means that banks look weaker and experience higher exposures to loan losses. In turn, when banks look weaker and markets begin to question if they need to be bailed out, the sovereign gets downgraded, triggering such negative feedback loop. There could be several ways to improve the functioning of the European banking system and to break this link between the national banking system and the national sovereign.[10] One would be to have diversification requirements on sovereign bonds, or there could be European level deposit insurance, a European level recapitalization fund or European level guarantees. In the current state, without such institution, recapitalization of banks largely is the job of individual countries, and such national recapitalization do not provide any risk sharing. While creating a buffer and overcapitalizing banks is one way to insure against large idiosyncratic shocks to the banking sector of an individual nation, it is a quite expensive option. On the other hand, while self-insurance (by building up a buffer) is more expensive than collective insurance, but with collective insurance we face large moral hazard problems that we don't know how to deal

[9] The group includes, other than Philip Lane, prominent academics such as Markus Brunnermeier, Ricardo Reis, Dimitri Vaianos, Marco Pagano, Luis Garicano, Tano Santos, Stijn Van Nieuwerburgh.

[10] The situation in the US is different: should, e.g. the economy of Arizona be experiencing rough times, the banking system of Arizona is still backed by the Federal Government.

with. So Professor Lane agrees there is increased need for fiscal cooperation in that narrow segment of banking (only), but does not see why a fiscal union should be the answer in general.

In addition to the required improvements on banking system aspects, there is a need for European institutions that allow sovereigns to default in a way that does not lead to instability, that allows being true to the no-bail policy. In the short run, this is needed for Greece, in the long term a system is needed for crisis management in the future. This system does not necessarily need to be a rigid rule-based system, such as firm restructuring requirements for all countries when a certain debt-to-GDP ratio is reached. As Professor Lane stresses, it is, however, important to recognize that the line in the liquidity versus solvency debate is not always a hard line, there are episodes at which at a certain interest rate a sovereign may look insolvent but at a lower interest it would not. For some countries the downside scenario (the scenario of insolvency) can be mitigated. As an example he points to the Irish case: when Ireland had 130 per cent debt-to-GDP everybody was talking about default. After some rounds of reforms and recapitalization of banks this ratio now stands at about 105 per cent, and the public opinion in Ireland is somewhat more relaxed. Liquidity crisis can be quite contained, the concept of liquidity is not a one week concept but can easily extend over 1 or 2 year horizons, macro-adjustments can take time. Banks that have long term assets, such as sovereign bonds or mortgages, may look better again if they hold on to it. If a country, such as Ireland, had to downsize its banking system within 90 days it may be worth nothing, if it were to do it over three years recovery rates are much higher. To insure such easier handling of providing liquidity over one or two year horizons, there is need for institutions such as the EFSF or the ESM. These institutions should also be able to treat individual countries differently, there is not one set of rules that should be applied to each country.

Professor Eric M. Leeper argued that as of now, it is just one country (Greece), that has debt crisis, and that the term PIGS (or, 'US PIGS' if one were to include the US) lumps together economies that are facing very different problems: Ireland experienced fiscal stress as a response to a very severe banking crisis, Italy and Spain certainly face long-term fiscal stress, but it is less clear why they should be having immediate problems, and the US has a problem that is due to a current dysfunctional political process, but not because of any threat that it may be near its fiscal limit. Yet, financial markets do not seem to distinguish countries according to their country specific situations in such systematic way, which is reflected in high and widely varying credit spread implied default probabilities of these countries. This is, so Professor Leeper, because we completely lack fiscal institutions or systematic analysis of fiscal policy. Currently we rely on financial markets to see when fiscal policy is in trouble, and future fiscal actions often seem like a roll of a dice.

Unlike for monetary policy, our societies have failed to create robust fiscal infrastructures, we have given almost no thought at all how to coherently run fiscal policies. Being aware of the institutional contrast between MP and FP is instructive: central banks are independent (that is, not political), are staffed with economists, have earned credibility from following a clearly stated long-term objective, they conduct research to understand and optimize the long-term objectives, and they tend to integrate research with policy analysis.

In contrast, fiscal institutions are not independent, but are purely political.[11] Unlike central banks fiscal agencies are not staffed with economists but with politicians that may have their own political careers objectives, they have no clearly stated economic objectives or rule-based behavior, and no research is being conducted.

Professor Leeper argued that the short run fiscal needs that Europe, the UK or the US are facing are very different from the long run fiscal needs. The real short run problem is unemployment, as the fiscal consequence of which means large deficits and rising debt. It is important to note, however, that to some degree this is exactly what one should expect when going through the biggest recession since the Great Depression. Optimal policy calls for smoothing tax rates and government investment by using debt as a shock absorber. It may also call for only very gradual adjustments of future policies to retire debt from its high levels. In contrast, what policy institutions are delivering across the Euro Area, the UK, and the US are large immediate cuts in expenditure and some increases in taxes. Fiscal consolidation coupled with fixed CB interest rates can raise real interest rates and could amplify the contractionary effects on the economy. There is a huge need for conducting research that forces decisionmakers to think about what the tradeoffs are, research that allows us to develop the economics to inform us about how to undertake these reforms. If fiscal decisionmakers are presented with the economic consequences (both macroeconomic and distributional consequences) of alternative resolutions to fiscal stress, this will make a

[11] In the US they are called 'bi-partisan', but this clearly is a different concept than independence.

difference in their decisions. Such research agenda must include the development of formal models for monetary-fiscal policy, that allows for features such as risky sovereign debt, the importance of the banking systems, the possibility of substantial fiscal consolidations in the short and long run, adoptions of fiscal rules and targets, or creation of independent fiscal councils. Useful work will explicitly model the political economy aspects of policy choices, in the hope of arriving at credible and enforceable policy rules that can be implemented and that also happen to deliver good economic performance.

CONCLUSION

The workshop provided an excellent opportunity for macroeconomists in the area of fiscal policy to meet and discuss the current state of research of models with monetary-fiscal interactions, sovereign debt and sovereign risk, or questions concerning fiscal stimulus versus fiscal consolidation. The topics covered in the keynote speeches, the contributed papers of presenters, or the panel discussion, as well as the mix of academic and policy-oriented elements of the workshop likely have provided many workshop participants with a lot of food for thought in the current policy debates or in future academic work.

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Gábor Szigel and Péter Fáykiss: The effect of indebtedness on the financial and income position of Hungarian households[1]

During the credit boom prior to 2008, a substantial quantity of cash flowed from the banking sector to Hungarian households. With the emergence of the crisis, however, the direction of the cash flow has reversed, due to a net lending related factor and an income-related factor. First, in terms of the net lending, households turned from net borrowers to net repayers. But there is a second, less often analysed, income-related aspect of the process: the volume of interest payable by households has also increased as a result of the strong growth of credit in the pre-crisis years. This was further aggravated by the effect of the depreciation of the forint on FX loans, and, to a lesser extent, by unilateral interest rate increases by banks after 2008. As a consequence, the net interest balance of households deteriorated significantly, reducing both their disposable income and consumption. As a further novel aspect of our analysis, we also carried out an EU-wide comparison of interest burden on households. This has revealed that although the ratio of (bank-related) household credit to GDP is relatively low in Hungary in comparison to other European countries, the related interest-to-GDP ratio is high.

INTRODUCTION

Our analysis consists of four parts. The first part briefly summarises problems caused by (over)indebtedness examined in the literature, and underlines the relevance of analysing the topic. The second chapter discusses recent developments in Hungarian households' financial balance sheet and net interest income in connection with their indebtedness. In the third chapter, taking advantage of more detailed data, we still examine households' balance sheet and net interest rate income, but limit the scope to assess the relationship between households and banks, presenting a sort of a cash flow between the banking sector and households. The fourth and last chapter examines the ratio of Hungarian household debt to GDP and disposable income in an EU-wide comparison, and here we also introduce an indicator which is less widely discussed in the literature: the ratio of *interest payments* to GDP and disposable income.

TOPICAL RELEVANCE: WHY CAN INDEBTEDNESS BE A PROBLEM?

Lending is essential for economic growth, but over-indebtedness of economic participants may also become an impediment to growth. The relationship between growth and debt is a much discussed topic in the theoretical and empirical literature. The study by Reinhart-Rogoff (2010) is an example of the latter; it shows with simple statistical indicators that indebtedness above a certain level significantly reduces the growth prospects of a national economy.

The investment and growth reducing effect of over-indebtedness was first described on a micro level in the often referenced theoretical article by Myers (1977) in relation to companies. He made the general argument that companies with a critically high level of debt[2] invest less, as returns on investment are mostly paid to creditors. In other

[1] The authors wish to thank Béla Simon for the compilation and availability of the household interest balance and Zsuzsa Kékesi and Regina Kiss for their assistance provided in connection with the financial instruments of households and their disposable incomes.

