MNB Bulletin

March 2014

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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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This publication was approved by Márton Nagy, Dániel Palotai

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

Contents

Summary

DEAR READER,

The Magyar Nemzeti Bank attaches great importance to make central bank analyses on various current economic and financial trends of general interest available to the wider public. The March 2014 issue of the MNB Bulletin discusses the relationship between corporate profitability and labour market adjustment; the factor behind part-time employment; the components of the yield curve; and the effects of the introduction of the transaction fee and intraday clearing. The Bulletin continues its series of interviews. The current issue features an interview with Christopher D. Carroll, professor of Johns Hopkins University.

In his article, Péter Bauer analyses changes in the profitability of Hungarian companies and the resulting labour market adjustment. During the crisis, firms saw their profitability deteriorate sharply in the weakening demand environment, which they reacted to by curbing labour costs. Cost-side adjustment thus acted as a buffer against inflationary pressure. In earlier analyses, we investigated this behaviour of firms using macro variables; this study complements our previous effort with an analysis carried out on a firm-level database. The profit margin determined on the basis of micro data paints a similar picture as the one calculated using macro statistics, suggesting that profitability had returned to pre-recession levels by 2011. At the same time, we believe that the return indicator (ROA) derived from corporate data provides a better indication of developments in profitability, to which firms must adjust. Growth in value added plays a pivotal role in their profitability gains. Companies adapted to lower demand during the recession through labour cost adjustment, but this trend only more or less followed changes in profitability. The return indicator suggests that a pronounced improvement in the demand environment is needed in order for private sector profitability to regain its pre-recession level of 2007 from the level of 2011. At the same time, profitability trends are characterised by strong heterogeneity, and thus as external demand started to increase moderately from 2010, the profitability of export-oriented firms improved significantly. Firms producing for the domestic market may see a marked improvement in their profitability once domestic demand picks up.

The article by Katalin Bodnár examines part-time employment during the crisis. Before the recent economic crisis, part-time employment was very low in Hungary. During the crisis, however, the most rapid increase in the number of part-time employees within the European Union was observed in Hungary. Part-time employment increased in a number of European Union countries for cyclical reasons: companies hoarded labour – usually with government assistance – by reducing the number of per capita working hours instead of laying off workers. At the same time, part-time labour supply also increased during the economic downturn. Such cyclical impacts were also observed in Hungary. This article examines whether the changes in the number of part-time employees were really driven solely by cyclical reasons. What should follow from this assumption is that the per capita number of working hours would increase in the course of economic recovery, while part-time employment would fall back to the earlier prevailing low levels and the total number of employees would not increase significantly. This assumption, however, is not supported by the available data. The increase in the number of part-time employees – particularly in the market services segment – seems to be more of a trend that may keep the number of part-time jobs higher during economic recovery than before the crisis.

Dániel Horváth, Péter Kálmán, Zalán Kocsis and Imre Ligeti examine two components of market yields: expectations of future yields and the term premium. The authors present the key theoretical factors influencing the yield curve and examine their role in advanced and emerging market developments seen in recent years. Their findings show that the common component of term premia and interest rate expectations of emerging countries co-move with corresponding factors observed in the United States. Of these two components, the term premium appears to be affected by global risk shocks. Concerns related to the Fed's tapering of its QE3 programme were reflected markedly in the term premia of emerging markets and, to some extent, even had an upward impact on rate expectations. In the Hungarian context, in addition to analysing co-movement with international factors, the authors focus on the potential of the yield curve in the monitoring of

domestic base rate expectations. FRA yields and the interest rate expectations identified by the Reuters survey had significant forecasting ability regarding the central bank base rate. By contrast, the forecasting ability of government bond yields was more uncertain.

In their article, Tamás Ilyés, Kristóf Takács and Lóránt Varga consider the effects of the financial transaction tax. Their findings show that payment service providers passed the transaction tax on to their clients in several steps and to a significant degree, both in the spring, upon introduction of the tax, and in the autumn, when the rates of tax were raised. For cash withdrawals and bank transfers, the tax was typically passed on by being charged against the transaction directly. The tax was passed on directly at a much lower average rate among card purchases; however, the annual fees of payment cards were increased considerably. Payment statistics for Hungary for the first half of 2013 do not suggest a deviation from the trends of earlier years, as electronic transactions continue to slowly gain ground and the use of cash declines. Accordingly, the introduction of the transaction tax did not affect the development path of the payments structure in Hungary either positively or negatively in this period.

The article by Miklós Luspay and Annamária Madarász investigates how turnover has changed in the Hungarian payment system over the almost 18-month period since the introduction of intraday clearing (2 July 2012). A development exercise of a similar scale took place in Hungarian payments when VIBER was introduced in 1999, which allowed the central bank to estimate the effects on payment turnover and bank liquidity in preparation for this project. The authors once more pose the questions most frequently encountered during the development project and offer answers based on the experience available today. Even before the introduction of intraday clearing, it was clear that this new clearing system would be beneficial for retail and corporate clients alike, but it is only now, after more than a year, that the changes in turnover and the effects on liquidity can be assessed. The authors show that in the initial period following the launch of intraday clearing part of VIBER transactions moved into the new clearing system. In addition, they also find that the introduction of intraday clearing did not generate liquidity problems in the domestic payment and settlement systems either at systemic or individual bank level.

Áron Kiss and István Kónya have made an interview with Christopher D. Carroll of Johns Hopkins University. Professor Carroll answered questions related to the applicability of the current macroeconomic modelling practice, its relevance for economic policy and future prospects. In addition, he talked about the perspectives of his own research field, namely, the heterogeneity of household behaviour. The interview also covers issues such as the relationship between economics and the crisis and the ability of macro models to predict a crisis.

The Editorial Board

Péter Bauer: Corporate profitability and labour market adjustment – findings of a micro data study

During the crisis, firms saw their profitability deteriorate sharply in the weakening demand environment, which they reacted to by curbing labour costs. Cost-side adjustment thus acted as a buffer against inflationary pressure. In earlier analyses, we investigated this behaviour of firms using macro variables; this study complements our previous effort with an analysis carried out on a firm-level database. The profit margin determined on the basis of micro data paints a similar picture as the one calculated using macro statistics, suggesting that profitability had returned to pre-recession levels by 2011. At the same time, we believe that the return indicator (ROA) derived from corporate data provides a better indication of developments in profitability, to which firms must adjust. Growth in value added plays a pivotal role in their profitability gains. Companies adapted to lower demand during the recession through labour cost adjustment, but this trend only more or less followed changes in profitability. The return indicator suggests that a pronounced improvement in the demand environment is needed in order for private sector profitability to regain its pre-recession level of 2007 from the level of 2011. At the same time, profitability trends are characterised by strong heterogeneity, and thus as external demand started to increase moderately from 2010, the profitability of export-oriented firms improved significantly. Firms producing for the domestic market may see a marked improvement in their profitability once domestic demand picks up.

INTRODUCTION

During the global recession that started in 2008, demand for domestic products decreased significantly, which took a huge toll on firms' profitability. Instead of raising prices, firms reacted to deteriorating profitability by curbing expenses, specifically labour costs, which accounted for a large part of their expenditures. Past studies have only investigated profitability at the macro level (see e.g. MNB, 2013a); by contrast, this article attempts to supplement the literature with an analysis of a firm-level database.

We first demonstrate that the profit margin calculated based on microdata co-moves closely with the macro level profit margin. We then determine profitability metrics that cannot be construed based on macro data and compare the overall picture they give to corporate sector profitability. Private sector profitability deteriorated more sharply based on ROA (*return on assets*) than based on profit margin, and profitability would need to improve significantly following 2011 in order to return to pre-recession levels. It should be noted, however, that profitability may remain below this level for a prolonged period if capital and labour substitution occurred, resulting in expected capital gains that are lower than in the past. The recent cut in taxes on labour compared to capital taxes could foster such a substitution process.

Using micro-level data, firms can be segmented based on sector, size and other characteristics, allowing a study of profitability heterogeneity across firms. We also examined labour market adjustment in relation to this, concluding that manufacturing and export-oriented firms experienced a marked improvement in profitability up to 2011 compared to the trough seen during the recession, while others only saw much weaker improvement. Almost every segment reviewed showed signs of labour market adjustment, i.e. slower growth in real wages coupled with declining employment. However, this adjustment was only able to stop the further deterioration of profitability, which only improved materially when demand rose. In the latter cases, the real labour cost had returned to its pre-crisis level by 2011. For the firms that failed to experience the improvement in demand, the real labour cost persistently fell short of the pre-crisis level, albeit to a slight degree. Finally, after the investigation of the simple co-movement of the time series, we analysed firms' labour market adjustment in response to profitability shocks using econometric tools. Our findings shed light on the fact that the deterioration in profitability does in fact lead to a decline in labour costs, partly by pulling real wages downwards and partly by reducing employment. In addition, labour market adjustment is more pronounced among loss-making firms.

DATA

We used the National Tax and Customs Administration's (NAV) firm-level panel database, which essentially covers the entire corporate sector. Annual data is available for the 1995–2011 period. We used tax years in our analysis, meaning that for firms reporting based on business years that diverge from the calendar year, we consider the preceding year as the tax year if the balance sheet date falls before 1 June, and the year at issue for later dates.

This article only examines private sector firms (sectors A–N). We omitted the financial sector (sector K), which would call for different methods for examining profitability, and is also rife with structural breaks.

In the case of micro-level analyses, we use the ROA profitability indicator, the indicator most commonly used in corporate finance, determined as the ratio of operating profit and the balance sheet total.

In order to clean the sample, we omitted firms with balance sheet totals of under HUF 1 million or holding non-financial assets of less than HUF 100,000.

In order to eliminate outliers, we omitted the upper and lower one per cent of the sample ranked based on the ROA indicator.

The database features an unbalanced panel structure, meaning that data is not uniformly available for each firm for every year. This may yield a composition effect in the case of temporal analyses. In order to eliminate this potential bias, we also calculated results (with the exception of regression analyses) from 2006 onwards only in respect of the firms for which data was available for every year between 2006–2011. In other words, we also examined a balanced panel database for the 2006–2011 period, and our statements proved robust. In the following, we present only the findings based on the unbalanced panel.

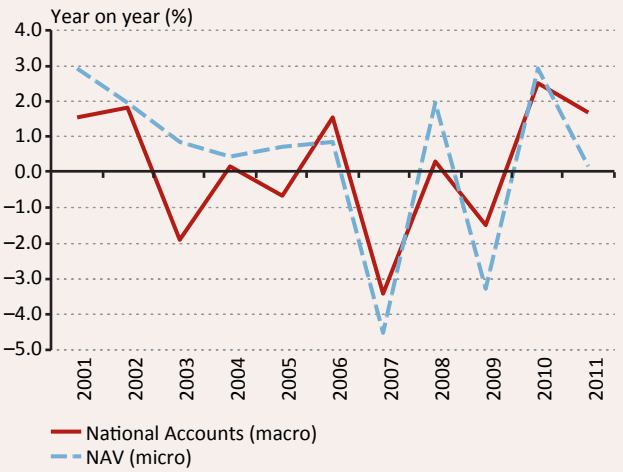
The charts only cover the 2001–2011 period as the developments in the transition period leading up to 2001 are not typical and would provide little valuable insight on the period of the crisis.

PROFIT MARGIN BASED ON MACRO AND MICRO DATA

The profit margin is a commonly used profitability indicator based on macro statistics and is the ratio of gross operating surplus (GOS) to value added. GOS is the difference between value added and labour cost. There are several versions of the indicator: labour cost can be determined based on full-time workers, adjusted for part-time workers or based on national accounts data, where all domestic workers are taken into account, not including those working abroad. The Report on Inflation is based on the latter indicator when analysing corporate adjustment (MNB, 2013b). The profit margin that can be calculated from the firm level database is closely linked to the latter concept. At the same time, the indicator based on the firm-level database cannot be expected to match the macro statistics in terms of level, as in the latter case the calculation methodology for GDP calls for adjustments that were not applied to firm-level statistics (e.g. taking into account the impact of the shadow economy). Therefore, in addition to levels, we also compared annual changes: annual changes that are close to each other suggest co-movement of the indicators. The findings for the private sector (Chart 1 and 2) illustrate that the value derived from the corporate database is close to national accounts figures in terms of the annual change of profit margin (the correlation is approximately 0.8 from 2001).[1]

The profit margins calculated based on both macro and micro level data illustrate that after hitting a low in 2009, profitability had returned to its 2007 level by 2011 (Chart 2).

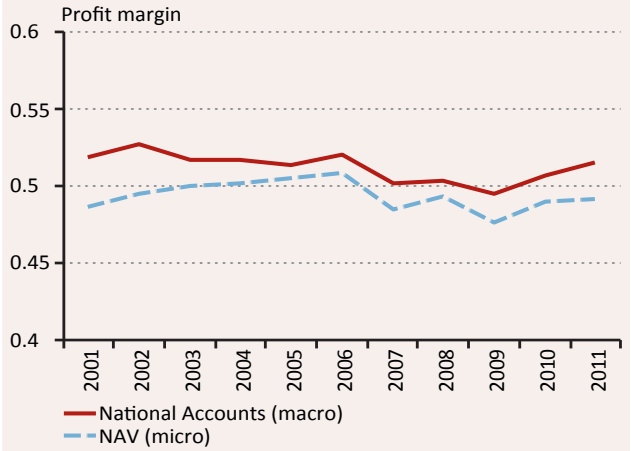
Chart 1
Private sector profit margin based on macro and micro level data
(annual change)



Source: MNB.

[1] If the financial sector is included in the private sector, the correlation of macro- and micro-level data is essentially lost. This observation also corroborates the choice of omitting the financial sector.

Chart 2
Private sector profit margin based on macro and micro level data
(level)



Source: MNB.

PRIVATE SECTOR PROFITABILITY BASED ON ROA

In the previous section, we examined firms' profitability based on their profit margin. However, firms seek to maximise their profit, rather than their profit margin, and therefore changes in profit must be used to assess profitability. Falling value added, for instance, only appears in the profit margin in a diluted manner, as profitability is examined relative to value added. In addition, the GOS used for calculating the profit margin differs from actual profit, in that it contains depreciation of capital, for instance. However, profit alone cannot function as the sole basis of comparison, as firms with different amounts of assets will post different profit figures. Profitability is therefore expressed using various return indicators. The most common are: ROA *(return on assets),* ROE *(return on equity),* ROI *(return on investment),* and ROIC *(return on invested capital),* where a company's profits are divided by its assets, equity, profit-generating investments and invested capital, respectively. Company earnings can also be determined in different manners, such as operating surplus, operating profit, earnings before tax or earnings after tax. These indicators can be determined using corporate data, but not or only with great difficulty using macro data.