[2] Specifically, companies expected to have negative shareholders' equity due to high leverage.

words, debt – similarly to taxes – distorts the allocation of resources and the decisions of economic participants, which may negatively affect growth.[3]

The above model has also been applied to household indebtedness: Melzer (2010) proves with empirical data that mortgage loan debtors with a loan-to-value ratio of over 100 per cent, i.e. with negative equity[4], spend proportionally less on home maintenance and renewal, as the increased value of their property would essentially increase the coverage of the bank's loan, while the net equity of the debtor might remain still negative. In the referenced research, the correlation was also valid to households *with no liquidity constraints,* i.e. to households that could have afforded home renewal based on their income position. This obviously has a negative effect on household (home) investments, real estate prices and economic growth as well. Although our recent paper does not explore this mechanism in detail for Hungary (moreover, comparison of US data used by Melzer with Hungarian data should be treated with caution, due to different legal-institutional environments[5]), we should note that this balance sheet structure related problem may also be relevant in Hungary. Due to the weakening of the forint exchange rate, namely, the amount of the loan has grown above the value of properties serving as collateral in the case of a substantial portion of FX mortgage loans (at least for 25 per cent of loans)[6], and the average LTV ratios have increased significantly. In parallel with the above (see Annex, Chart i), (home) investment by households also declined in recent years (although this is clearly not attributable exclusively to the high LTV ratios, but also to income trends and stalled lending).

Beyond the distorting effect on (home) investment, the over-indebtedness of households also negatively affects growth prospects through another channel, at least in the short run. In essence, this means that the direction of cash flows between households and their lenders is suddenly reversed in the period following the credit boom: households become net credit repayers from net credit borrowers, and this suddenly and temporarily reduces the income of households disposable for consumption. In periods of recession, this may further aggravate the decline in consumption and increase the time required for the recovery of consumption. The empirical analysis by Olney (1999) shows that the record level of consumer loans borrowed by US households significantly contributed to the collapse of consumption during the major global economic crisis. Mian et al. (2011) applies micro data from the current US debt crisis to show that consumption declined at a faster rate in regions where household indebtedness was higher. An analysis prepared by the Dutch central bank (van Els et al., 2005) provides an example where not only the reversal of a credit boom, but also its temporary slowdown may cause a decline in consumption and an economic downturn.

In relation to Hungary, studies published so far on the indebtedness of households have predominantly focused on determining whether the rate and dynamics of household borrowing before the crisis was at an equilibrium or excessive level. The study by Kiss et al. (2006) did not perceive a higher than equilibrium level of household indebtedness up to 2005. Using the same methodology and more recent data, however, we identified signs of excessive indebtedness from 2006 (see Annex, Chart ii), although this methodology is not appropriate for doubtless identification. In another study (Brown and Lane, 2011) prepared by the World Bank, analysing the level of indebtedness in emerging European countries on the basis of GDP-proportionate credit stock data, the conclusion is drawn that the Hungarian household sector, similarly to sectors in other countries in the region, does not show excessive indebtedness. This study, however, only analysed stock data and not the interest burden, and it disregarded further substantial growth in the volume of FX loans since 2009 due to the exchange rate effect. The draft analysis by Endrész and Virág (2012) takes into account this latter effect as well and observes a high level of indebtedness of Hungarian households and its negative effects on consumption.

BALANCE SHEET ADJUSTMENTS AND NET INTEREST INCOME OF HOUSEHOLDS BEFORE AND AFTER THE CREDIT BOOM

In this chapter, we review the two impact channels of indebtedness affecting household income and consumption: balance sheet changes and the net interest income channel.

[3] For a more detailed summary of related literature, see Brown and Lane (2011).

[4] In relation to household mortgage loans, negative equity means that the value of the property (asset) owned by the households, serving as collateral for the loan, is smaller than that of the household loan (funds), therefore the "net asset" of the debtor is negative.

[5] As a main difference, in many states of the United States, debtors are not liable for the value of the mortgage loan in excess of the value of the property collateral, thus they are not obliged to repay their outstanding mortgage loan debt following the sale of the property, while debtors in Hungary are obliged to do so. However, Melzer's results suggest that debtors with negative equity reduced their home investments by a similar rate in US states, where they were also liable for debt in excess of the value of the property. The behaviour of debtors living in different legal environments, however, did vary in relation to their propensity to repay loans.

[6] This estimate derives from the database of the MNB Bank Panel, based on data measured in the summer of 2010 (with a 210 HUF/CHF exchange rate).

The trends affecting the balance sheet of the resident household sector are summarised in Chart 1. From 1995 until the early 2000s, households generally saved; borrowing was not widespread. There were two waves of borrowing witnessed in the 2000s: the rise in subsidised forint loans in the first half of the decade and FX mortgage loans between 2005 and 2008. As a result, the consumption rate of households increased significantly, while their investment rate rose at a more moderate level. Thus, by definition, the gross savings rate could not increase and the net savings rate fell to approximately zero.

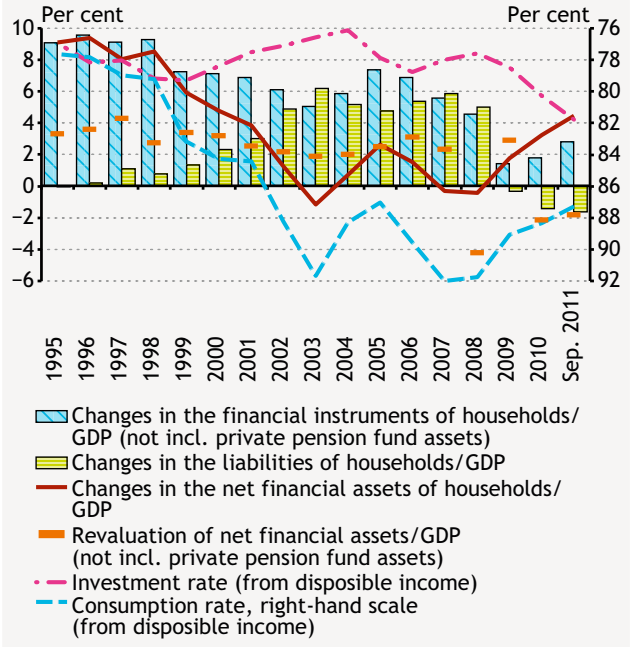
The emergence of the crisis at the end of 2008 – declining credit demand caused by uncertainty and tightening bank credit standards – put an end to the credit boom, and the net saving rate of households slowly recovered to pre-2001 levels. Due to the cumulated credit stock, however, this was accompanied by a lower gross saving rate and negative credit flow (net credit repayment). Adjustment was observed in the consumption rate and more strongly in the investment rate (although this was also attributed to a decrease in real income).

Improving net savings, however, were significantly offset by the revaluation of net financial assets in 2010 and 2011.[7] This is principally attributed to the revaluation of FX loans caused by the appreciating Swiss franc. The revaluation exceeded net debt repayment in both 2010 and 2011. Thus, overall, household debt denominated in forints increased, notwithstanding that in the meantime households became net repayers. If we take into account this revaluation effect as well, this "adjusted net saving rate" was even lower in the past two years than during the credit boom in 2006 and 2007 (when the revaluation of households' financial assets – mainly that of their equity shares – was positive). In other words, the growth of total net financial assets of households *denominated in forints* was even more subdued than during the credit boom.

The above data, however, only reveal changes in the balance sheet of households (balance sheet channel), i.e. the effects of loan flows. These do not take into account

Chart 1

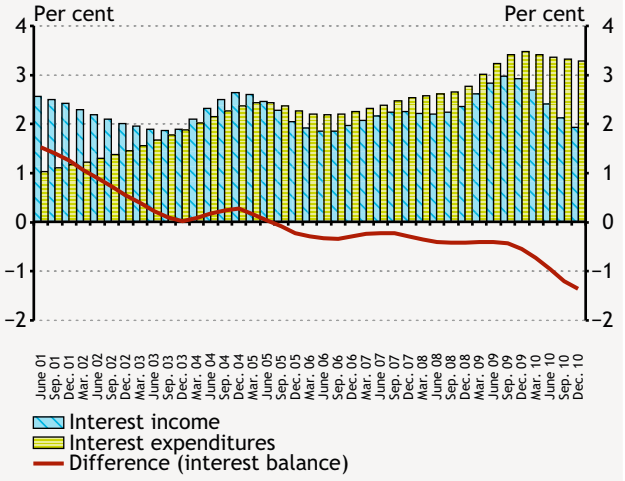
Changes in the financial instruments and liabilities of households (not including private pension fund assets) adjusted for exchange rate changes and revaluation of net financial assets relative to GDP, and investment and consumption rate



Note: Change in financial assets and liabilities, difference between the two and revaluation effect relative to GDP; the consumption and investment rate is based on disposable income.
Source: MNB, financial accounts (consolidated).

Chart 2

Interest income-to-GDP ratio, interest expenditures of households, difference between the two (interest balance), 12-month rolling average



Note: The following items are settled among household interest income: interest on deposits (including interest tax), interest on debt securities (e.g. government securities, bank or corporate bonds), all non-exchange gain and revaluation yields from investment units, dividend from share investments. Interest expenditures of households include interest and similar expenditures payable on loans drawn from banks and other participants (financial enterprises, companies, non-residents) (including interest expenditures financed by the government). The data are estimates.
Source: MNB Statistics.

[7] Although the chart only indicates data relating to the first three quarters of 2011, and net repayment sharply increased in the last three months of the year as a result of the preferential total repayment programme, the revaluation effect is still in proportion to net repayment.

that the volume of interest payable on the credit stock also rose (income channel), first, because of the credit boom and the increasing loan volume itself and, later, because of the impact of the weakening forint exchange rate on FX loans. This reduces the *disposable income* of households, which produces a further negative effect on consumption, *in addition* to the balance sheet adjustment and the resulting decline in the consumption rate.[8]

The difference between interest received and paid (interest balance) by households has indeed increased significantly: at a gradual and slower rate during the credit boom and suddenly, at a faster rate after the emergence of the crisis. As indicated by Chart 2, at the end of 2010 the interest balance of households was negative, exceeding 1.4% of GDP, in comparison to the approximately 0 value before the crisis. If projected to disposable income, this net interest balance of households equalled −2.2 per cent in 2010 (in comparison: real wages decreased by approximately 3 per cent in the crisis year 2009). On the basis of preliminary data and bank statistics presented in the next chapter, we may assume that the trend has not reversed in 2011 either. We should add that although the financial income balance of households stated in this study is not complete, we assume that it effectively shows the income dynamics (decline) at work.[9]

The decline in net interest balance is primarily attributed to the steady increase in interest expenditures caused by the credit boom, while the interest income of households shows non-trend related fluctuation. The latter is attributable to the fact that household interest income was generally determined by the current interest environment, although the ratio of the interest bearing stock to GDP also increased at a gradual rate[10]. For example, the significant central bank interest rate increases in the autumn of 2003 and 2008 temporarily increased the interest income (and hence income) of households, but their effect gradually ceased with the beginning of the interest rate easing cycle. Chart 2 clearly shows that the interest rate increase at the end of 2008 and strong deposit competition among banks thereafter temporarily and significantly increased the volume of interest received by households, which temporarily delayed the deterioration in the interest balance.

The rate of interest paid by households, however, was predominantly determined by the credit boom, affected by the flow of credit until 2008 and thereafter by the revaluation of FX loans attributed to the depreciation of the forint exchange rate. From 2001 to September 2011, the household credit-to-GDP ratio increased from 10.7 per cent to 40.6 per cent in Hungary, thus the ratio of interest expenditures of households to GDP rose from 1 per cent to over 3 per cent over the period. In parallel, the average interest rate even decreased over the year 2001, that is, the increase in the volume of payable interest is clearly attributable to the growing credit stock.[11]

In conclusion, indebtedness before the crisis caused a shock to the income and consumption of households through two channels. First, the direction of cash flows reversed, and households became net credit repayers from net borrowers, and, second, more interest is obviously payable on a credit stock that expanded in previous years to exceed its amount at the beginning of the decade. Interest received on financial savings could not offset this increasing interest burden either, essentially because the rise in the volume of household financial instruments could not adjust to the dynamic rise in the credit stock.[12]

[8] Disposable income in the national accounts is income available for consumption after production and income distribution. Net borrowing enables households to temporarily consume more than their disposable income (consumption rate > 100 per cent). In consequence, households will eventually need to effect "compulsory savings" of sorts to make net repayments, which reduces the rate of consumption from income at a given level. The balance of paid and received interest, however, reduces (disposable) income itself, and thereby affects consumption. We should note, however, that a portion of household net interest payments is part of consumption, as financial services (FISIM) related thereto, measured indirectly, are included in consumption. In other words, some changes in interest rates do not modify consumption, but only increase or decrease the weight of bank financial services within consumption to the disadvantage of other sectors' products.

[9] The stated interest balance completely covers the financial liabilities of households, but not their financial savings. This is attributable to the fact that interest received does not include household income originating from insurance technical reserves and participations. Thus, the income balance of households realised on total financial assets may actually be moderately higher than shown in Chart 2. Since, however, the financial savings of households did not undergo substantial restructuring in the past ten years, save for changes in the private pension fund scheme which our calculations have disregarded, the dynamics presented here presumably effectively indicate changes in the total financial income of households.

[10] The interest bearing financial instruments of households – bank deposits, bonds, loans provided, portion of investment units invested in interest bearing instruments – showed slow but continuous growth (rising from 35.5 per cent in 2001 to 44.5 per cent in September 2011). These data do not include private pension fund savings.

[11] Interest payable by households also includes interest subsidies on government subsidised mortgage loans. Since the ratio of such loans was higher in the volume of payable interest in the early 2000s, interest actually payable by households grew less in the early 2000s than shown in Chart 2. FX loans, however, are not linked to government interest subsidies, thus the effect of this factor diminished over time.

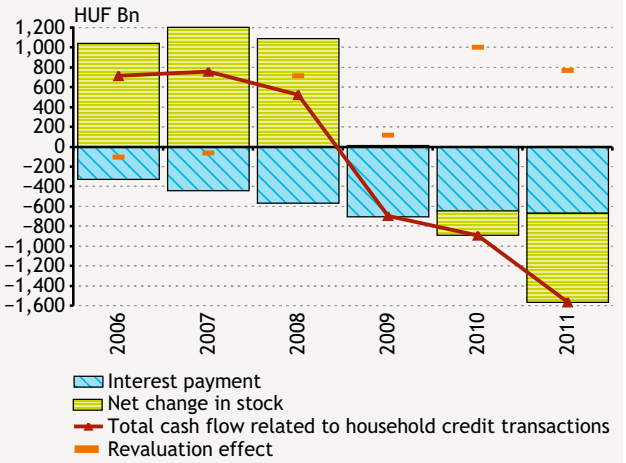
[12] As regards the latter, we should note that even if the GDP-proportionate volume of received interest would have increased, the negative effect on consumption resulting from the heterogeneity of households (deposit interest is received and interest is paid on loans not by the same households) would have been present in some degree. See Mankiw (2000) for details regarding the heterogeneity of deposit holders and borrowers.

BALANCE SHEET ADJUSTMENT AND INCOME EFFECTS IN THE RELATIONSHIP BETWEEN HOUSEHOLDS AND THE BANKING SECTOR

The previous chapter examined the effect of indebtedness on the balance sheet position and net interest income on the basis of a wider range of financial statistics on households. In the following section, we will only analyse the relationship of households and credit institutions (not including the co-operative sector), practically establishing a cash flow – relating to credit and debit transactions – between the two sectors. This has the advantage that more detailed data available from 2006 enable further analysis and comparison on an international scale (see next section). In this chapter, we state cash flow values in HUF billions, so that GDP dynamics do not distort the indicators; but the Annex also contains charts projected to the nominal GDP and the disposable income of households.

Chart 3 shows cash flows related to credit side transactions between banks and households. It reveals trends similar to those described in the previous chapter: the robust credit boom before the crisis is stalled in 2009 and turned into net repayment from 2010. Interest payments of households to banks basically doubled between 2006 and 2009, followed by a very moderate decrease in 2010 and 2011.[13] The chart also shows that since the crisis, the role of interest payment has been significantly larger than that of stock on the credit side in cash flows between households and the banking sector, although the decline in net stock also picked up at the end of 2011 due to the preferential total repayment option. Overall, the marked change of direction of cash flows on the credit side is also revealed: the difference between annual cash flows on the credit side before and after the crisis well exceeded HUF 1,000 billion (4 per cent of GDP, 7 per cent of disposable income) – even before the preferential early repayment scheme of the Hungarian Government (launched in September 2012). Notwithstanding the above, the bank debt of households even increased as a result of the revaluation of FX loans – in 2010, at a level approximating the credit boom in the 2006–2008 period.

Chart 3
Cash flows between households and the banking sector (not incl. the co-operative sector) related to household credit transactions



Note: Net change in stock is a value adjusted for exchange rate changes. We drew data on household interest payments on bank loans from bank profit and loss accounts, therefore, these contain actual interest payment figures (not including, for example, unpaid interest on non-performing loans). The above data relate to the banking sector exclusive of the co-operative sector.
Source: MNB.

Since the weight of interest flow between households and banks has increased, we also prepared an estimate of the underlying factors, as indicated by Chart 4. Using MNB interest rate and other banking statistics, we distinguished the following effects of changes in interest payment volume. It is important to emphasise that the following results are estimates that effectively show the magnitude and direction of changes, but are not accurate accounting statements, therefore, they should be interpreted with caution[14]:

- *Volume and composition effect:* we treated these jointly for technical reasons. In general terms, the *volume effect* means that with constant credit interest and exchange rates the interest volume payable by households *ceteris paribus* automatically increases with the rise in household credit stock. This effect generally explains the rise in

[13] See Annex for version of Chart 3 relative to the GDP and disposable income.