In the following, we analyse the ROA based on operating profit, that is operating profit divided by the balance sheet total. This type of indicator is frequently used in business valuations. Another advantage of the ROA indicator is that the balance sheet total can be deemed as a reliable figure based on the available data, as opposed to the amount of equity providing the basis for the ROE indicator, which appears to be a good alternative. At the same time, ROA is often determined by dividing earnings after tax, rather than operating profit, by the balance sheet total. Earnings after tax includes earnings on financial operations and extraordinary profit, but does not include corporate tax. Although earnings after tax are a better indicator of a company's actual profit than operating profit, they also include several volatile elements that a company has little influence in the short run and is unlikely to react to in labour or wage-related decisions. If firms view these changes as lasting ones, they may of course make the necessary adjustments. Our analysis of Hungarian data revealed that the revaluation of financial investments and securities significantly dampened profitability in both 2008 and 2011. As the main focus of our investigation is the relationship between profitability and labour market adjustment, such impacts should be ignored. Accordingly, we determined ROA in this study using operating profit (unless specified otherwise). Another aspect worth mentioning is that the difference between the aforementioned GOS and amortisation is a good approximation of operating profit (furthermore, we did not include the balance of other revenues and expenditures for GOS, but did include it for operating profit).

The ROA indicator is most commonly used in economics in industrial organisations analyses (e.g. Slade, 2004; Claessens and Laeven, 2004). A recent European Commission analysis is an example of the application of the indicator in macroeconomic analyses (European Commission, 2013a).

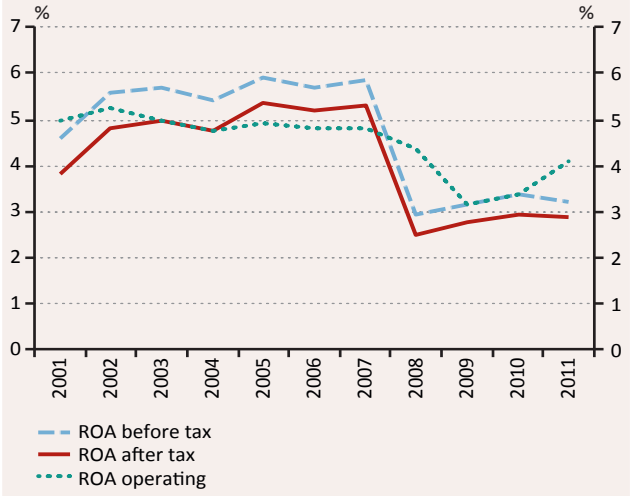
Using the average of a corporate-level profitability indicator is most suited for characterising the profitability of a corporate segment (e.g. sector). A simple average is not suitable, as there are many small businesses with weak profitability which bias the average. In the following, we use the balance sheet total weighted average. Other options are averages calculated using value added or employment. Compared with these, the balance sheet total weighted average has the benefit of being additive, meaning that if several firms are examined in aggregate form, the ROA for the new entity thus formed is exactly the balance sheet total weighted average of the individual ROA indicators. The drawback of value added weighting is that firms with negative value added must be omitted, and the employment weighted average biases the figure towards smaller firms (as larger firms generally have higher labour productivity).

Analysing these results, Chart 3 illustrates the difference between ROA calculated based on operating profit and earnings before or earnings after tax in the private sector. The chart shows that the evolution over time of ROA calculated based on earnings before and earnings after tax is highly similar, with the latter obviously being lower. ROA calculated based on operating profit displays a different dynamic: after hitting a low in 2009 during the crisis, it then improved

Chart 3

ROA indicators calculated based on operating profit, earnings before tax and earnings after tax

(balance sheet total weighted averages)

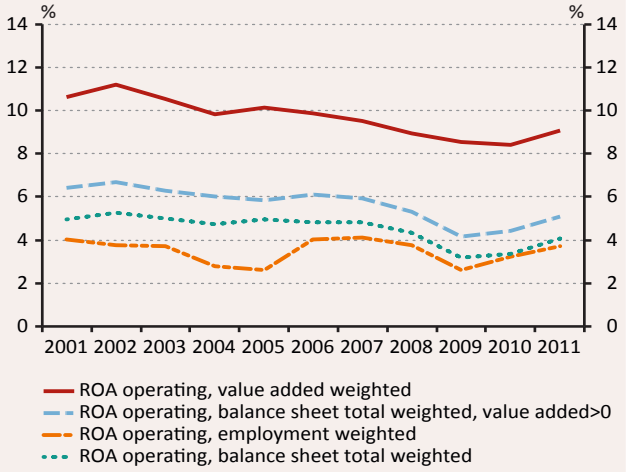


Source: MNB.

Chart 4

Private sector profitability using various weightings

(based on ROA calculated with operating profit)



Source: MNB.

markedly. The more pronounced divergence from the earnings before tax ROA indicator in 2008 and 2011 stems from the revaluation of financial investments addressed above. Chart 4 presents the impact of the different weightings: despite the differences in level, the value added weighted and the balance sheet total weighted ROA (for all firms, or only for positive value added firms) share very similar dynamics. Only employment weighted ROA shows a pronounced divergence.

The remainder of this analysis is based on the balance sheet total weighted ROA metric calculated using operating profit. It reveals that private sector profitability already started deteriorating from 2008, plummeted in 2009, and then started an increase up to 2011. Profitability still would need to improve substantially in the period following 2011 in order to regain its 2007 level. By contrast, profit margins returned to their 2007 levels in 2011. The main reason behind this difference is that the profit margin is obtained by dividing by value added, and thus the decline in value added is partially eliminated from the indicator, while balance sheet total adjusted to a lesser extent in case of ROA.

HETEROGENEITY OF PROFITABILITY

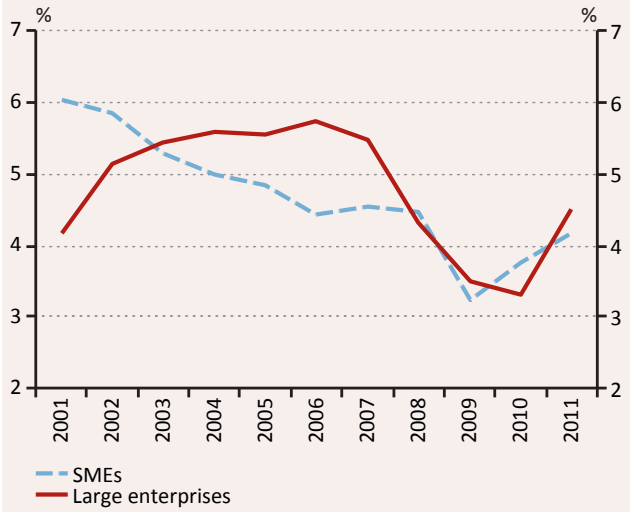
Firm-level data allow the examination of the differences in the profitability of firms with different attributes. Table 1 and Table 2 in the Appendices show the distribution of firms by employment, sector and exporting status.

We first examined the diverging developments in profitability according to company size. As the conduct of large corporations may differ sharply from the rest of firms, we examined the profitability of companies with at least 250 employees and companies with less than 250 employees (Chart 5). Firms in the latter group are called SMEs (small and medium-sized enterprises).[2] Both large enterprises and SMEs saw their profitability dip sharply during the crisis. Large enterprise profitability already took a downward turn in 2008 and bottomed out in 2010, while SMEs only saw a marked deterioration in profitability in 2009, which has since been slowly improving. Profitability in 2011 failed to reach the pre-crisis level of 2007 in both segments. Large enterprise profitability was somewhat higher than those in the SME segment in 2011, and was substantially better compared to the latter in the years leading up to the crisis. This discrepancy was almost entirely eliminated following the crisis. Thus, in contrast to the pre-crisis period, company size alone does not entirely explain the level of profitability in a low demand environment.

We then examined profitability in a breakdown by sector, looking at two major groups: manufacturing and market service firms (Chart 6). After hitting a low in 2009, the manufacturing sector's profitability took a positive turn until 2011 and essentially returned to its 2007 level. It should be noted, however, that profitability had already deteriorated by 2007, and the 2011 figure falls short of the 2006 peak. By contrast, market service sector profitability only improved slightly compared to the low point during the crisis.

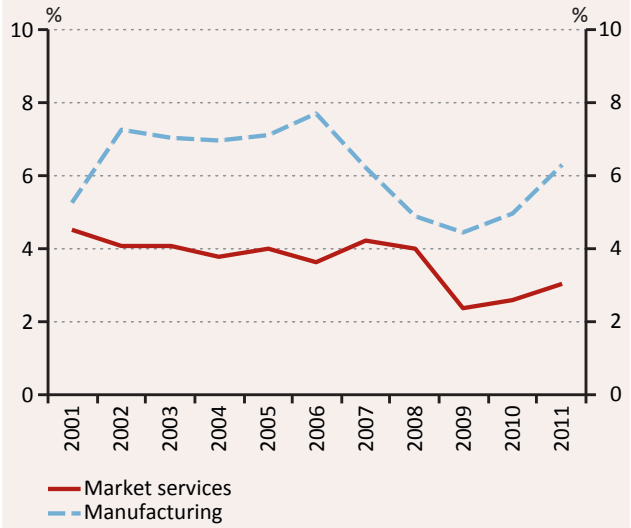
[2] The official definition of the SME sector also sets limits on sales revenue and balance sheet total, which we ignored for the sake of simplicity. The European Commission follows a similar methodology in its analyses on SMEs (e.g. European Commission, 2013b).

Chart 5
Profitability of firms with less than 250 employees (SMEs) and firms with more than 250 employees



Source: MNB.

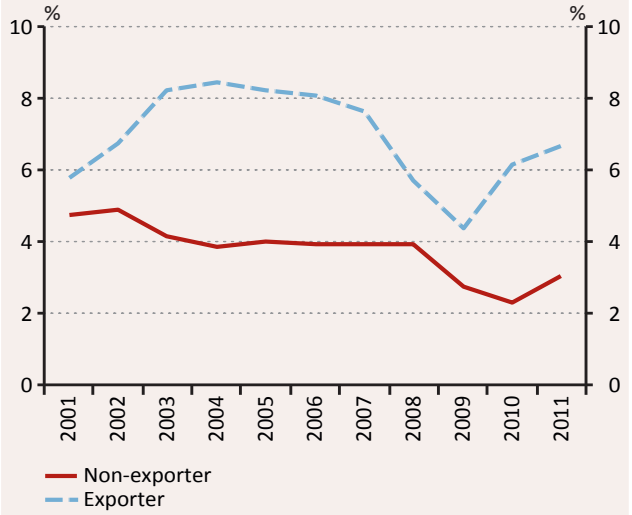
Chart 6
Profitability in the manufacturing and market services sector



Source: MNB.

It is also worthwhile to analyse profitability for export-oriented and non export-oriented firms, as external demand trends were far more positive after the initial shock of the crisis than domestic demand (Chart 7). Unsurprisingly, this breakdown yields similar results as a breakdown along the lines of manufacturing versus market services, as export-oriented firms are usually manufacturing firms.[3]

Chart 7
Profitability of exporting and non-exporting firms
(classified based on export share of at least 50 per cent)



Source: MNB.

Analysing the heterogeneity of profitability among firms, we can conclude that profitability improved significantly for mainly export-oriented manufacturing firms following the low point of the crisis, while service sector and non-exporting firms failed to regain profitability. The breakdown by size category yields a far smaller difference: large enterprise profitability only just outperformed smaller firms' at the end of the period.

DEVELOPMENTS IN FACTORS SHAPING PROFITABILITY AND AN ANALYSIS OF LABOUR MARKET ADJUSTMENT

In this section, we not only look at profitability, but also the other factors shaping it for the various categories of firms. For one, we look at cost factors, including labour market variables: real wages (or more specifically, the real labour cost per capita), employment and the total real labour cost obtained as the product of these two items. On the revenue side, we look at (real) value added, which may partially reflect trends in demand and partially changes in productivity, if examined in conjunction with changes in employment.[4] As ROA expresses profit in proportion to the balance sheet total, we also examine

[3] We defined exporting firms as companies with at least half of their sales revenue derived from export operations. Results are insensitive to this threshold, which stems from the fact that export share follows a U-shaped distribution, i.e. the lion's share of sales revenue of firms exporting in any quantity is derived from exports.

[4] If we look at sales revenue instead of value added, changes in intermediate consumption would also have to be taken into account. We ignored this factor for the sake of simplicity.

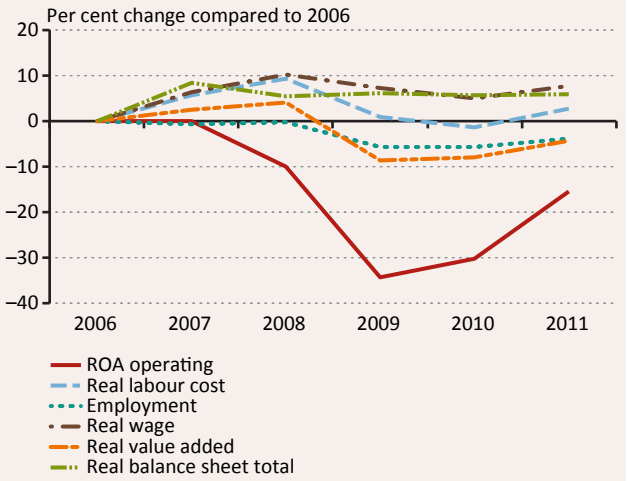
changes in the balance sheet total as a determining factor of profitability.[5] It should be noted that any potential price adjustment is reflected in real wages and real labour costs. Our analysis characterises each corporate segment using employment, real labour cost, value added and balance sheet total variables defined as a simple average of each company, and the real wage variable using an employment weighted average.[6] As the variables under review feature different units of measure and orders of magnitude, the charts show the percentage change compared to 2006.

We first examined the entire private sector, which showed improvement in profitability following a sharp deterioration in 2008 and 2009, but has since failed to return to the pre-recession levels of 2007 (Chart 8). Real labour costs were curbed following the shock in 2008, mainly in the form of job cuts, while real wages started rising again from 2011. Nonetheless, the upward trend in real wages in the years leading up to the crisis was clearly broken. Labour market adjustment, however, was only enough to halt the further deterioration in profitability, as the slight improvement was primarily driven by minor growth in value added and lower depreciation (not included on the chart).

Companies with at least five employees should be examined separately within the private sector, as data on firms smaller than these are quite noisy (Chart 9). In this segment, the initial sharp deterioration was followed by a significant improvement in profitability, which already exceeded the 2008 level by 2011. Value added had returned to its 2008 levels by 2011; in parallel, real labour costs had resumed a rising trajectory by 2011 after shrinking in 2009–2010, only just slightly lagging from the 2008 level. The improvement in profitability in this segment was therefore driven by rising value added, instead of the reduction in labour costs.