[14] We estimated the volume of interest paid by households by multiplying average customer interest set for various credit types in the interest statistics of the MNB with the related stock of outstanding credit. Thus, the effect resulting from changes in average customer interest can be easily estimated for the volume of paid interest, and the amount of payable interest relating to FX loans could be calculated even with different exchange rate levels. We approached the portfolio effect by assuming that customers will not fulfil their interest payment obligations overdue more than 90 days and customers with obligations overdue within 90 days will fully effect interest payment. Interest income estimated from interest statistics effectively approximates household interest income stated in bank profit and loss accounts, although the difference between the two may become substantial in certain periods, as shown by Chart 4. This is attributed, among others, to our inability to accurately identify the effect of non-performing debtors, interest income from revolving loans and bank fees charged on principal, not included in interest statistics, in estimation from interest statistics.

credit interest paid by households up to the end of 2009, sustained by the credit boom's effect on 12-month rolled-over data. The volume effect has since become minimal. With the *composition effect,* the weight of certain credit products increases, while that of others decreases. Until 2008, when the weight of the relatively cheaper Swiss franc loans increased within household loans, this effect generally reduced the interest payment volume. After 2008, however, the weight of Swiss franc loans decreased somewhat against more expensive euro loans, generating a moderate increase in the interest burden (the weight of forint loans, dominating new disbursements, within the credit stock has basically remained unchanged since 2008 due to the nominal increase of FX loans caused by the weaker forint exchange rate);

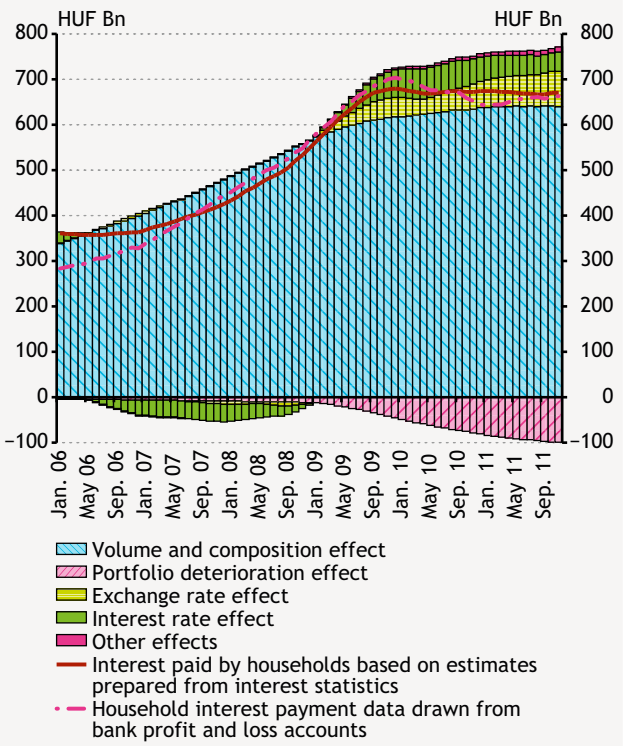
- *Exchange rate effect:* due to the weakening of the forint since 2008, the stock of FX loans has been revalued, thus the value of interest payment calculated on the basis of stock, denominated in forints, has also increased. This effect does not affect forint loans, but due to the weaker HUF rate, in 2011 (average exchange rates: 277 HUF/EUR, 224 HUF/CHF) households paid approximately HUF 80 billion more on interest than they would have paid at exchange rates before 2008 in relation to Swiss franc and euro loans;[15]

- *Interest rate effect:* the volume of interest payable depends on the nominal credit interest rate. Since the emergence of the crisis, only interest rates on forint denominated mortgage loans have decreased among the various types of products, while interest rates on FX loans and uncovered forint loans have increased. As a result of the interest rate effects, in 2011 debtors paid HUF 45 billion more than in 2008. We discussed the reasons for interest rate increases by banks in the MNB (2010) publication; we drew the conclusion that the interest rate hikes were not fully supported by the rise in financing costs and credit losses in relation to Swiss franc mortgage loans. The increase in the country risk premium in 2011 H2, proving to be protracted, changed our view in this regard, as the persistence of current risk premia may also significantly raise the funding costs of banks, which would not rule out the necessity of further interest rate increases in relation to Swiss franc loans (see Annex, Chart vii);

- *Portfolio deterioration effect:* non-performing debtors obviously do not pay interest either. Due but unpaid interest does not have a cash flow effect or appear in banks' financial statements. The ratio of non-performing debtors increased from 1.5 per cent at the end of 2008 to over 11 per cent, reducing interest payments from households to banks by a total of HUF 90 billion;

- *Other effects:* combined effect of the above partial factors (+HUF 10 billion over the year 2008).

Chart 4
Decomposition of bank credit interest paid by households based on estimates prepared from MNB interest statistics



Note: Footnote 14 contains the background to the calculations. It is important to emphasise that the decomposed interest payment volume is an estimate which – shown in the chart – varies from actual household interest payment data drawn from bank profit and loss accounts. Therefore, the data shown are not accurate, but well reflect the main trends. The above data relate to the banking sector exclusive of the co-operative sector.
Source: Estimate by the authors based on MNB interest statistics.

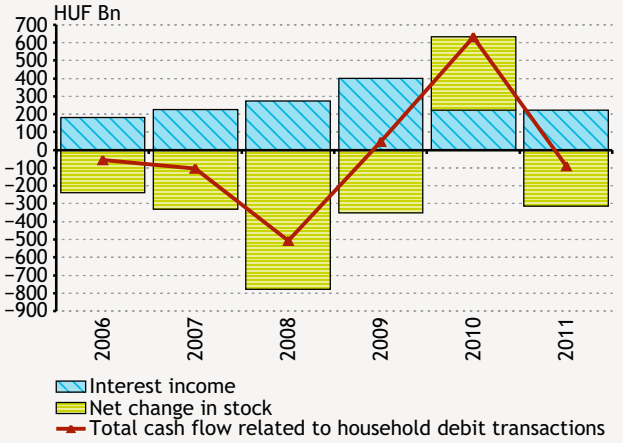
In conclusion, bank interest expenditures of households basically increased in parallel with the rise in credit stock until the end of 2008. Thereafter, however, the rising volume of interest paid was increasingly attributable to the weakening of the forint and interest rate hikes implemented by banks; according to our estimates, this amounted to a total value of approximately HUF 120-130 billion. This fully

[15] This increase may seem small in comparison to the annual interest payment volume of roughly HUF 600-700 billion, considering that the strengthening of the Swiss franc against the forint amounted to 40 per cent at the average exchange rate in 2011 over levels measured before the crisis. In fact, approximately half of credit interest paid by households is linked to forint loans: although the FX loans account for over 70 per cent of the credit stock, interest on forint loans is higher, particularly in relation to consumer loans.

encumbered still performing debtors. *Actual aggregate* interest payments by households, however, did not increase at such a rate, as the volume of interest *not paid* by non-performing debtors also rose sharply. At first glance, this would imply that portfolio deterioration dampened the income reducing effect of household interest payments. However, if we assume that the income of non-performing debtors declined in any case during the crisis, there was no such dampening effect at work[16]; the increase in interest payments attributed to the rising exchange rate and interest rates fully decreased the disposable income of households. This amounts to 0.7-0.8 per cent of disposable income, approximately 0.8-0.9 per cent of consumption, based on the above additional interest expenditures of HUF 120-130 billion annually.

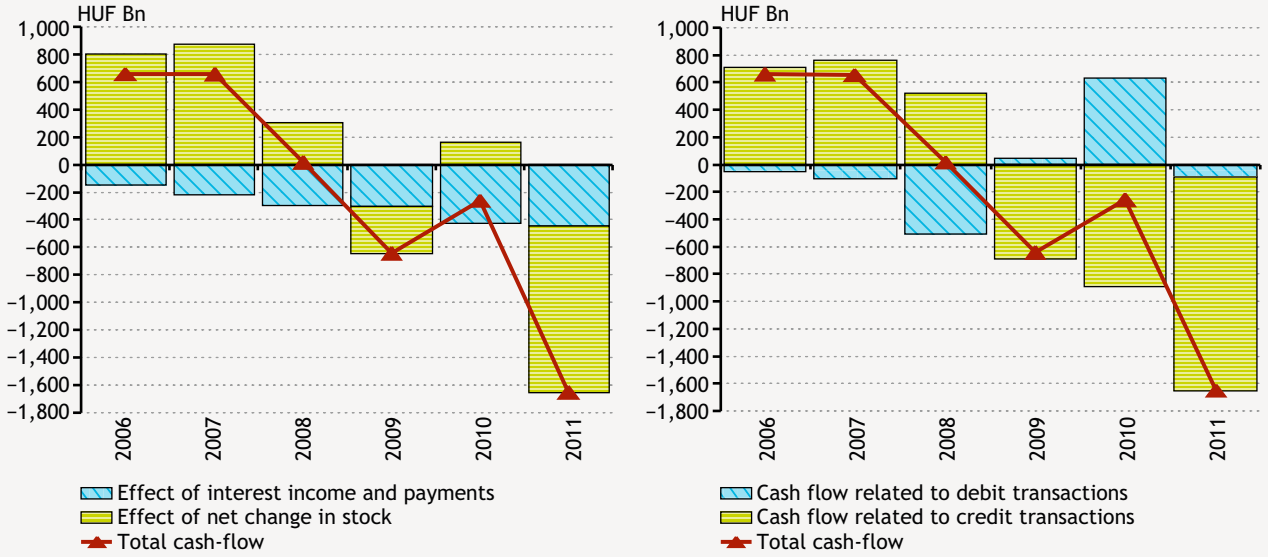
Analysis of the debit side, however, is much more difficult and shows a different picture than the one emerging in the previous chapter. This is attributable to the fact that while the majority of household loans are bank loans, only a smaller portion of household savings are bank deposits. Moreover, households reorganise relatively frequently their portfolios between different forms of savings (stock movement is particularly common between investment units and bank deposits). In addition, the market share of the credit union sector – disregarded in our analysis – on the debit side is also much higher than that of loans. All these factors distort the change in the stock of net bank deposits of households in Chart 5; in 2006 and 2010, for example, a significant amount of deposits flowed into investment units (net deposits are therefore at a relatively low level), while this was reversed at the end of 2008. Income trends, however, are well reflected by this

Chart 5
Estimated cash flows between households and the banking sector (not including the co-operative sector) related to household debit transactions



Note: Net change in stock is a value adjusted for exchange rate changes. We estimated interest payment data relating to household bank loans with the help of the MNB interest statistics, as bank profit and loss accounts do not contain relevant data before 2010. The above data relate to the banking sector exclusive of the co-operative sector.
Source: MNB.