In examining the heterogeneity of profitability trends, we found that manufacturing and export-oriented firms saw a pronounced rise in their profitability, while by 2011 large enterprises also saw slight improvements in their profitability, which surpasses that of SMEs. We will therefore now investigate developments in the determinants of profitability for firms sharing these three attributes — large, export-oriented manufacturing firms (Chart 10). The evidence shows that profitability has essentially returned to its pre-2007 level in this corporate segment, in parallel with a sharp rise in value added, which had already

Chart 8
Private sector profitability and its main determining factors
(percentage change compared to 2006)



Source: MNB.

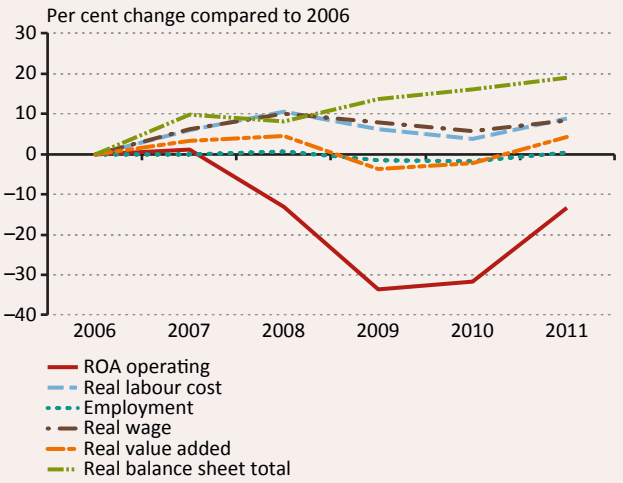
surpassed 2007–2008 levels by 2011. Meanwhile, real labour costs and its determinants (employment, wage) had returned to the 2008 level by 2011. This illustrates that the decline in labour costs was only temporary and the gains in profitability are linked to rising value added, as profitability improved even as real wages and employment increased.

Non-exporting market service SMEs showed the smallest improvement in profitability. It is worth taking a look at firms' labour market adjustment in this corporate segment (Chart 11): real labour costs have remained below the 2008 level, in particular due to falling real wages. Improving profitability in this segment in 2010–2011 therefore partly stems from the slight increase in value added and partly from falling labour costs, alongside steeply declining depreciation (not represented on the chart).

The above findings suggest that it was not possible to achieve a marked improvement in profitability following the crisis merely by scaling back labour costs; it also required increasing value added. As the latter was generally achieved in the export sector which is sensitive to improvements in the external demand environment, we can assume that demand was a driver of increases in value added. Improving profitability generally went hand-in-hand with rising labour cost.

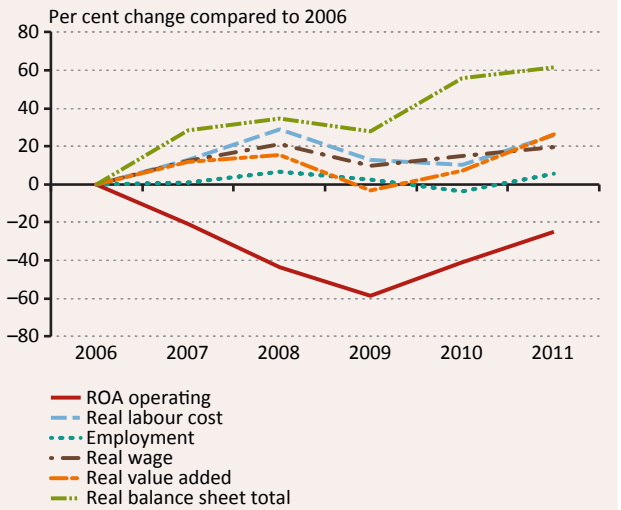
[5] We deflated the labour cost by producer prices and balance sheet total by value added deflator.
[6] The reasoning behind the average calculation method is similar to the reasoning behind the ROA metric: the variables are extensive in nature, with the exception of real wages, meaning that they can be added up among firms. In contrast, real wage is an intensive variable, that is the weighted average calculation satisfies the criterion of additivity.

Chart 9
Profitability of firms with at least five employees and its determinants
(percentage change compared to 2006)



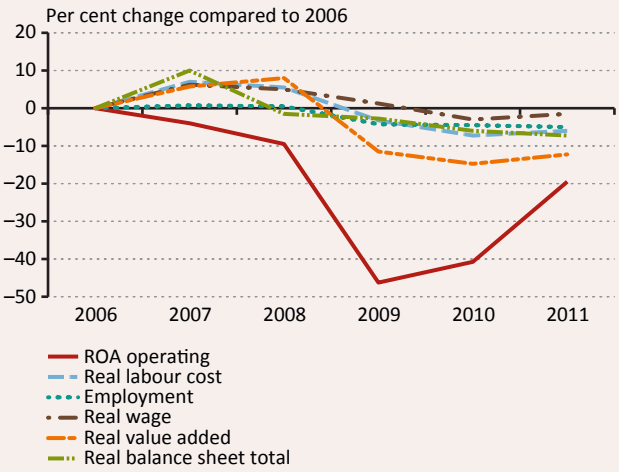
Source: MNB.

Chart 10
Profitability of export-oriented manufacturing firms with at least 250 employees and its determinants
(percentage change compared to 2006)



Source: MNB.

Chart 11
Profitability of non-exporting service firms with less than 250 employees (SMEs) and its determinants
(percentage change compared to 2006)



Source: MNB.

ECONOMETRIC ANALYSIS OF THE RELATIONSHIP BETWEEN PROFITABILITY AND LABOUR MARKET ADJUSTMENT

The previous section examined the relationship between profitability and labour market adjustment by firms using illustrative examples and based on the co-movement of time series, but a causal relationship was only assumed. In this section, using econometric tools we analyse whether changes in firms' profitability cause any changes in wages or employment. The crisis saw a rise in the number of loss-making firms, and we can assume that these firms had to adapt more strongly than profitable ones.[7] We therefore examine separately whether loss-making firms adjusted differently (to a greater degree). It should be noted that there was an exceptionally high proportion of loss-making firms among non-exporting firms even before the crisis hit, and this situation was subsequently exacerbated by the recession.

We would like to preface that our findings reflect estimated average effects drawing on data for the period 1995-2011 and therefore do not capture the degree of adjustment during times of crisis for the same profitability shocks.

For examining labour market adjustment, we used an equation very similar to the one used in the study of Blanchflower et al. (1996).[8] The equation we estimated:

$$y_{it} = a_i + \delta_t + \gamma y_{it-1} + \beta_1 roa_{it-1} + \beta_2 loss_{it-1} + u_{it},$$

where i is the firm, t the year, a_i the firm fixed effect, δ_t the time fixed effect (time dummies), roa_{it-1} the ROA of company i in year $t-1$, and $loss_{it-1}$ is 1 if company i was in the red in the

[7] Some studies simply qualify trends in profit position in the crisis with loss (e.g. Crawford et al., 2013).
[8] The cited study focuses on how revenues in excess of cost are shared between the company and the employee, thus examining whether higher profits-per-employee would actually lead to higher wages.

year *t-1,* or 0 otherwise. We performed an estimate of three different versions of the equation: (1) y_{it} is the logarithm of real labour costs, (2) y_{it} is the logarithm of real wage, (3) y_{it} is the logarithm of employment for firm *i* in the year *t.*

The inclusion of the firm fixed effect controls for factors specific to the company that are constant in time, and thus their effect is not mistaken for the effect of profitability in the estimation. For instance, certain sectors may be more profitable and boast higher wages because they employ more qualified labour. Without controlling for such factors, we would find that higher profit generates higher wages solely based on this correlation. Sector-based classification, however, is a fixed effect and we therefore control for it. We control for aggregate effects specific to individual years by including time fixed effects.

We resolve the issue of simultaneity — i.e. that it is not only profitability that affects labour market variables, but also vice versa — by lagging ROA and the dummy variable expressing loss. The drawback of this approach is that we cannot give an estimate of the simultaneous effect of profitability. During normal periods, reactions to shocks are expected to materialise with a smaller lag, while during the recession, adjustment to larger shocks materialise only with longer lag. The estimates, however, reflect an average reaction, and therefore it is probable that our findings will be a lower bound of adjustment during the crisis.

The lagged dependent variable (y_{it-1}) must be included in the equation, because labour market variables are highly persistent, as they are incapable of reacting to shocks immediately due to various frictions.

Interpretation of the coefficient β_1 based on the equation: real wages/real labour costs/employment are β_1 per cent higher in the following year if ROA is 1 percentage point (0.01) higher for one firm compared to another. Here, we compare the two firms in the same year; their time-invariant attributes are the same, and real wages/real labour costs/employment in the year at issue are also the same, and both firms are either profitable or loss-making. Interpreting β_2 is more complicated, as given the same ROA figure, one company cannot be in the red and the other one profitable. The interpretation therefore is that the difference in real wages/real labour costs/employment in the following year is 100 β_2 per cent higher between the loss-making and the profitable company compared to what the difference in profitability alone would warrant. This coefficient therefore captures the non-linear effect of profitability, i.e. deterioration in profitability triggers a stronger degree of adjustment if it puts a firm in the red.

We estimated the coefficients of the equation using the so-called fixed-effect method, meaning we eliminated the effect for companies that is constant over time (a_i) by using only the deviation of variables from the time average. It is well known that including a lagged dependent variable causes bias, but its size decreases as the time dimension increases. We assume that the available sample (1995–2011) is long enough not to cause any significant bias. Estimation results are presented in Table 3 included in the Appendix.[9]

To assess the robustness of our results, we also estimated the equation using a version of the Anderson and Hsiao (1982) method, where we used the first difference of the equation's variables and instrumented the lagged dependent variable with two lagged level variables (y_{it-2}, y_{it-3}) (Table 4). Our findings corresponded with the fixed-effect estimate qualitatively (sign, magnitude and significance of coefficients). In the following, we interpret coefficients obtained using the fixed-effect estimate (see Table 3).

Based on our findings, an increase in profitability triggers higher real labour costs, stemming in part from higher real wages and in part from higher employment. Going into the red would warrant a stronger reaction in both employment and real wages, and thus in real labour costs than a fall in profitability alone would warrant. While mere changes in profitability affects employment and real wage adjustment similarly, going into the red triggers a more pronounced labour-side adjustment, i.e. a sharper cut in the number of employees or per capita hours worked.

However, the adjustment suggested by estimates is in fact lower than what emerges at the aggregate level. Private sector profitability fell by roughly 2 per cent and the proportion of loss-making firms rose by 6 per cent in 2008–2009. Based on the regressions used, this entails an approximately 1-1.5 per cent fall in real labour costs. In reality, labour cost in the private sector fell to a much greater extent in the 2009–2010 period. This is presumably explained by the fact that for one, the estimate only shows the lagged effect of profitability, and also the above specified simple equation does not capture the heterogeneity of reactions of different firms to the crisis. Furthermore, the degree and lag in labour market adjustment to substantial shocks may have also changed during the crisis, and therefore the above regression analysis only yields an average result — over time and among

[9] We also estimated the equation using ROA obtained using earnings after taxes and obtained highly similar results.

firms — regarding the link between profitability and labour market adjustment.

CONCLUSION

This paper sheds new light on the relationship between developments in profitability and labour market adjustment. The former can be analysed drawing on macro or micro data and characterised using various indicators. Our findings show that the choice of indicator is important. The usual profit margin indicator calculated using macro statistics paints a similar picture of firms' profitability as the same indicator determined using micro data, which suggests that profitability had returned to pre-crisis levels by 2011. At the same time, we believe that the ROA metric derived from firm-level micro data provides a better indication of actual developments in profitability, which calls for adjustment from firms. This indicates that further improvement is needed in the private sector in the period following 2011 to regain 2007 levels. Trends in profitability show a large degree of heterogeneity; for instance, the profitability of large export-oriented manufacturing firms has improved significantly compared to the low point in the crisis, driven by rising value added and only temporarily coupled with falling labour costs. Profitability improved to a slighter degree among non-exporting market service SMEs, which have retained lower labour costs compared to the pre-crisis period, while their value added only grew slightly. This means that the rise in value added plays a pivotal role in profitability improvements. Companies adapted to lower demand with labour cost adjustment, but this trend only more or less followed changes in profitability. Formal econometric analyses confirmed that firms react to changes in profitability by adjusting employment and wages, which are the determinants of labour costs, and loss-making firms do so in a more pronounced manner.

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APPENDICES: CHARTS AND TABLES

Table 1
Distribution of firms by employment and sector
(percentage ratio within employment categories)

Sector	Employment					Total
	<10	<50	<250	≥250	Missing	
Manufacturing	12.1	25.4	39.1	52.8	7.7	14.6
Market services	72.7	53.7	36.8	31.2	77.9	69.3
Other	15.2	21.0	24.1	16.0	14.4	16.2
Total	100	100	100	100	100	100

Source: MNB.

Table 2
Distribution of firms by employment and export status
(percentage ratio within employment categories)

Export status	Employment					Total
	<10	<50	<250	≥250	Missing	
Non-exporter	97.0	93.6	81.9	69.4	98.5	96.1
Exporter	3.0	6.4	18.1	30.6	1.5	3.9
Total	100	100	100	100	100	100

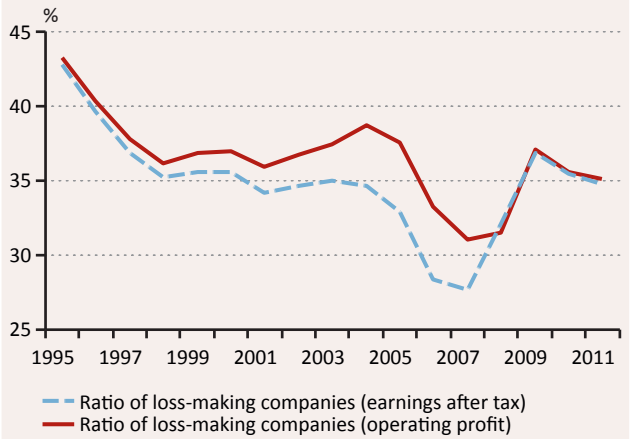
Source: MNB.

Table 3
Impact of profitability on labour market adjustment

	y_t = log(real labour cost)		y_t = log(employment)		y_t = log(real wage)	
y_{t-1}	0.498	0.496	0.577	0.575	0.336	0.336
	(0.0007)	(0.0007)	(0.0006)	(0.0006)	(0.0007)	(0.0007)
ROA_{t-1}	0.288	0.213	0.150	0.095	0.138	0.111
	(0.0027)	(0.0034)	(0.0016)	(0.0020)	(0.0022)	(0.0028)
loss-making$_{t-1}$	–	–0.066	–	–0.048	–	–0.024
		(0.0018)		(0.0011)		(0.0015)
Number of observations	1,689,255	1,689,255	1,686,384	1,686,384	1,656,651	1,656,651
within R^2	0.31	0.31	0.38	0.38	0.17	0.17

Note: Fixed-effect estimation of the dynamic panel model, sample period 1995–2011, standard errors in parentheses, all coefficients being significant at a level of 1 per cent, year dummies included in all cases in the regression.

Chart 12
Proportion of loss-making firms in the private sector
(based on operating profit and earnings after taxes)



Source: MNB.

Table 4
Robustness analysis

	y_t = log(real labour cost)		y_t = log(employment)		y_t = log(real wage)	
y_{t-1}	0.513	0.512	0.814	0.813	0.382	0.382
	(0.0072)	(0.0072)	(0.0082)	(0.0082)	(0.0034)	(0.0034)
ROA_{t-1}	0.208	0.175	0.103	0.088	0.103	0.089
	(0.0029)	(0.0035)	(0.0021)	(0.0025)	(0.0025)	(0.0030)
loss-making$_{t-1}$	–	–0.029	–	–0.014	–	–0.013
		(0.0017)		(0.0013)		(0.0015)
Number of observations	1,103,004	1,103,004	1,107,164	1,107,164	1,087,754	1,087,754

Note: Dynamic panel model estimation taking first differences, instrumenting the lagged dependent variable using two lagged level variables, sample period 1995–2011, standard errors in parentheses, all coefficients being significant at a level of 1 per cent, year dummies included in all cases in the regression.

Katalin Bodnár: Part-time employment during the crisis

Before the recent economic crisis, part-time employment was very low in Hungary. During the crisis, however, the most rapid increase in the number of part-time employees within the European Union was observed in Hungary. Part-time employment increased in a number of European Union countries for cyclical reasons: companies hoarded labour – usually with government assistance – by reducing the number of per capita hours worked instead of laying off workers. At the same time, part-time labour supply also increased during the economic downturn. Such cyclical impacts were also observed in Hungary. This article examines whether the changes in the number of part-time employees were really driven solely by cyclical reasons. What should follow from this assumption is that the per capita number of hours worked would increase in the course of economic recovery, while part-time employment would fall back to the earlier prevailing low levels and the total number of employees would not increase significantly. This assumption, however, is not supported by the available data. The increase in the number of part-time employees – particularly in the market services segment – seems to be more of a trend that may keep the number of part-time jobs higher during economic recovery than before the crisis.

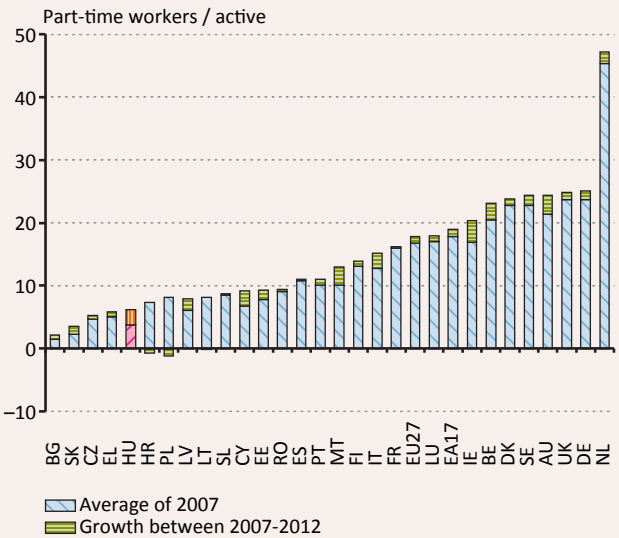
INTRODUCTION

Both the number and the ratio of part-time employees were very low in Hungary before the onset of the economic crisis. This – together with the rarity of other atypical forms of employment – had a negative impact on labour market flexibility as well as on activity and employment rates. Part-time employment increased substantially, from 4.9 per cent to over 7 per cent during the crisis (Chart 1). The current level is still rather low by EU standards, but the growth in the number of part-time employees during the crisis (according to Eurostat data, the average number of part-time employees in 2012 was 67 per cent higher than in 2007) was among the highest in the EU.

The number of employees in the private sector dropped significantly at the beginning of the crisis and bottomed out in 2009 Q3. The rise in employment since the trough of the crisis is primarily the result of growth in the number of part-time jobs, which offset about one-third of the full-time jobs lost. Part-time employment, however, had already started to expand in late 2006 before the onset of the crisis, mainly in market services, while the number of people holding part-time jobs slightly moderated in 2013.

A more marked adjustment was observed in terms of total hours worked than in the number of employees (Chart 2).

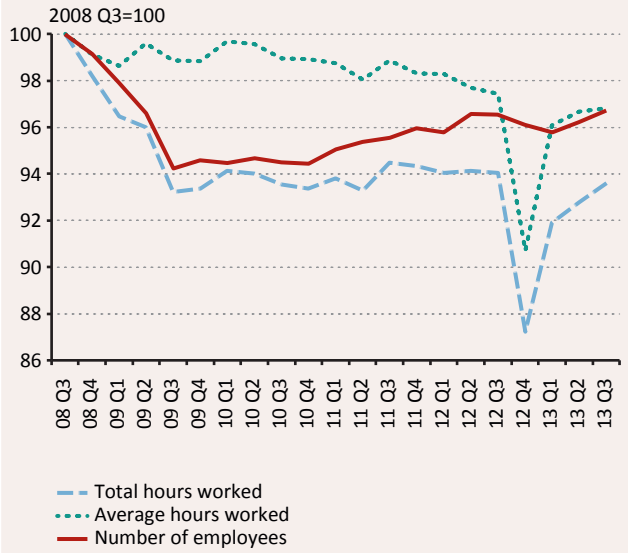
Chart 1
Ratio of part-time employees among the economically active population in EU countries



Source: Eurostat.

The total number of hours worked has not increased since the bottom of the crisis, despite a slow rise in the number of employees. Average per capita hours worked have fallen as a combined result of these two impacts. This is explained, for the most part, by changes in the composition of employment

Chart 2
Changes in employment and the number of hours worked in the Hungarian private sector



Note: The dip observed in 2012 Q4 is the result of end-of-year production stoppages in factories.
Source: Labour force survey.

during the crisis, i.e. the replacement of full-time jobs by part-time jobs. At the same time, the number of hours worked by full-time employees has also been diminishing slowly and since 2011 even part-time workers have been, on average, working an ever lower number of hours.

On the whole, much of the Hungarian labour market adjustment during the crisis took place through changes in the number of hours worked per employee (in other words, adjustment occurred in the intensive margin). One form of this adjustment process was an increase in part-time employment, entailing a direct impact on the number of employees and the rate of unutilised capacities on the labour market, and thereby indirectly affecting the tightness of the labour market. This article presents an analysis of the possible causes of and the expected changes in part-time employment.

Using descriptive statistics, this article analyses the null hypothesis, according to which the increase in part-time employment was brought about exclusively by cyclical reasons. The rise in part-time employment enabled a faster increase in employment and a larger fall in the unemployment rate than would have been justified by current economic growth, in other words, the labour market is somewhat tighter than it would have been without adjustment through part-time employment. If this change is exclusively cyclical, then in the course of economic recovery it is the number of hours worked that should first begin to adjust (primarily through employers employing part-time staff on a full-time basis, but possibly also through an increase in overtime work). In this case, there would be only a modest growth in employment, while the labour market would continue to be slack. If, however, this null hypothesis is incorrect and part-time employment is, at least to a certain extent, a result of trend-like processes, the proportion of part-time employees should remain higher than before the crisis even during recovery, while new full-time jobs would be also created. Accordingly, employment could expand faster and the labour market might be tighter.

The first part of this article presents a brief summary of the possible causes of part-time employment – based on the literature – and then describes domestic trends in the light of international developments. This is followed by a discussion of the characteristics and causes of part-time employment on the basis of two micro databases. The last section sums up the conclusions.

DRIVERS OF PART-TIME EMPLOYMENT – THEORETICAL OVERVIEW

Microeconomic fundamentals

Individuals decide how to split their time between work and leisure in view of the prevailing wages. They decide whether to work (extensive margin), and if so, how much and how intensively (intensive margin). An increase in wages will increase labour supply (income effect), but will also lead to an increase in demand for leisure time (substitution effect). In the case of a change in the level of wages, labour supply is determined by the net result of the income effect and the substitution effect. A continued wage increase above a given level may even reduce labour supply, which is reflected by what is called a backward bending supply curve of labour. Accordingly, the choice between full-time and part-time employment depends – from the aspect of labour supply – on how valuable the individual's leisure time is (e.g. the leisure time of a mother with young children may be more valuable due to family commitments) and on the level of net wages. Adjustment at the intensive margin, however, takes on a variety of other forms as well, including for instance changes in the amount of overtime or in the intensity of work.

On the labour demand side, the question of whether full-time or part-time employees are preferred is determined by companies' profit maximising behaviour. The cost of employment comprises fixed costs (e.g. the cost of the building use, training costs, payroll accounting and human resource administration costs) and variable costs (primarily wages and fringe benefits). A part-time employee has less time to 'compensate' the employer for its fixed costs, consequently,

it is worthwhile for a company to employ people on a part-time basis if their total wage is lower than that of a full timer or this form of employment offers advantages such as improved efficiency or other benefits. Circumstances where part-time employment is warranted:

– the hourly wage is lower on part-time work than on full-time work;

– the fringe benefits provided for part-time employees are lower than those of full-time staff;

– the per-hour performance of part-time employees is higher than that of full-time staff;

– demand fluctuates by season or cycle and part-time employment makes it easier for the employer to adjust to changes (dynamic flexibility);

– demand fluctuates within a day or a week and part-time employment makes it easier for the employer to adjust to changes (organisational flexibility).

Macroeconomic factors underlying part-time employment

Based on the above, the factors explaining the differences in the level and dynamics of part-time employment between countries may be derived.

Economic cycle is the first such factor. Full-time employment is predominantly procyclical (in other words, it increases during economic upswings and diminishes during downturns), while part-time employment is countercyclical (that is, it increases during downturns and diminishes during a recovery). Owing to the decrease in full-time jobs, the proportion of part-time employees relative to full-time employees will appear to be even more markedly countercyclical. An increase in part-time employment during an economic downturn can be explained by a variety of factors. On *the demand side,* companies find it worthwhile to hoard labour during times of recession because when the economy picks up, they can thus reduce the costs of recruitment and training and also prevent the erosion of employee skills and expertise while away from work. This type of adjustment may be more prevalent among market service companies than in the manufacturing sector, particularly when both are affected at the same time (composition effect).[1] Moreover, governments may also support part-time employment as a solution for unemployment. On the other hand, part-time *labour supply* may also grow during times of recession: job seekers are more likely to accept part-time positions during times of high unemployment and second potential earners of families, who have a higher likelihood of working part-time, become more active during such periods. This may be offset if groups (namely, discouraged workers) that have also tended to primarily apply for part-time jobs are discouraged from active job seeking by the high unemployment rate.

Factors independent of economic cycles may also contribute to the increase in the number of part-time workers. These factors can be broken down into several groups: the first one is made up of labour market regulations and institutions that affect *demand* for part-time labour. Such regulations includes, for example, the laws on work during weekends and night hours or those governing the wages of full-time and part-time employees (e.g. rules prescribing that part-time workers must be paid exactly the same hourly wages and benefits as full-time employees in the same positions). Institutional factors are, for example, the power of trade unions, and the way they relate to part-time employment. Part-time employment of low-earners may also increase in the wake of substantial minimum wage increases, since this is one way for companies to compensate for higher costs of a low-productivity workforce. The second group is comprised of factors affecting *labour supply.* Increased labour activity among women as well as higher fertility rates usually result in increased part-time labour supply as women, particularly mothers, are more likely to seek part-time work. Labour supply is also affected by the laws on social subsidies paid for those with dependent children: if working is allowed while receiving such benefits, part-time labour supply will expand. An increase in schooling within the 15-24 year age group may also entail an increase in part-time labour supply since students are likely to take up part-time jobs to acquire experience or fund their studies. It is difficult to determine, however, whether such factors are causes or consequences of increased part-time employment. Changes to the tax system may also affect labour supply: cutting taxes on labour for higher wage categories may lead to increased labour supply, particularly at the intensive margin.

[1] There are several reasons for part-time employment being more frequent in market services. On the one hand, this is where opening hours have been growing longer, at the same time decoupled from production time. Shops and customer service units increasingly need to be open outside the normal working hours so that they can serve their customers. Part-time workers can help improve the efficiency of service provision during the busiest periods. This may be linked to the part-time employment expansion trend in market services. At the same time, this factor may result in part-time employment playing a more significant role of adjustment during cyclical downturns in market services than in manufacturing.

Table 1
Macroeconomic factors affecting part-time employment

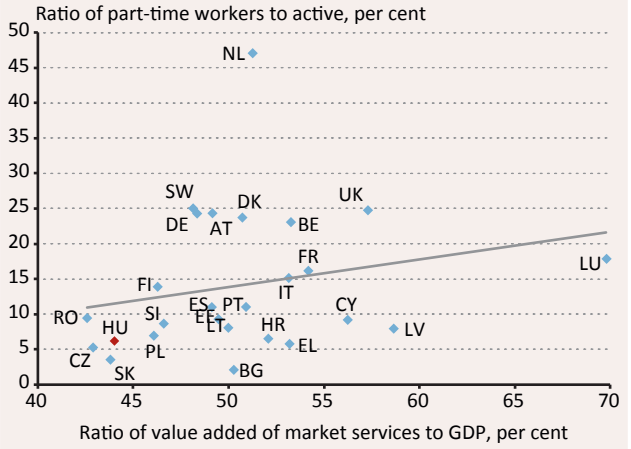
	Drivers of labour demand	Drivers of labour supply
Cyclical drivers	Labour hoarding (-) Composition effect, i.e. relative impact of the crisis on different sectors (?) State subsidies (-)	Level of unemployment (-) Second and third earners entering the labour market (-) Discouraged workers (+)
Non-cyclical drivers	Labour market regulation and institutions Minimum wage increases	Economic activity Fertility rate Family benefits Unemployment benefits Tax system

Note: The nature of the relationship is indicated between brackets after the cyclical causes: '+' indicates that when GDP grows (decreases) the given factor increases (reduces) part-time employment (procyclical), while '-' indicates the contrary (countercyclical).

INTERNATIONAL COMPARISON

Central and Eastern European countries typically have low levels of part-time employment (accounting for 2-10 per cent of the active population based on 2012 data). Significant differences can be identified among the old European Union member states: part-time employment is less prevalent in peripheral countries, particularly in Greece, while it is more common than the EU average in Austria, Belgium, Denmark, the United Kingdom, Ireland, Germany, Luxembourg, Sweden and particularly in the Netherlands. A similar pattern exists for the share of value added by service sectors within GDP: in the majority of the Central and Eastern European countries it is usually below 50 per cent, whereas it is higher in the older member states (Chart 3). The smaller GDP shares of market service sectors and the lower levels of part-time employment in new member states likely stem from the same factors. According to Buddelmeyer et al. (2004), the differences in the level of part-time employment among the old European Union member states are explained in large part by the relative weight of service sectors, labour market regulations, particularly the rules on part-time employment and on employment under indefinite-term contracts, as well as fertility rates and the ratio of enrollment in higher education. Moreover, the proportion of part-time employees was also higher in countries where regulations allow lower hourly wage rates for part-time employees compared to their full-time peers.