Chart 6
Estimated total cash flows between households and the banking sector (not including the co-operative sector) related to household credit and debit transactions



Source: MNB.

[16] Moreover, "income smoothing" aggregated in this manner is obviously unsustainable and negatively affects financial stability.

calculation: the 300 basis point interest rate increase by the central bank at the end of 2008 and intensifying deposit competition among banks emerging in early 2009 increased household interest income substantially in 2009 (this was less attributable to new deposits flowing in at the end of 2008).

Chart 6 shows the comparison of debit and credit side cash flows (Chart 3 and 5) between households and the banking sector.[17] We can observe that cash flows between households and banks was generally determined by the change in net stock on the credit side: before the crisis, on the credit side cash flows from banks to households, which was reversed with credit repayments. The interest balance of households also significantly deteriorated as a combined result of the credit boom, the depreciation of the forint exchange rate and rising credit interest rates since 2008 – in line with the results presented in the previous chapter. (The negative interest balance comes as no surprise, as the interest balance of households vis-à-vis banks is typically negative in other European countries as well).

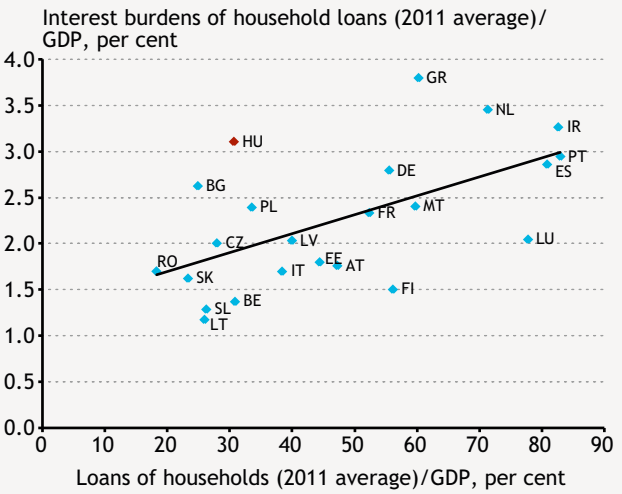
INDEBTEDNESS AND INTEREST BURDEN OF HUNGARIAN HOUSEHOLDS IN INTERNATIONAL COMPARISON

The literature[18] on the debt overhang of households generally focuses on stock data. On the basis of these literature data/reviews, the indebtedness of Hungarian households does not seem high in international comparison. In the previous chapters, however, we observed that rising debt may have a negative effect on household income (and hence on consumption) through a higher interest burden as well, and if we also take into account the volume of interest paid by households, domestic household indebtedness thus measured does not at all seem low in international comparison.

To produce the estimate shown below, we used interest statistics and credit stock data accessible on the websites of the ECB and central banks. Before we discuss the results, we should briefly describe the applied methodology. Below, we focus only on household loans within the banking sector, as comparable data are available in relation to these. This allows us to effectively cover the credit side of households, as household lending is commonly conducted through the banking sector in Europe; other financial intermediaries play a small role (Annex, Chart viii), albeit a somewhat larger one in Hungary. Several other factors, however, limit the international comparison of interest burdens. First, interest statistics are not comprehensive in scope or fully harmonised, and, second, costs similar to interest but not termed as interest are generally not covered by interest statistics (e.g. principal-proportionate bank fees which are frequent in Hungary in relation to mortgage loans). Furthermore, when using interest statistics, we are unable to take into account the effect of non-performing loans either, although we observed in the previous chapter that this is a major distorting item in national data. Due to the above reason and other distorting effects, estimates stated here in relation to Hungary are not in full harmony with the previous chapter. In view of these estimation related problems, it is important to emphasise that the comparison below should be interpreted with caution.

International comparison indicates that the estimated bank credit interest burden of Hungarian households as a proportion of GDP is among the highest in Europe (Chart 7). In 2011, the ratio of interest payments by Hungarian households to GDP was broadly at the same level as in countries with over twice as large household indebtedness as a proportion of GDP as that of Hungary. The interest payments-to-GDP ratio in Hungary is also higher in comparison with the Central Eastern European region (the possible causes are discussed in greater detail below.)

Chart 7
Ratio of loans and interest burdens of households to GDP
(2011)



Note: the 2011 GDP figure is the current forecast available through Eurostat. We estimated interest burdens with the help of bank interest statistics (with 12 month rolled-over data for 2011, between December 2010 and November 2011). Due to the different methodology (effect of non-performing loans, consideration of co-operative credit institutions, etc.), the national interest burden shown here is roughly similar to, but not an exact match of data shown in the previous chapter.
Source: Web sites of ECB, MNB, Eurostat, various central banks.

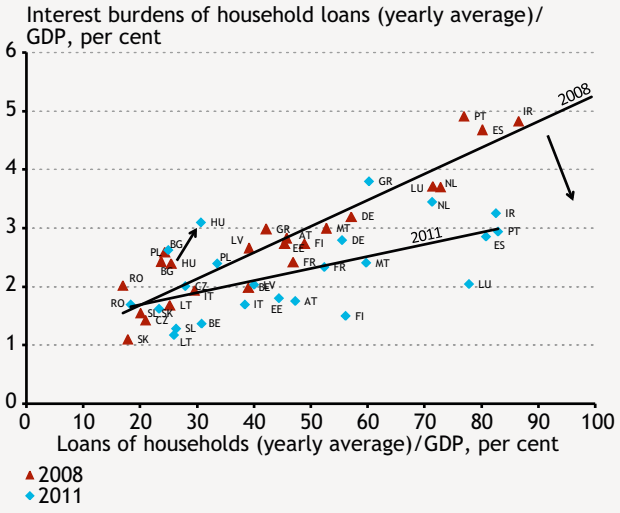
[17] The version of Chart 6 showing data relative to the GDP and disposable income is also contained in the Annex.
[18] For example, Brown and Lane (2011) and Kiss et al. (2006) referenced above, and Hudecz et al. (2012).

Analysing the dynamics of the indebtedness and interest burdens of households before and after the crisis, we may observe that although the credit stock of households as a proportion of GDP- did not decline in most European countries and even increased in some regional countries (Czech Republic, Slovakia, Poland), the ratio of interest payments by households to GDP decreased (Chart 8). This may be attributable to the downward effect on financing costs of central bank interest rate cuts implemented during the crisis. This in turn may have reflected the continuing rise in lending in countries where the interest burden as a proportion of GDP increased (Czech Republic, Slovakia), while the proportionate increase of the interest burden in Greece is linked to the sharp decline in nominal GDP. Hungary is the only country where the interest burden of households as a proportion of GDP increased without either a credit boom or a sharp fall in nominal GDP, for reasons discussed in the previous chapters.

The difference between the ratios of bank credit interest paid by households to GDP in various countries – beyond the difference in credit-to-GDP ratios, i.e. in the volume effect – is attributable to several factors. First, varying interest burdens may depend on differences in general credit interest rate levels (interest rate effect) and the product type of loans drawn by households (composition effect). With the latter effect, interest rates on less risky loans, particularly mortgage loans and loans for house purchase, are generally lower in all countries and for all debtors than those of uncovered loans. Thus, if debtors in a country have unsecured loans at higher interest rates, the average interest burden will obviously be higher there as well.

As shown in Chart 9, the ratio of more risky non-housing loans in Hungary is higher within the stock of household loans than in most European countries (excluding Bulgaria and Romania), therefore, the composition effect also increases the interest burden in Hungary. In addition, a general difference in interest rates was also observed in 2011: the nominal interest rate on housing loans is the second highest in Hungary behind Bulgaria,[19] while Hungarian interest rates on non-housing loans are the highest within the entire European Union.[20] The latter is somewhat surprising in view of the fact that home equity loans account for a high, 67 per cent percentage of non-housing loans in Hungary, which would, in principle, result in lower nominal interest in comparison to unsecured consumer loans. At the same time, the 15-30 per cent interest rates on unsecured (forint) loans in Hungary are also high.

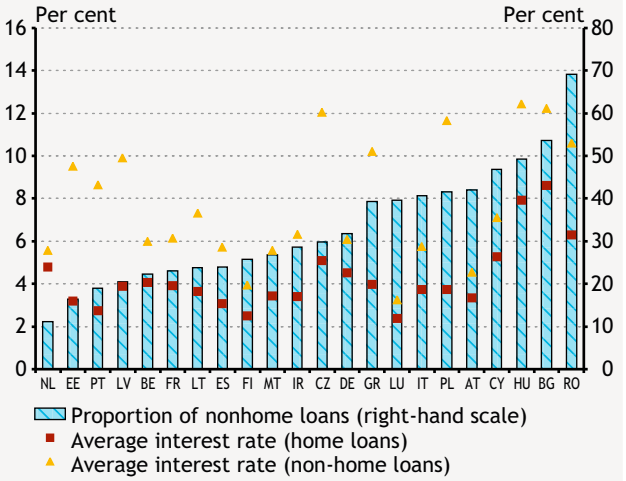
Chart 8
Loans and interest burdens of households to GDP in 2008 and 2011



Note: the 2011 GDP figure is the current forecast available through Eurostat. We estimated interest burdens with the help of bank interest statistics (with 12 month rolled-over data for 2011, between December 2010 and November 2011). Due to the different methodology (effect of non-performing loans, consideration of co-operative credit institutions, etc.), the national interest burden shown here is roughly similar to, but not an exact match of data shown in the previous chapter.
Source: Web sites of ECB, MNB, various central banks.