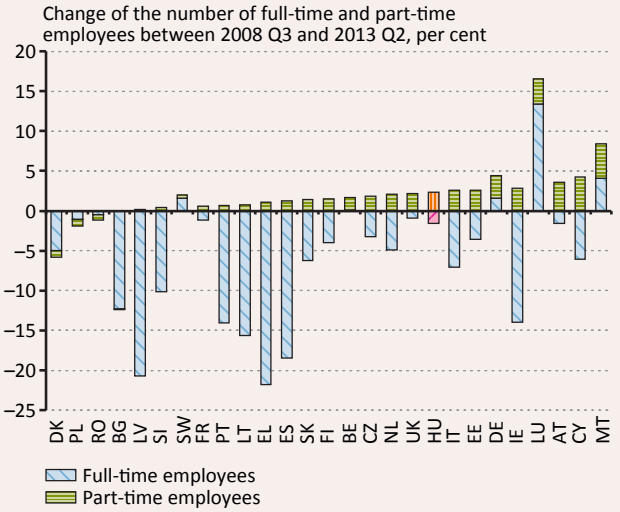
Chart 3
Part-time employment and the percentage of market services contribution to GDP in EU countries
(2012)



Note: The straight line illustrates a positive correlation between the points on the above chart, which remains true even if the two outliers (the Netherlands and Luxembourg) are not taken into account.
Source: Eurostat.

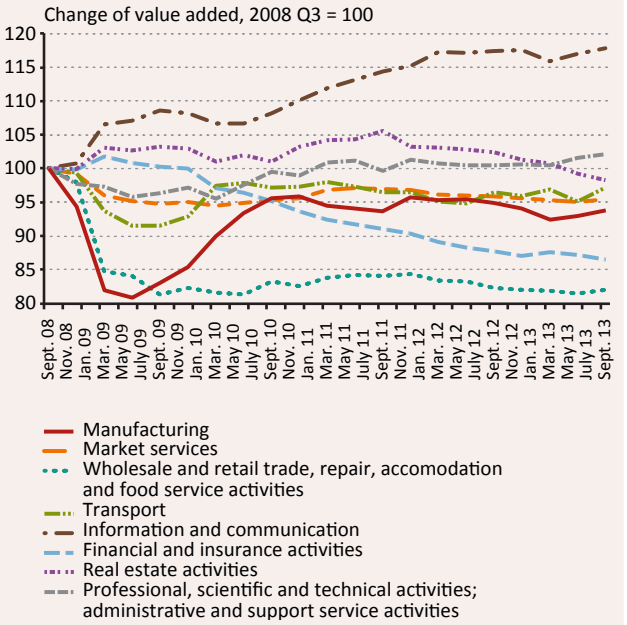
Part-time employment has been on the rise across the European Union ever since the onset of the crisis: on average, nearly half of the full-time jobs lost have been replaced by part-time ones. Accordingly, the level and proportion of part-time employment have followed a countercyclical trend in Europe as a whole, despite the pronounced differences between individual countries (Chart 4). On the labour supply side, labour market entry of second earners in families drove the expansion of part-time employment (*added worker effect*) (European Commission, 2012). As for labour demand, the above trend was driven, besides a high level of uncertainty, by short-time working schemes that are operated as part of the unemployment insurance systems, mainly in old member states. These schemes support working shorter hours instead of lay-offs (European Commission, 2010b). In the new member states where no such programmes were in place before the crisis, state-funded programmes supporting part-time employment were introduced after 2008. These programmes contributed to curbing the rise in unemployment during the downturn. However, they carry their own particular risks: they impede restructuring, may result in efficiency losses and may hinder entry of certain groups to the labour market (cyclical shifts towards part-time employment entail decreases in new hiring so groups intending to enter the labour market

Chart 4
Changes in full-time and part-time employees as a percentage of total workforce in 2013 Q2 compared to 2008 Q3, national economy



Source: Eurostat, Labour Force Survey.

Chart 5
Changes in value added in the main sectors



Source: HCSO.

with little or no working experience may be crowded out of employment). It is worth noting that in Hungary the number of employees was the first to respond to the decrease in GDP (extensive margin) (European Commission, 2010a), and it was only somewhat later that intensive side adjustment followed suit. In the countries where arrangements supporting part-time work were in place before the onset of the crisis, the number of hours worked was the first factor to start decreasing as the crisis unfolded. There are very few countries where part-time employment has dipped below pre-crisis levels, which may be an indication of the fact that this form of intensive side adjustment has been important across the EU as a whole.

A REVIEW OF HUNGARIAN MICRO-DATA

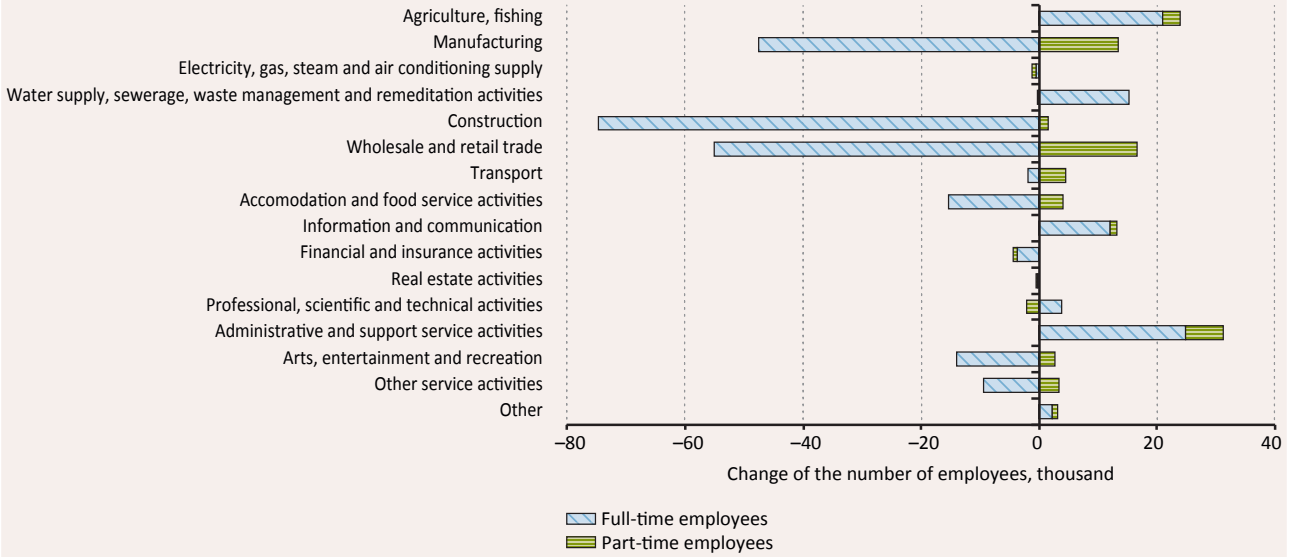
Nearly all of the factors affecting part-time employment have changed in Hungary since 2008, and therefore the increase in the number of part-time employees is likely to have been a result of a combination of factors. GDP has been decreasing, economic activity and unemployment have increased, a number of regulations concerning the labour market and the tax system have been changed, unemployment benefits have been transformed and the minimum wage was significantly increased in 2012. Detailed micro-data on the structure of part-time employment make it much easier to isolate the effects of the various relevant factors. Two databases are used in this article: the labour force survey and the wage-tariff survey (for a brief description of each, see the Appendix).

In the course of this analysis, it is worth looking at the various sectors individually. The slump in the manufacturing sector was deeper, but more temporary in nature: value added bottomed out in 2009 Q2 and then stabilised, although somewhat below pre-crisis levels. Value added in market services, particularly trade, accommodation and catering, has consistently and substantially lagged behind the pre-crisis level (Chart 5).

The sectoral structure of part-time employment is strongly linked to developments in value added. In most countries – including Hungary – the majority of part-time employees work in market service sectors, and these sectors have seen the most pronounced rise in their numbers. Within service sectors, the full-time jobs lost during the crisis were replaced by part-time jobs predominantly in trade, accommodation and catering and the transport and warehousing sectors (Chart 6).

Cyclical labour hoarding may have resulted in an increase in part-time employment primarily in the manufacturing sector, but this effect has partially subsided by now. Full-time employment decreased, while part-time employment expanded in manufacturing in both 2009 and 2012. During these two years, part-time employment is assumed to have increased in the manufacturing segments as a consequence of cyclical labour hoarding. Meanwhile, market services may have been affected more by trend-like factors, while cyclical impacts might also be involved. Part-time employment expanded in these sectors predominantly among new hires (which may be more of a reflection of trend-like processes), although the conversion of non-new hires from full-time to part-time

Chart 6
Changes in employment by sector between 2008 Q3 and 2013 Q3
(based on seasonally adjusted data)



Source: Labour force survey.

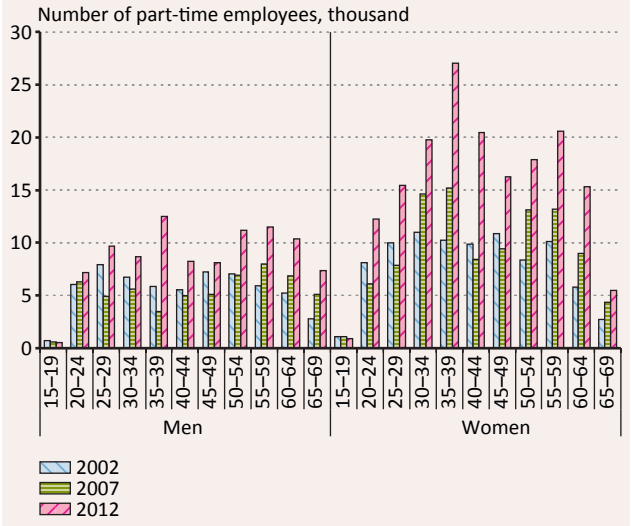
workers was also considerable (which may be a sign of labour hoarding). Part-time employment in market services fell in 2013, primarily among people who do not qualify as 'new hires', i.e. an increase in the number of per-capita working hours may have started.[2]

In Hungary – just as in other countries – the proportion of women is higher among part-time employees, but during the crisis part-time employment among men increased as well. In 2009 and in early 2010, during the first wave of the crisis, part-time employment began to increase both among men and women, followed by another significant increase from 2012, this time, however, almost exclusively among women. No significant increase in activity or part-time employment was observed, however, among women with small children or among families' second earners. The overall activity rate among women aged 25-40 remained practically unchanged during the crisis, but increased in the 40-65 year age group. The rise in the number of part-time employees is, however, relatively evenly distributed across the various age groups, apart from certain outstanding growth rates in some age groups (Chart 7). A review in the labour force survey of the number of children raised in families of part-time employees shows that the increase was accounted for mainly by a higher number of part-time employees without children. Therefore, this does not confirm the assumption that the increase in part-time employment was linked to an increase in activity, particularly among women. The majority of part-time employees are holders of secondary qualifications (with vocational qualification or with a high school leaving certificate and vocational qualification), and part-time employment increased for this group most markedly during the crisis.

According to the labour force survey, the increase in part-time employment was primarily driven by factors linked to demand for labour. In the labour force survey, respondents are asked about their reasons for working part-time and whether they would like to work longer hours. Job seekers, on the other hand, are asked about the type of work they are looking for (only full-time, preferably full-time, only part-time, preferably part-time or any kind). The answers revealed that, on the whole, part-time employment seems to be driven

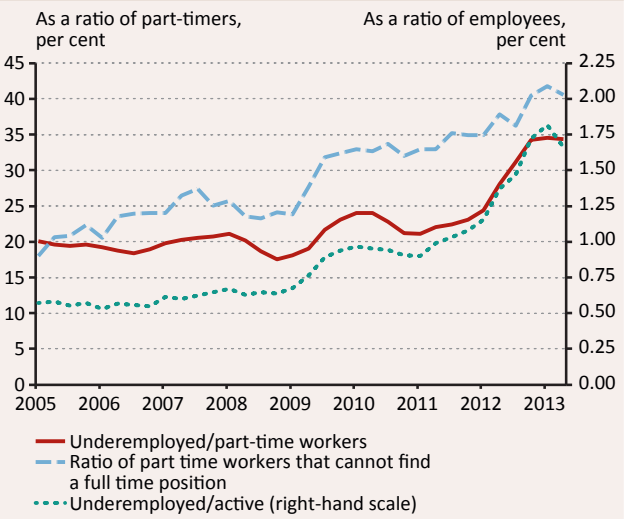
[2] Both the labour survey and the wage-tariff survey contain information on tenure. The wage-tariff survey is filled out by companies in May every year. People hired during the preceding year qualify as 'new hires' in the survey. Respondents in the labour force survey specify the year and month in which they started to work at the given workplace. This information is probably less accurate than those contained in the wage-tariff database. The two sets of data reflect different pictures. According to wage-tariff data, in manufacturing part-time employment increased among employees who do not qualify as new hires and in 2010 it decreased towards the earlier level, while among new hires a slow, gradual increase was observed. In the market services segment part-time employment increased predominantly among new hires. The labour force survey shows similar results for market services, however, its data on the manufacturing sector differ from the above: part-time employment has been growing since the outset of the crisis among both old and new employees.

Chart 7
Numbers of part-time employees by age group



Source: Labour force survey.

Chart 8
Underemployed part-timers and part-timers who can find no full-time job



Note: The questionnaire included the following question: 'Why do you usually work part-time in your main job/business?' Respondents had a choice between the following replies: school education/further training; own illness; takes care for own child(ren) or other children up to 14 without pay; takes care for other person (relative) who needs care; because of other family responsibilities; full-time work is not available; person does not want full-time work; other. This chart shows the ratio of respondents who replied 'I find no full-time job' compared to the total number of part-time employees. People regarded as 'underemployed' are defined on the basis of the following question: 'Would you like to work longer hours than you currently do?,' categorising respondents answering 'yes' as underemployed part-timers.[3]
Source: Labour force survey.

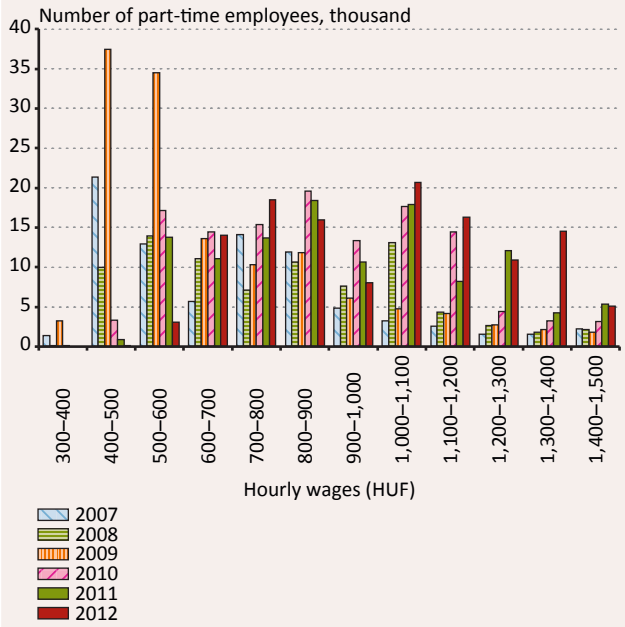
predominantly by reasons relating to demand for labour. Nearly all job seekers are looking for full-time positions and very few people actually want to work only or preferably part-time. About one third of all part-timers would like to work longer hours and about 40 per cent work part-time just because they cannot find full-time jobs (Chart 8). Much of the increase in part-time employment since the beginning of the crisis – particularly since 2012 – is linked to such non-voluntary part-time positions. In other words, from the list of factors listed above, demand-side factors dominate in explaining developments in part-time employment, while no increase in the part-time labour supply can be identified.

Wage-tariff data reveal that the rise in minimum wages in 2012 did not contribute to the increase in part-time employment among low-paid employees. Part-time employment increased most markedly among those earning 2-2.5 times the minimum wage and this typically held true for 2012 as well (Chart 9). This leads to the conclusion that the minimum wage increase in 2012 failed to have any impact on the number of part-time workers in the low wage categories. The minimum wage increase and the expected pay rise in 2012 was supported by the government in the form of wage compensation. Therefore, companies were not encouraged to reduce the wage costs of their employees with lower productivity by increasing the proportion of part-time employment. The fact that the data of the smallest businesses – among which this type of adjustment may have been the most widely adopted – are not included in the wage tariff survey might weaken the validity of the above conclusions to some extent.

The hourly wages of part-time employees are not lower than those of their full-time peers. The hourly wages paid and benefits provided for part-time employees may differ in Hungary from those of full-time employees. Empirical studies generally tend to find lower hourly rates and benefits among part-timers. This, however, may not necessarily be the case in Hungary. The hourly rates of part-time workers have, particularly in the market services sector, been similar to those of full-timers (Chart 10) over the recent period (except for 2009). Wage-tariff data show that part-time employees are paid higher average hourly wages than full-timers. This applies not only to regular wages but also to the final, full amounts of wages including non-regular elements. This stems partly from the composition effect (i.e. of the fact that the majority of part-timers work in market service segments where wages tend to be higher), but is also partly an indication of part-time employees having some special positive effect on their

[3] On statistics on underemployed persons see the Eurostat website at: http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Underemployment_and_potential_additional_labour_force_statistics.

Chart 9
Number of part-time employees by categories of hourly wages

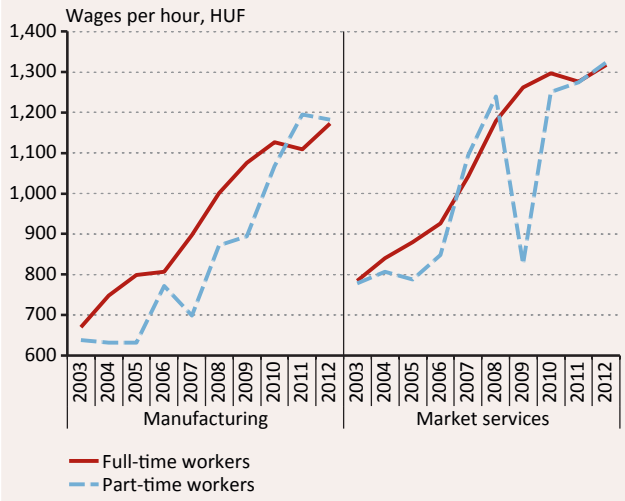


Source: Wage-tariff survey.

employers' activities (e.g. they work outside normal working hours or during busier periods in their respective businesses).

The new Labour Code (LC) was introduced in Hungary in 2012 and 2013, increasing flexibility of the labour market by introducing atypical forms of employment. This may also contribute to an increase in part-time employment. The new LC allows for on-call work (work as required by the tasks on hand, for up to 6 hours a day), job-sharing (several employees perform the duties of a single job), employment by multiple employers and simplified employment, amongst other options. Moreover, positive experience with part-time employment may also encourage companies to further increase the ratio of this form of employment.

Chart 10
Hourly wages of full-time and part-time employees



Source: Wage tariff survey.

CONCLUSIONS

This article examined the validity of the null hypothesis according to which part-time employment increased only as a result of cyclical factors. Descriptive statistics failed to support this hypothesis, as the data show that the increase in part-time employment was also driven by trend-like factors.

The growth in the number of part-time workers is mainly explained by labour demand factors. The increase in part-time employment since 2008 took place predominantly among non-voluntary (underemployed) part-timers: a significant proportion of part-time workers would like to work full-time. On the other hand, a substantial proportion of part-time employees would not be able to or do not wish to work full-time, thus without part-time jobs they would probably stay out of the labour market.

The increase in the number of part-timers – particularly in the market service sectors – appears to be partially trend-like. This is confirmed by the fact that the number of part-time employees had started to increase in the sectors concerned – particularly in trade, catering and tourism – even before the onset of the crisis, however, the decrease in demand during the crisis may have forced companies to adopt changes to improve efficiency. One such measure may have been to increase part-time employment instead of full-time employment. Accordingly, companies can allocate more staff to the shorter, but busier periods within the week or day. Cyclical factors may have contributed more to the increase in part-time employment in manufacturing, but trend-like impacts may have shaped this sector as well. The 2012 amendments to the Labour Code – which may facilitate the spread of more flexible forms of employment – are also expected to contribute to higher part-time employment in comparison to the pre-crisis period.

During the recovery, part-time employment is not expected to return to the low levels seen before the crisis. Part-time employment that has been expanding since the bottom of the crisis has contributed to an increase in the rate of employment and to a slowing in unemployment growth. Since this analysis has shown that the increase in part-time employment was not only driven by cyclical factors, at least part of these jobs may survive after the recovery, or may even continue to increase. The number of per-capita working hours may also remain below the pre-crisis level.

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APPENDIX

Description of the databases:

Labour force survey:

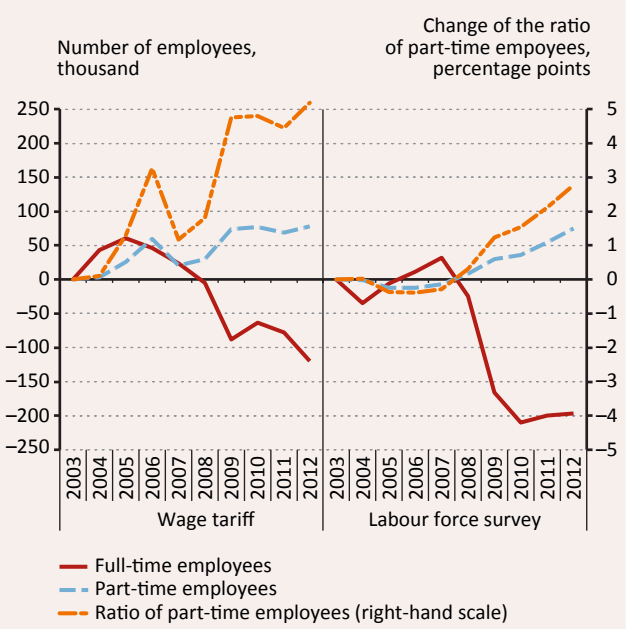
– Conducted by the Central Statistical Office. The questionnaire is filled out by a representative sample of the population. At the time of the analysis, the latest data available referred to 2013 Q3.

– Data content: labour market status and relevant detailed questions

  – individual characteristics: gender, age, schooling attainment, activities one year before, social security benefits, involvement in studies; in the case of employees: the type of work (full-time or part-time), number of working hours, reason for working part-time, whether the respondent would like to work longer hours, search for another job; in the case of unemployed persons: the type of work sought, activities immediately before commencing job seeking

– company characteristics: sector, site, size, nationality of owner

Chart 11
Changes in the number of full-time and part-time employees in the private sector (thousand people, in comparison to 2003), and change in the ratio of part-timers (percentage points, in comparison to 2003)



Source: Wage-tariff, labour force survey.

Wage-tariff:

– The survey is carried out by the National Employment Service in May each year based on data disclosed by firms. Data are available up to 2012. Only the private sector database is used in the analysis.

– The questionnaire is not filled out by businesses with workforces of under 5; it is filled out by a random sample of enterprises with workforces between 5 and 20, and the whole population of enterprises with workforces of over 20. As regards employees, enterprises with workforces of over 50 provide data on a sample selected by date of birth, but on all part-time employees if their number is not higher than 10. In the case of companies with less than 50 people information is supplied on all employees.

– Data content: wage data and employment details

  – individual characteristics: gender, age, schooling attainment, type of contract (full-time or part-time), Hungarian Standard Classification of Occupations (HSCO) code, wage and wage components, working hours and whether or not a new hire.

  – company characteristics: sector, company size (number of blue-collar and white-collar workers), share of foreign ownership, share of state ownership, information on collective agreement, place of operation.

Difference: a smaller increase was found in the labour survey in the proportion of part-timers (the total number of observations is much smaller in the wage tariff survey). There may be two reasons for this:

  – different sample: the proportion of part-time employment may be higher for smaller businesses and remuneration data does not include enterprises of less than five employees.

  – shadow employment: the wage-tariff database mostly contains information on contracts. In some cases employees with part-time contracts work full-time in reality. By contrast, in the labour force survey respondents actually working less than 40 hours a week probably answer that they are part-timers.

Dániel Horváth, Péter Kálmán, Zalán Kocsis and Imre Ligeti: What factors influence the yield curve?[1]

The role of expectations and the term premium in the evolution of the yield curve

The shape and dynamics of the yield curve provide useful information in the analysis of current economic and financial developments, and market expectations. This article describes the key theoretical factors affecting the yield curve and examines their role in the developments in advanced and emerging markets seen in recent years. Our findings show that the common component of term premia and interest rate expectations of emerging countries co-move with corresponding factors observed in the United States. Of these two components, the term premium appears to be affected by global risk shocks. Concerns related to the Fed's tapering of its QE3 programme were reflected markedly in the term premia of emerging markets and, to some extent, even had an upward impact on rate expectations. In the Hungarian context, in addition to analysing co-movement with international factors, we focus on the potential of the yield curve in the monitoring of domestic base rate expectations.

INTRODUCTION

From a central bank and economic policy point of view, money market yields – as indicators of market expectations, risk perception and monetary conditions – are important sources of information. Accurate evaluation of the information extracted from the level, shape and dynamics of the yield curve broadens the information base of the economic policy maker, thereby contributing to sound decision-making.

According to the theoretical framework underlying this article, the market yield level comprises two factors: the expected baseline scenario and the term premium. In markets linked directly or indirectly to the central bank base rate, the expected yield level is usually closely tied to the reference rate. Thus, this component reflects the actual expectations about the central bank's interest rate policy. The term premium component of yields is composed of multiple factors, and experience shows that it increases with the length of maturity. In general, central bank measures only directly affect short-term yields, but since the 2007–2008 crisis a more effective shaping of longer sections on the yield curve has also become important for the central banks of certain developed countries. That, in turn, has put further emphasis on the need to analyse the factors affecting the yield curve. To be able to choose the tools most suitable for influencing yield levels, decision makers need to identify the factors bearing relevance under the given circumstances. The most important techniques used for this purpose by central banks in developed countries have included asset purchase programmes (*quantitative easing, QE*) and so-called forward looking messages (*forward guidance).* While quantitative easing can help bring down the term premium, forward guidance is more suitable for putting downward pressure on the expectation component.

The article first reviews the most important theoretical issues related to the yield curve and the role of the term premium, along with the relevant literature. This is followed by an analysis of trends observed in the United States, with particular attention to the impacts of recent measures taken by the Fed. Then, developments in emerging markets are assessed through an analysis of common drivers of emerging markets' yield components. These drivers are interpreted in relation with events in developed markets. The final section of our article provides a discussion of trends and developments in Hungary. On the one hand, we investigate the relationship between the country's term premium and the factors of both developed and emerging markets. On the other hand, we study how available

[1] We wish to thank our colleagues for their suggestions and useful comments. We are especially grateful to Csaba Balogh, Szilárd Erhart, Gábor Kiss, András Kollarik and Melinda Lakatos for their input.

domestic sources of information can be used to infer base rate expectations.

THEORETICAL CONSIDERATIONS

In general, government securities and interbank market instruments represent investment opportunities over different maturities. Yields vary by the length of the term of the investment, and thus the yield curve (i.e. the rate of return in relation to maturity) is seldom horizontal.

One reason for this is that, on short-term investments, current yields typically differ from expected future yields, which, in turn, also causes current short and long-term yields to depart from each other. The expected yields on future short-term investments affect the yields on long-term investments, since – instead of a single long-term investment – market participants may also opt to continuously reinvest their funds in short-term instruments. If market participants expect short-term yields to increase in the future, the current longer-term yields will also be higher than the current short-term yield (in other words, the yield curve will rise).

If the shape of the yield curve is determined only by expectations – this is called 'expectations hypothesis' – forward rates calculated from the yield curve will correspond to the actually expected future yields. In this case, for instance, the forward rates calculated from government bond and interbank yield curves would directly indicate the future trajectory of the central bank base rate as expected by market participants.

Yield expectations can be affected by a variety of factors. Short-term yields are predominantly driven by the interest rate policy adopted by the central bank. Therefore, the relevant expectations are formed based on expected future trends in macroeconomic variables considered by the central bank (expected future inflation, expected changes in real economic variables) and the measures taken in response (central bank reaction function). For emerging currencies, exchange rate risk may be another important determinant of short-term yields, along with the sovereign default risk, which is factored into the prices of instruments denominated in the given country's currency.

However, besides future yield expectations, the shape of the yield curve may also be affected by a number of other factors, collectively referred to as the term premium. Where there is a term premium, forward rates do not match market expectations concerning the future central bank base rate. Most empirical research in recent decades has found positive term premia – i.e. market yield curves were above those derived from real yield expectations – and the rate of the premium varied across maturities and in time (Kane, 1981; Campbell and Schiller, 1991; Fama-Bliss, 1987; for a summary of the relevant body of literature, see Gürkaynak and Wright, 2012; for Hungarian data, see for example Gábriel and Pintér, 2006).