Chart 9
Distribution of housing and non-housing loans of households in international comparison and average nominal interest rates of such loans

(2011)



Note: The distribution of loans is based on an annual average.
Source: Websites of ECB, MNB, various central banks.

[19] It is important to note that the composition effect may play a major role in determining the average national interest rates of non-housing loans, as in addition to home equity loans, these include consumer loans, credit card and overdraft facilities and motor vehicle loans, where interest rates – and credit risks – significantly vary.

[20] See Annex for interest burden on non-housing household loans.

In conclusion, the high interest burden of Hungarian households is attributable to both the composition effect and the generally higher interest rates. Differences in the latter across various countries may depend on several factors (a more detailed analysis of these goes beyond the scope of this work):

- *Denomination of loans:* since the interest environment varies in different countries, depending on the general economic environment, this may also contribute to the difference in household credit interest rates (as reflected by the higher interest rate on Hungarian forint loans). The relevance of the interest rate level in Hungary is reduced to the extent that a larger portion of total household loans is denominated in foreign currency;

- *Availability and costs of bank funds, particularly in relation to the country risk premium*: since the Hungarian country risk premium is among the highest in the European Union, and the country is heavily reliant on external funds, this factor clearly plays an important role in determining differences in customer interest rates;

- *Rate and volatility of inflation:* nominal credit interest rates in the national currency are also higher in a high inflation environment, and we may observe that household customer interest rates are the highest in three EU countries, where inflation has been relatively high in recent years – Romania, Bulgaria and Hungary (see Annex, Chart xi). It is important to emphasise that although inflation may decrease the real value of the debtor's credit in the long term (although this is not true in relation to loans with variable interest rates), this is in principle not the case in relation to FX loans, as the devaluation of the exchange rate caused by inflation differentials also increases the value of the credit denominated in the national currency. In other words, a high inflation environment does not reduce, but rather increases the (foreign exchange) debt problems of domestic households. (The application of inflation-adjusted income statistics could serve as a possible method for filtering out the effect of inflation)[21];

- *Other factors, sectoral competition,*[22] *local legal environment, changes in non-performing loans:* among these factors, the significantly higher ratio of non-performing debtors/loans in Hungary compared to the EU average and the more difficult comparability of interest rates of household mortgage loans may play a role in higher customer interest rates.

Finally, it is possible, that due to the high Hungarian interest rate environment, Hungarian households realise higher interest income as a proportion of GDP on their deposits compared to the EU average, therefore, the net interest balance of households is not exceptionally high – even with higher expenditures on the credit side. Analysis of this assumption, however, is more difficult. This is because, first, a substantial portion of household financial income is not related to deposits within the banking sector, and we did not have available comparable data from other countries for the calculation of net interest income noted in the second chapter. Second, easily comparable international statistics are not available either on bank deposits.

We can, however, carry out a comparison between Hungary and the entire eurozone. As shown in Table 1, on the basis of data for the year 2011, bank interest income of Hungarian households as a proportion of GDP was indeed higher than in the eurozone, as only 20 per cent less household interest income was realised on approximately a third of bank deposit stock. In other words, a higher interest rate environment may produce a compensation effect on the interest payment volume of Hungarian households – higher than the EU average – on the debit/deposit side. We assume, however, that this can only moderately dampen the shock caused by declining net interest income resulting from indebtedness, owing to the heterogeneity of households (most borrowers are not savers). Moreover, this compensation effect was certainly unable to mitigate the adverse dynamics affecting the net interest income of Hungarian households since the crisis. As noted in the second chapter, interest income was insufficient to offset the rise in interest payable, thus the interest balance suffered a substantial deterioration.

Table 1
Ratio of interest on household bank deposits to GDP

	Eurozone	Hungary
Bank deposits of households/GDP	62%	22%
Average (gross) deposit interest rate	1.6%	3.7%
Deposit interest income of households/GDP	1.0%	0.8%

Source: ECB, Eurostat, MNB.

[21] But this statistics are available only for Hungary at the moment – international comparison is not possible.
[22] For details see Corvoisier and Gropp (2002).

SUMMARY

Our analysis aimed at focusing attention on problems arising from the rapidly rising indebtedness of Hungarian households prior to 2008. As a natural consequence of the credit cycle, the direction of cash flows between households and the banking sector reversed after the credit expansion slowed down and stopped: debtors turned from net borrowers to net repayers. Net interest income of households also declined as a result of an increase in the (foreign exchange) credit stock up to 2008, and expanded further in response to the depreciation of the forint exchange rate: at a rate of over 1 per cent of GDP and over 2 per cent of disposable income compared to figures measured in 2006 and 2007. This obviously decreased household income and consumption. In addition, our estimates show that the volume of credit interest paid by Hungarian households as a proportion of GDP is one of the highest in the European Union, and indebtedness thus measured significantly exceeds the value shown through the credit stock-to-GDP ratio. This, however, may be partially offset by proportionately higher interest income earned on savings, attributable to the higher Hungarian interest rate environment, but this effect was presumably unable to offset the decline in net interest income. These data broaden somewhat the picture of the level of indebtedness – regarded earlier to be low – of Hungarian households.

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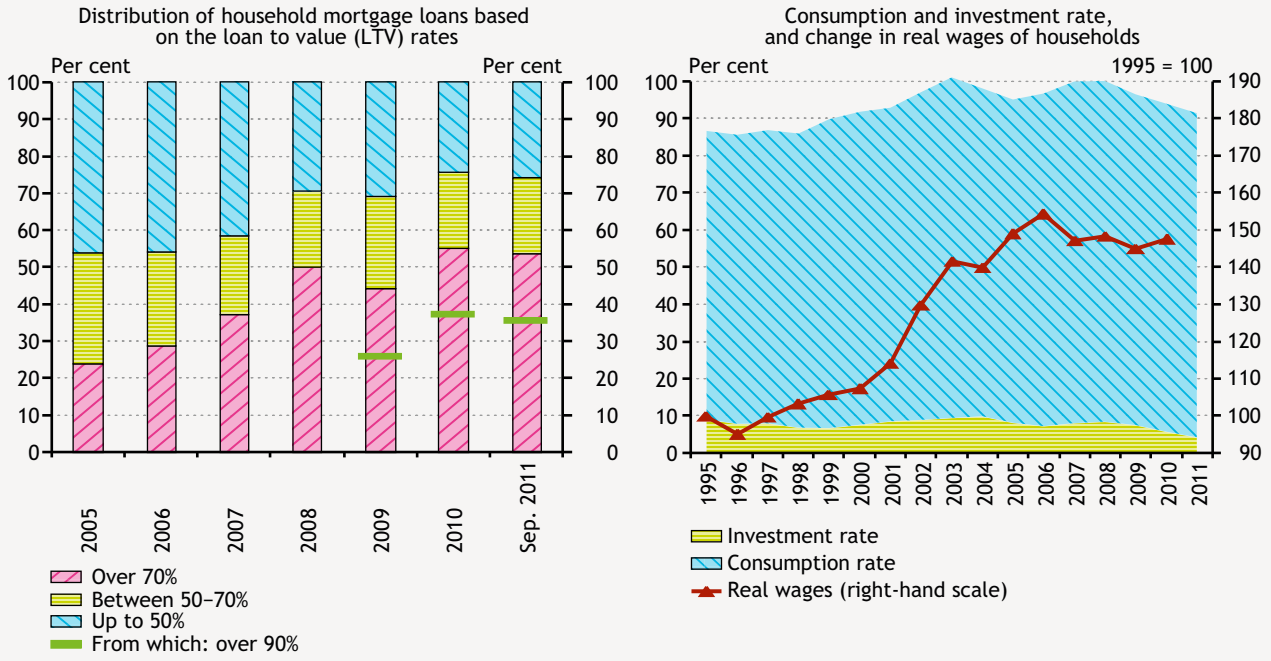
ANNEX

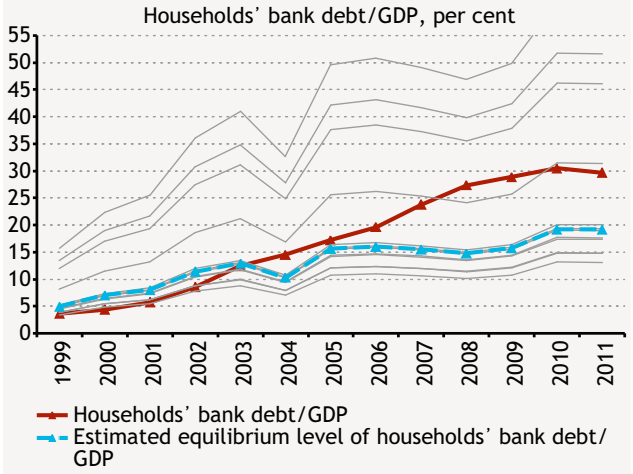
Chart i
Distribution of household mortgage loans based on loan-to-value (LTV) ratios; consumption and investment rate, and change in real wages of households



Note: Separate breakdown for loans with over 90% LTV ratio is available only from 2009.
Source: MNB.

Chart ii
Out-of-sample estimates of the equilibrium level of Hungarian households' bank debt to GDP

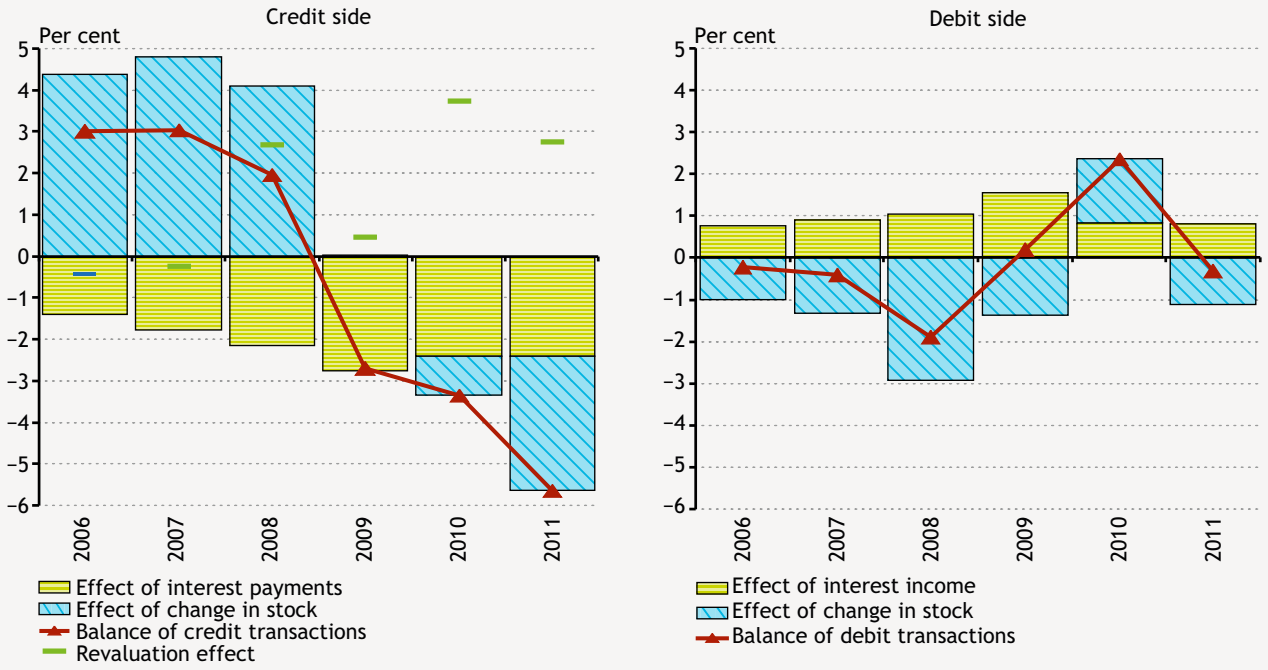
(thin lines indicate equilibrium paths estimated with different country constants)



Note: See a detailed methodology in the referenced literature.
Source: Kiss et al. (2006).

Chart iii
Household cash flows vis-à-vis banks on the credit and debit sides relative to GDP

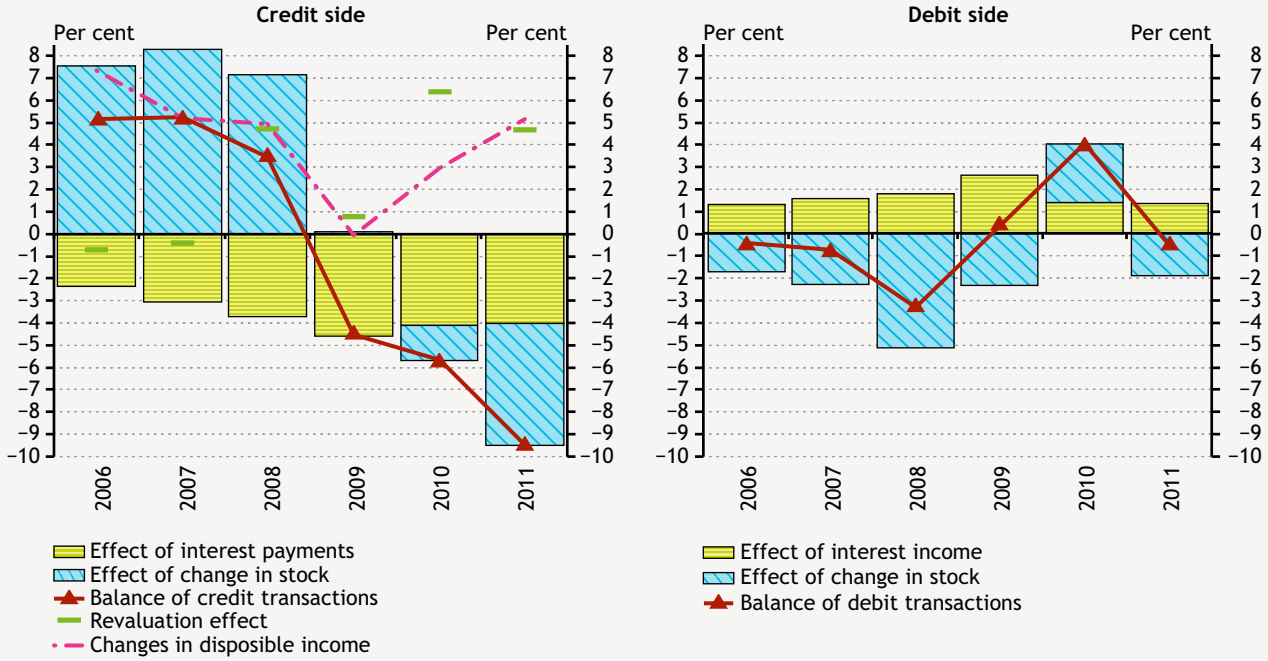
(distribution of values in Charts 3 and 5 to GDP)



Note: GDP for 2011 is calculated with 12-month cumulated GDP as at September 2011.
Source: MNB.

Chart iv
Household cash flows vis-à-vis banks on the credit and debit sides, relative to disposable income of households

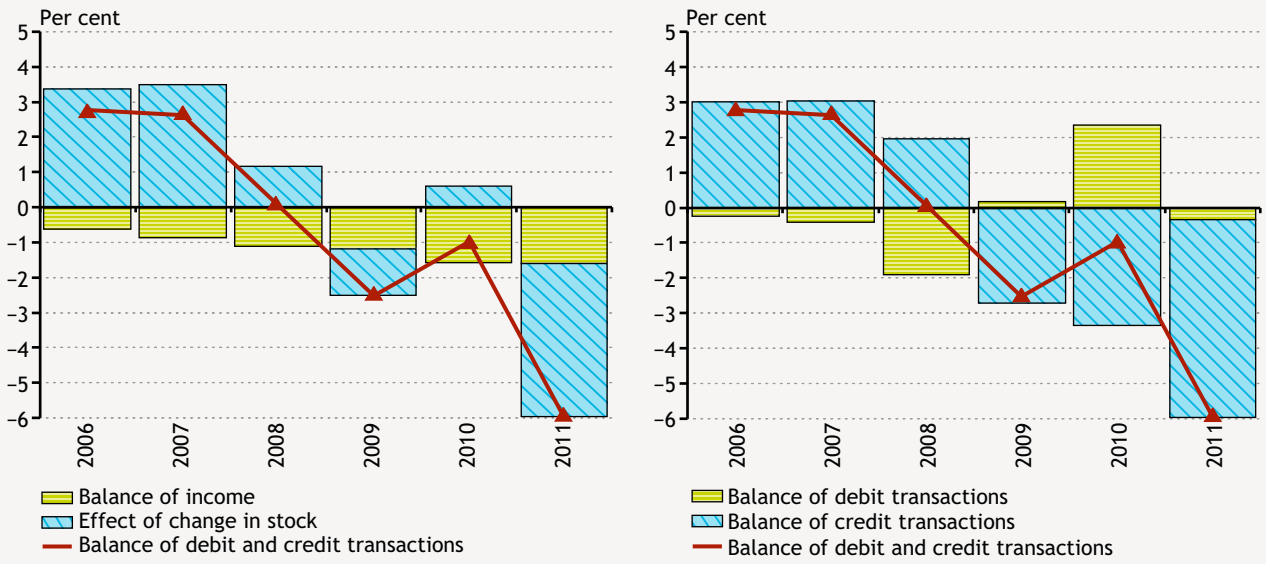
(distribution of values in Charts 3 and 5 to disposable income)



Source: MNB.