The term premium may comprise a number of factors. For the purposes of this article, **and taking into account the aspects of the analysis that is to follow, the term premium is broken down into two groups of factors (Chart 1). One represents the component linked to the uncertainty of yield expectations, which is separated from liquidity and structural factors.**

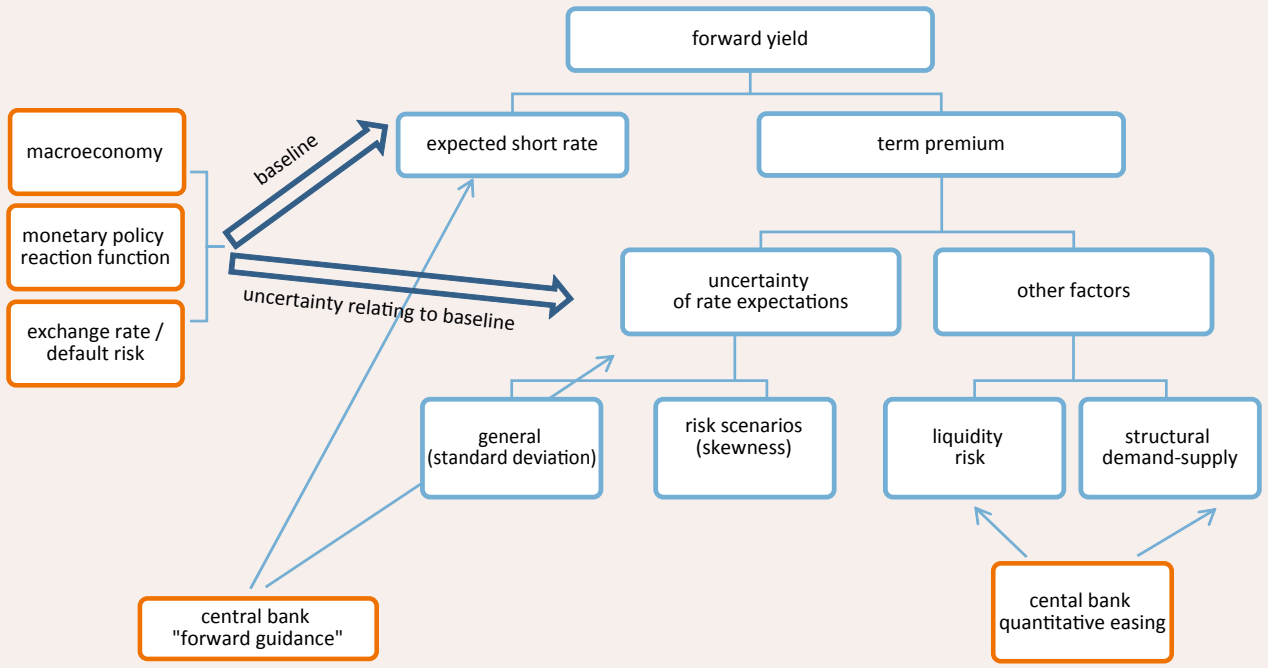
The uncertainty of yield expectations stems from the uncertainty of factors determining future yields. Accordingly, the term premium is affected by uncertainties relating to future trends in macroeconomic factors (such as inflation and real economic activity), uncertainties relating to the monetary policy reaction function and uncertainties relating to exchange rate and sovereign default risks. For example, Backus and Wright (2007) argue that the flattening of the yield curve (which Alan Greenspan called a 'conundrum') between 2004 and 2006 stemmed, for the most part, from an increasing predictability of the macroeconomic environment and monetary policy, through a decline in the term premium. Transparent communication and the increasingly popular forward guidance of central banks may, in addition to its direct influence on the expected yield, reduce the term premium by increasing the predictability of the central bank reaction function.

Besides the general uncertainty (standard deviation) of the expected yield path, another important driver of the term premium is the asymmetric impact of deviations from the expected value in terms of the utility of market participants. That is, a rise in yields may affect investor utility differently from the effects of a decrease in yield of equal magnitude. Such asymmetry in utility may, for instance, be a result of yield increases being related to incidence of a recession/crisis, when incurring a loss due to a yield increase comes at a particularly unfavourable time.

Clearly, in the case of interest rate swaps, for example, if it were not for this asymmetry, there would be no term premium stemming from the uncertainty of yields. In interest rate swaps – where participants take up symmetrical interest rate positions – short and long counterparties, respectively, would require equal compensation on account of upside and downside risks associated with the yields. Since these would necessitate a positive and a negative term premium at the same time, the actual forward yield would not deviate from the expected value.

If, however, in the case of an increase in yields, the relative increase in utility on the profitable (long) position would

Chart 1
A schematic illustration of the components of the forward rate



exceed the relative loss of utility in the case of a decrease in the yield, and then there would be a net utility advantage of the long position. For this expected utility advantage investors in long positions would pay compensation to the short counterparty in the form of a higher-than-expected fixed swap yield. Therefore, the correlation between yields and the incidence of crisis/recession will cause the term premium to be positive, with its rate rising parallel to the increase in yield uncertainty.

However, the term premium may also be a product of two other factors in addition to the uncertainties of yield expectations (Chart 1, other factors).

– One such factor is **liquidity risk**. Investors require liquidity premia on their long-term investments (liquidity preference theory), because they may happen to need cash during the maturity period and quickly selling their longer-term investments is bound to entail certain expenses. This may be the case when, as a consequence of a systemic shock, many investors find themselves in need of cash at the same time. For instance, the funding liquidity shortage witnessed during the 2007–2008 financial crisis caused such a systemic supply shock with regard to bonds of longer maturities in emerging markets.

– The term premium may also be affected by **structural factors of supply and demand.** If arbitrage is not or is only partly functioning across different maturities (for example because market participants have a preferred investment horizon from which they only depart under a strong price stimulus – preferred habitat theory), market supply and demand in the longer maturity segments may deflect yields from the expectations.

One of the most interesting such structural factor currently is the impact on yields of the asset purchase programmes of advanced central banks, for which estimates have been calculated by a number of authors (Gagnon et al., 2010; Krishnamurthy et al., 2011; Jarrow and Li, 2012). Quantitative easing on the part of central banks, however, may also impact other factors affecting yields. The liquidity effect is evident for instance in the case of the Fed, as the US central bank entered the market to create additional demand in the case of negative systemic shocks, which mitigated risks stemming from market illiquidity. The effectiveness of quantitative easing, however, depends on central bank credibility as well. In the absence of credibility, such a programme can drive expected inflation higher, along with expected yields, while also sending other components of the term premium on an upward course through the uncertainty of the macro path/central bank reaction function.

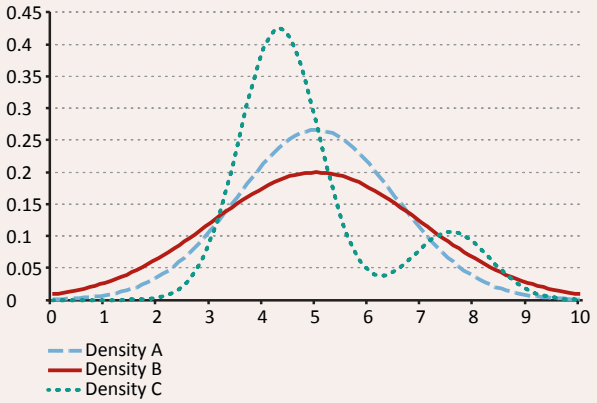
Box 1
Types of uncertainty: the standard deviation and asymmetry of the expected yield distribution

Uncertainty relating to yield expectations can come in a variety of forms. It may take the form of a period of higher volatility, during which future yields are generally less predictable. On the other hand, uncertainty may stem from the pricing of low-probability alternative risk scenarios (e.g. a return of the crisis). Such theoretical concepts are illustrated in Chart 2. For each of the three distributions featured, the hypothetical expected value equals 5 per cent, i.e. whichever distribution reflects the expectations of market participants, the expected yield will remain at 5 per cent. The standard deviation of distribution 'B' however, exceeds that of distribution 'A', which can be interpreted as an increase in general uncertainty regarding the expected yield. Risk averse investors would claim higher premia in the case of distribution 'B' than in that of distribution 'A'.

By contrast, while matching the standard deviation of distribution 'A', distribution 'C' is asymmetric: the expected yield distribution it illustrates is the sum of a probability distribution of mean 4.25 per cent (according to the baseline scenario) and another distribution with mean of 7.5 per cent (reflecting a risk scenario). The market may factor in a premium in this hypothetical case as well, owing to the existence of the risk scenario.

A brief mention should also be made of analysts' surveys as well, where analysts – in order to best predict eventually realised yields most of the time – may be assumed to report the most likely values of the expected distributions (their mode in the baseline scenario), which, for market expectations similar to distribution 'C', does not match the expected value. The forward rate priced in the case of 'C' in the above example would thus be higher than the 5 per cent average yield expected by the market (this is the term premium) and the difference would be even more substantial in comparison with the 4.5 per cent consensus of analyst forecasts.

Chart 2
Hypothetical density functions associated with different yield expectations



Methods for estimating the term premium

Over the past decades, financial economic research has elaborated a number of methods for separating forward rate components (expected yields and the term premium). This study draws on three main methodological approaches.

– **Arbitrage-free yield curve models.** This method assumes a factor model for changes in the yield curve over time, the parameters of which are estimated by using time series and cross section data (yield curve points) of the yields. It has the advantage that the yield curve is well fitted by just a few factors, but it has the drawback that short-term yield forecasts estimated based on a short time sample usually change very little through the forecast horizon (i.e. the model provides forecasts very similar to the current short-term yield, whether on a one- or ten-year horizon), which often contradicts analysts' estimates and economic considerations. For longer time samples, however, the performance of such models deteriorates due to the possibility of structural breaks and potential specification errors (see for example Kim and Orphanides, 2005; Wright, 2011).

– **Direct comparison of forward rates to realised yields.** Comparing forward rates to subsequent actual yields is a simpler method which may reveal systemic errors in the forecasts of forward rates, which may be interpreted directly as the term premium. While this method is model-free, it also has the disadvantage that the choice of the sample has a significant impact on the outcome: an overly short sample may lead to a less reliable estimate owing to small sample bias, while an overly long sample may do so on account of structural breaks. Another drawback of this method is that it is more backward-looking in nature, and is therefore less

suitable for analysing current developments or producing forecasts. Further implicit assumptions of the method are rational expectations and constant premia relating to each tenor.

– **Use of analysts' surveys.** Expected future yields may be approximated by analysts' forecasts, in which case the term premium equals the difference between the forward rate and the forecasts. The advantages of this method include that it provides a more robust model-free estimate for expected short-term yields and that it is free of the majority of the problems of sample selection. The use of analysts' surveys also has its disadvantages: surveys may include measurement errors; also of relevance may be the different information sets based on which analysts produce their forecasts (different analysts produce their forecasts at different points in time). The difference between the mode and expected value of the distribution of the yield expectation may be an important factor in some cases, when the expectational distribution is asymmetric (see also Box).

EXPERIENCES OF DEVELOPED MARKETS

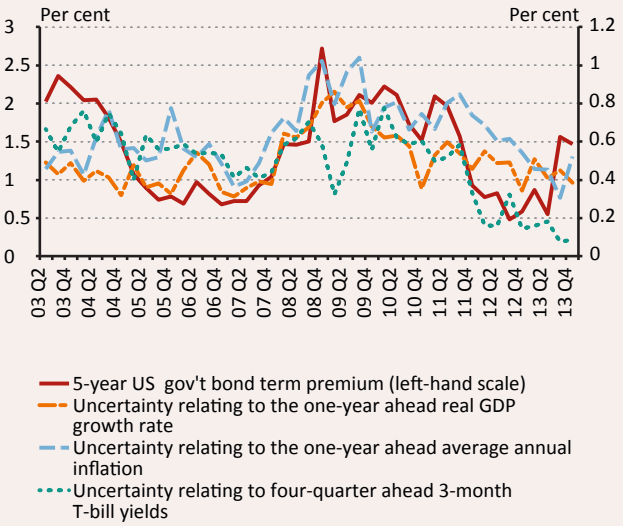
The following section shows proxies for term premium components identified in the theoretical framework, based on examples from the US government securities market. This is the most frequently studied market in the literature on term premia and it also offers the advantage of having a strong structural supply and demand element in the yield curve (as a consequence of the central bank's asset purchase programme).

Decomposing the term premia would go beyond the scope of this study; therefore, only the main trends are discussed here with a focus on the period following the peak of the financial crisis. The main objective of the large-scale asset purchase programme launched by the Fed during this period was to reduce longer-term fixed income market yields mostly through the decline in term premia elements. Since term premia accrue most notably over longer terms, the impacts of term premium drivers are illustrated on the five-year maturity. The term premium variable used in the following analysis is based on an arbitrage-free yield curve model.[2]

The uncertainty of the macroeconomic and the monetary policy environment also affects the general uncertainty of yield expectations. For compensation, investors typically require extra yields on their longer-term investments. A widely applied approach for proxying forward-looking macroeconomic uncertainty is the use of survey information (Chun, 2011; Dick et al., 2013; Wright, 2011). Most of the studies have found a significant relationship between term premia and survey-based uncertainty factors.

The above mentioned uncertainty proxies are constructed as the standard deviation of individual expectations on annual inflation and real GDP growth rates expected over the next year, and as the standard deviation of individual expectations on the 3-month Treasury bill yield 4 quarters ahead. Source of survey data is the Survey of Professional Forecasters.[3] **Chart 3 demonstrates that the uncertainty relating to the expected developments in the real economic and monetary policy environment correlates with the five-year term premia in the US government securities market.** This co-movement is even more apparent in the period following the collapse of Lehman Brothers. This can be explained by the term premia and real economic variables monitored by the central bank becoming even more synchronised, due to large-scale asset purchase programmes. This co-movement was further strengthened by state-dependent forward guidance. **When news is published on the real economy which makes estimation of future fundamentals more difficult, this entails an increase in the term premium. A similar impact is noticeable when the central bank's likely responses to**

Chart 3
Forward-looking uncertainty in the US macro environment and developments in the 5-year term premia



Source: Survey of Professional Forecasters, authors' calculations.

[2] The model used is based on Adrian et al. (2013).
[3] In the SPF survey (Survey of Professional Forecaster) managed by the Federal Reserve Bank of Philadelphia, analysts provide estimates for a wide range of US macro and financial variables on a quarterly frequency.

information on the economy become more difficult to predict. Forward guidance – by affecting the baseline scenario – is aimed at improving this predictability. For this reason, communication relating to both the policy rate and the asset purchase programme plays a substantial role in influencing the term premium.

The asset purchase programmes (QE1, QE2, QE3) initiated by the Fed at various times belong to the structural supply and demand category of term premium components. Numerous empirical studies have investigated the impact of quantitative easing on term premia[4]. Event study-type analyses have examined price changes in US Treasuries during a short time window around important statements and news concerning the QE programmes. The weakness of this approach is the choice of the window-length: it should be long enough to include all the information relevant for pricing, but it should be short enough to exclude noise. The advantage of model-based methods is that these grasp the full information process. In this case, the main difficulty is the choice of the appropriate explanatory variables.