Chart v
Household cash flows vis-à-vis banks on the credit and debit sides relative to GDP

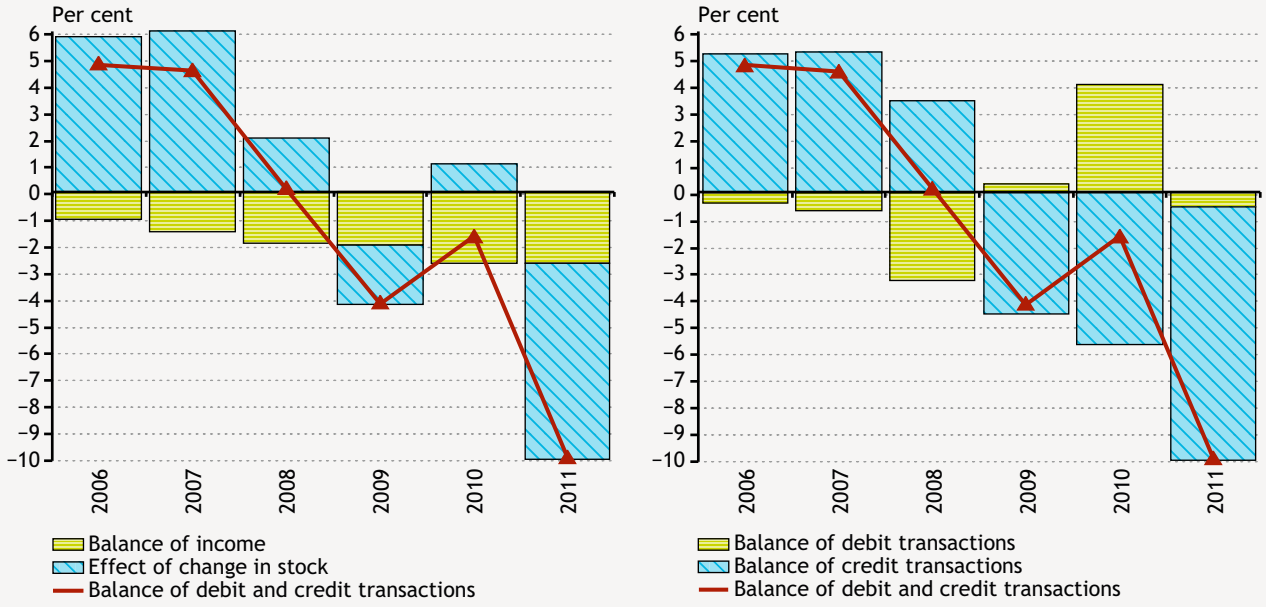
(distribution of values in Chart 6 to GDP)



Note: GDP for 2011 is calculated with 12-month cumulated GDP as at September 2011.
Source: MNB.

Chart vi
Household cash flows vis-à-vis banks on the credit and debit sides relative to disposable income of households

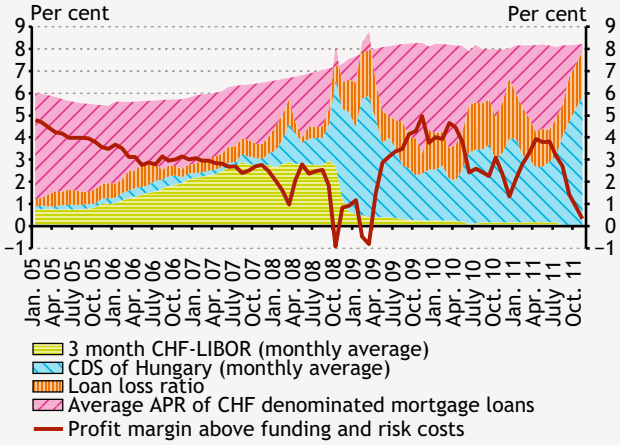
(distribution of values in Chart 6 to disposable income)



Source: MNB.

Chart vii

Bank credit interest rates, financing costs, credit losses and margins of Swiss franc mortgage loans in Hungary

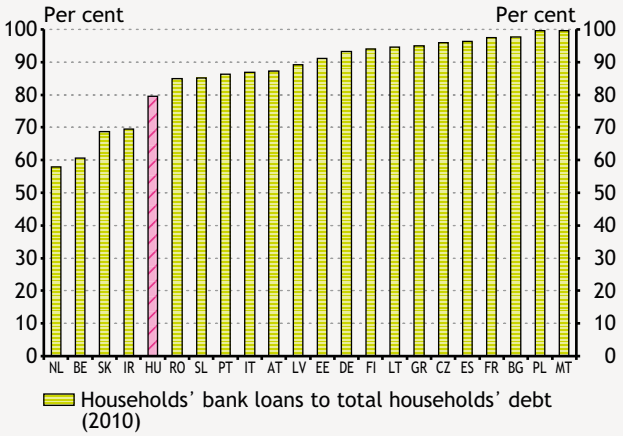


Note: See MNB (2010) for a detailed methodology.
Source: MNB.

Chart viii

Ratio of household bank loans to total household debt

(2010)

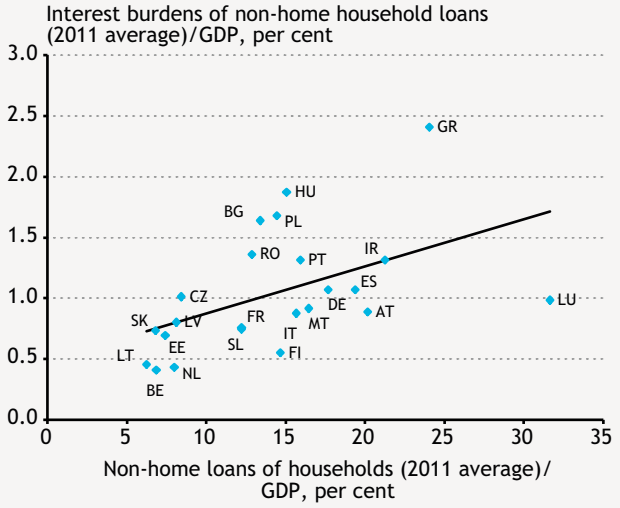


Source: Websites of ECB, MNB, Eurostat and various central banks.

Chart ix

Ratio of non-housing household loans and interest burdens on non-housing households to GDP

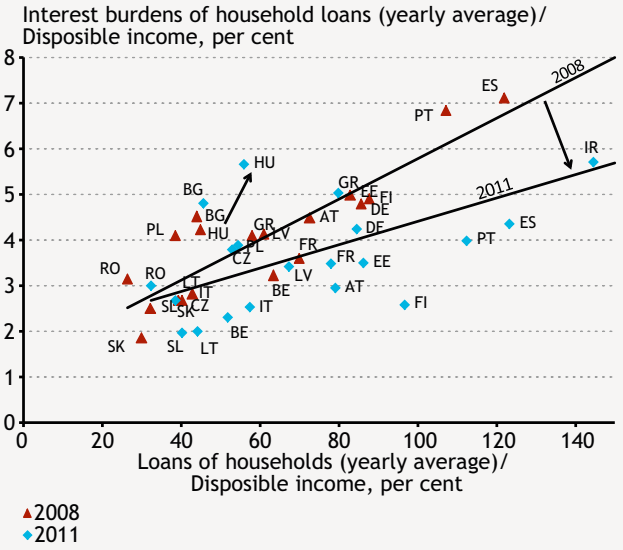
(2011)



Note: The 2011 GDP figure is the current forecast available through Eurostat. We used monthly rolled-over data between December 2010 and November 2011 to calculate the interest burden.
Source: Websites of ECB, MNB, Eurostat and various central banks.

Chart x

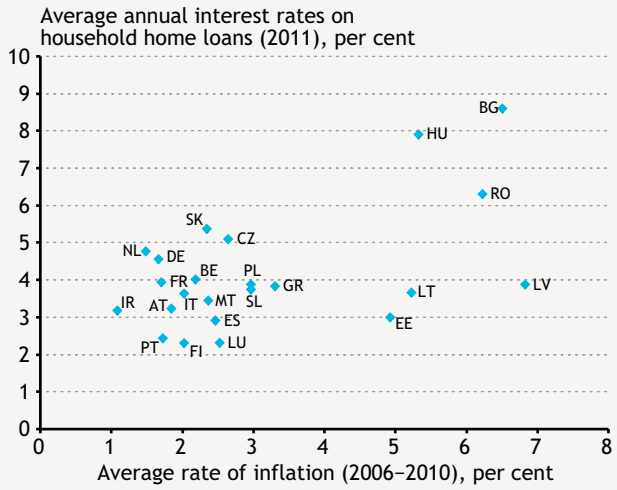
Ratio of loans and interest burdens of households to disposable income in 2008 and 2011



Note: The 2011 GDP figure is the current forecast available through Eurostat. We used monthly rolled-over data between December 2010 and November 2011 to calculate the interest burden.
Source: Websites of ECB, MNB, Eurostat and various central banks.

Chart xi

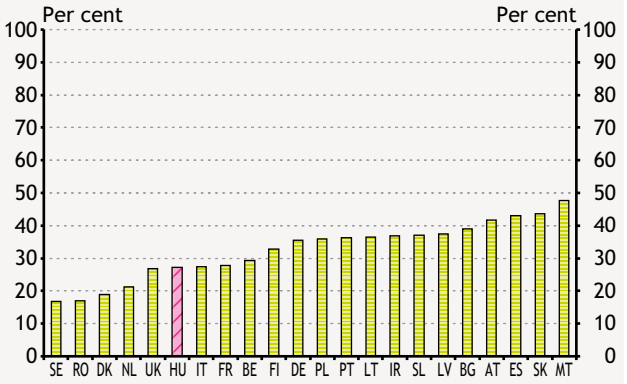
Correlation between average annual interest rates on household home loans and the average rate of inflation



Source: Websites of ECB, MNB, Eurostat and various central banks.

Chart xii

Ratio of household deposits to total financial assets of households



Source: MNB, Eurostat.

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