Depending on the method used, studies have shown that the first programme (QE1) reduced the yield on the 10-year Treasury by between 40 and 110 basis points, while the QE2 programme had an estimated effect of 15-45 basis points.

Comprehensive studies on the impact of the third round of quantitative easing have not emerged yet, but the increase in yields on long-term Treasury securities experienced in May 2013 attracted the attention of market analysts. Official communication on the possibility of reducing quantitative easing resulted in an increase in term premia and the expected interest rate path which contributed to the rise of US yields. As regards the US government bond market, liquidity risk is difficult to interpret since, given the role of US government bonds as safe haven assets (*flight to quality*), the liquidity of these instruments is less prone to being impaired by the increase in the general stress in financial markets.[5] Apart from the most turbulent periods of the crisis in 2008, the liquidity risk factor is not usually among the relevant term premium elements.

EXPERIENCES OF EMERGING MARKETS

In contrast to the large number of empirical analyses of US data, there is practically no literature on emerging market experiences. This is probably a result of the lack of suitably long and homogeneous time series which would be required for yield curve models. In our case, the problem can be bypassed with model-free and sample-independent analyst surveys and with principal component analysis, thereby analysing the relation between emerging market yields and trends in developed and the domestic market. Median values of analysts' forecasts are regarded below as the expected short-term yield, while the points making up the forward rate curve grasp the sum of the yield expectations and the term premium. Given the limitations of the analysts' forecast horizon, however, this method only allows for analyses of the short-term segments of the yield curve.

To interpret the trends in emerging market yield expectations, developments in monthly data for 15 countries[6] were analysed for the period between 2009 and 2013. Owing to differences in the data available for various countries, the term premium levels calculated for various countries are not directly comparable.[7] Nevertheless, the co-movement of term premium indicators can still be interpreted, since the general rise of the term premium in emerging countries is likely to drive the indicators (whether for swap or government securities markets calculated for the three, one-month yields or the base rate) similarly upwards, even if at different rates.

The principal components of the time series were taken into account to analyse common factors in the emerging countries. Thus, the first principal component of the analysts' short-term yield forecasts and the first principal component of the term premia were extracted from respective datasets. Using principal components is also consistent with viewing available country indicators as noisy observations of the global – or general emerging market – factors. The first principal components explain 30–50 per cent of the total variance, showing that there was material correlation between the indicators. However, the country-specific factors were also significant – partly on account of different yield drivers, partly

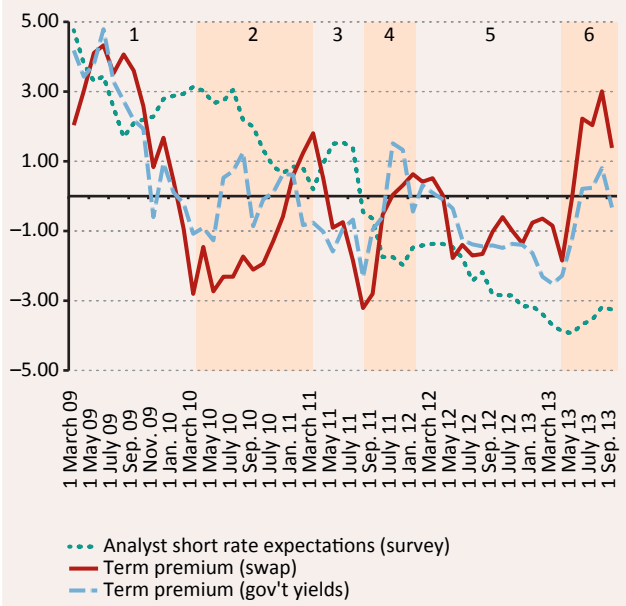
[4] Gagnon et al. (2011); Hamilton and Wu (2012); Krishnamurthy et al. (2011); Li and Wei (2012); Meaning and Zhu (2011); Wright (2012).

[5] In the literature, the liquidity premium in the case of US government securities is typically captured as the difference between the yields on currently issued *(on the run)* and earlier issued *(off the run)* bonds. The spread has been a few basis points on the 10-year term in the past 10 years.

[6] Hungary, Poland, the Czech Republic, Turkey, Israel, South Africa, the Philippines, Singapore, Thailand, India, Indonesia, Mexico, Columbia, South Korea and Russia.

[7] In general, 1-month swap and 3-month government bond yields in one year's time were used. In the absence of these, yields on different maturities, forward interest rate agreements or one-day indexed swap yields were used. Analysts' forecasts were also available for different short-term yields, forward rates for various horizons and for different money market instruments.

Chart 4
Principal components of analysts' yield expectations and swap and government securities market term premia in emerging countries
(2009–2013)



Note: Developments and main turning points of emerging market yield expectations and term premium time series: Period 1: easing of the first phase of the financial crisis; Period 2: first escalation of European debt concerns; Period 3: easing of the debt crisis and launch of the Fed's QE2 programme; Period 4: European debt crisis in focus again, USA loses its "AAA" status, closure of QE2 programme; Period 5: general consolidation and correction of risk pricing due to ECB's commitment; Period 6: Bernanke's address on the possible reduction in the pace of the Fed's QE3 asset purchases.
Source: Bloomberg, Thomson Reuters, authors' calculations.

as a consequence of the differences between the indicators used, and partly as a result of the characteristics of the analysts' forecasts. A number of clearly separable periods can be distinguished in the observed time horizon, associated mainly with market-moving events.

Major events of global importance significantly affected yields in emerging countries between 2009 and 2013. It was primarily the term premium components of those yields (in both the government securities and the inter-bank market) which reacted significantly to these events. The markets primarily focused on the waves of the euro-area debt crisis, the Federal Reserve's quantitative easing programmes and its commitment to a steadily low base rate, the downgrading of the US debt rating and a key announcement of the ECB governor (on potential bond market intervention).

Bernanke's speech in May 2013 on the possible tapering of US central bank's asset purchase programme triggered a massive increase in emerging market yields, risk aversion and capital outflows from the emerging markets. The term premium component responded markedly again (to an extent comparable to that observed during the euro-area debt crisis), while analysts' rate expectations increased less sharply in comparison to their historical developments. In general, it could also be said that the **principal component of analyst expectations was characterised by a gradual downward trend and that it responded less spectacularly to global risk shocks.**

Relationship with US yield components

The co-movement between the above-mentioned emerging market yield components and their US counterparts[8] is illustrated in Chart 5.

The yield components of emerging countries (interest rate expectations and term premium) showed a marked correlation with the respective US yield components. The rise in US term premium coincided, in general, with a rise in term premia in emerging markets as well, though in many cases with a certain delay, and the US indicator was clearly more noisy than the emerging market indicator. This is partly a consequence of the applied method, since the principal component eliminates country-specific noise from the emerging market time series. A close correlation was also found between the developments of interest rate expectations in emerging markets and in the US. The correlation was weaker in recent years due to the fact that the US base rate has reached the zero-lower bound. Consequently, the forward looking US three-month LIBOR expectations were also stuck below 0.5 per cent, while the downward trend continued in the emerging regions up to May 2013, which was followed by a slight increase.

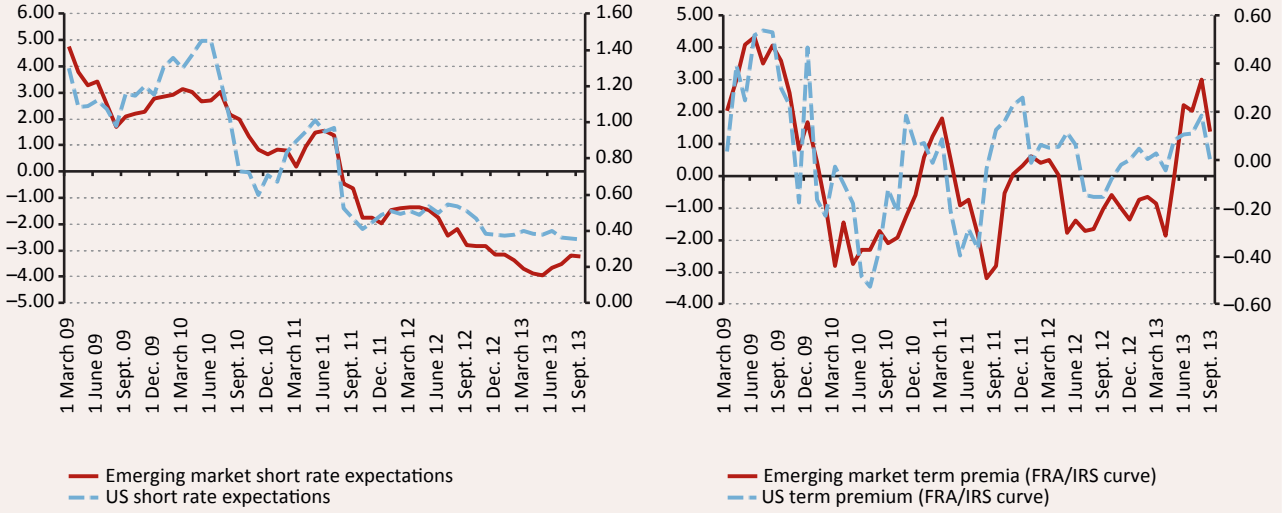
EXPERIENCES IN HUNGARY

Relationship between the domestic risk premium and international factors

Domestic financial and economic trends may be understood more thoroughly using estimates on the extent to which domestic yields were affected by rate expectations and by the term premium. A comparison of the developments observed in the domestic market to those in the international emerging markets also provides important information for economic policy decision makers, with which they can separate country-specific and international shocks.

[8] The US yield components were calculated based on 3-month USD LIBOR forecasts for the 1-year horizon and the corresponding interbank forward rates.

Chart 5
Trends in US and emerging market yield components, 2009–2013

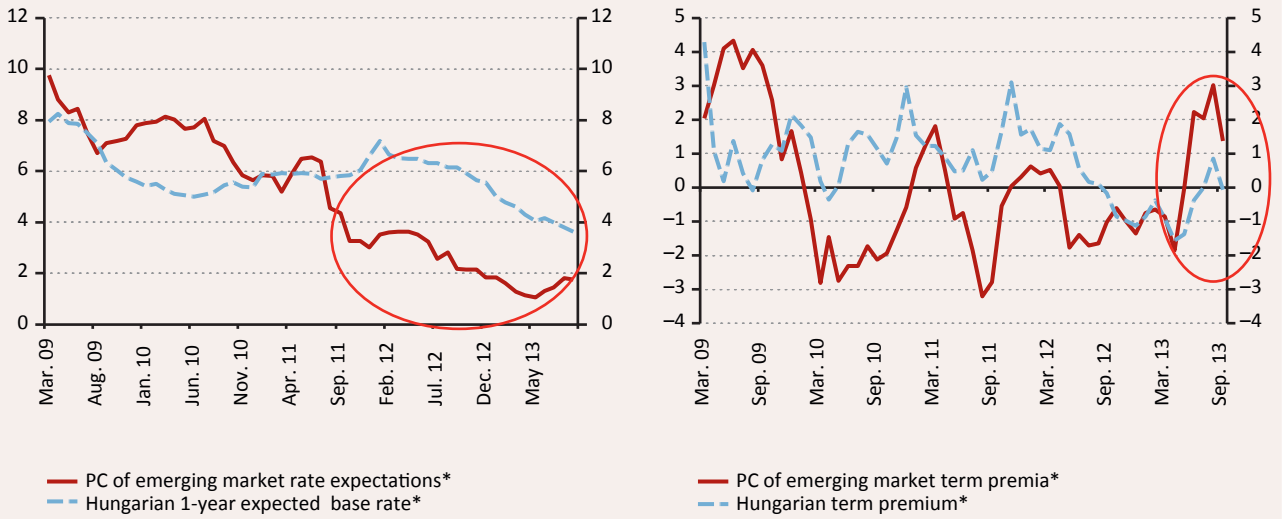


Note: The emerging market term premium is the first principal component of the emerging market one-year term premium series calculated from their inter-bank yields. This may be regarded as the basic trend of the term premia of the emerging region. The emerging market rate expectations time series is the first principal component of analysts' interest rate expectations, which reflects the general shifts in emerging market rate expectations. The sample average and the sample variance of the emerging market time series was normalised to the respective US time series.
Source: Bloomberg, Thomson Reuters, authors' calculations.

If one sees a strong link between the risk premium component of domestic yields and international factors, then developments are not likely to be driven by country-specific risk events, and thus domestic decision makers may only have limited ability to affect yields. In the opposite case, it may be worth identifying the factors that explain deviations from international trends. Regarding interest rate expectations, the relationship between international and domestic trends can be similarly analysed. It should also be noted that correlation does not necessarily reflect a causal relationship, and therefore the underlying money market drivers always need to be identified when analysing particular events.

Regarding Hungarian experiences (Chart 6) in general, we can say that yield components in the Hungarian market co-moved relatively closely in certain periods with the corresponding

Chart 6
One-year interest rate expectations and term premium in emerging markets and Hungary



**The common factor (principal component) is a quantity without a unit of measurement. To enable comparability to domestic indicators and for illustration purposes the values are adjusted to a common scale. Consequently, it is the dynamics that are comparable and not the levels of indicators. The domestic yield components were separated on the basis of Reuters analyst surveys.*
Source: Bloomberg, Thomson Reuters, authors' calculations.

international factors, while at other times the correlation was not so large. With respect to rate expectations, in 2010 and 2011 the expected level of interest rates seems to have been affected primarily by country-specific factors. Since March 2012 interest rate expectations have been more in line with the general emerging market trend, though domestic factors may also have played a role.

Some co-movement – albeit of varying intensity – can be identified since 2011 between domestic and international term premia. Chart 6 shows that the relationship was particularly strong after the spring of 2013 when Fed decision makers first mentioned the possibility of gradually phasing out asset purchases. At that point **an intensive increase in yields started along with a general outflow of capital from emerging markets. As indicated on the right and left panels of the chart, this yield increase in the emerging markets was related to an increase in interest rate expectations and in the term premium as well. Yields in Hungary appear to have been affected mostly through a rise in the term premium.**

Monitoring interest rate expectations in Hungary

For central banks, analysis of the short segment of the yield curve and the assessment of the size of the term premium are important primarily for inferring interest rate expectations from market pricing. In this section, we analyse how market participants' expectations can be assessed based on available domestic sources of information.

In Hungary, there are three main sources of information from which conclusions can be drawn concerning interest rate expectations: yields of government securities, interbank yields (forward rate agreements [FRA] and interest rate swaps [IRS]) and analysts' surveys. We have seen that the forward rates of government securities and interbank market yields may contain a term premium component in addition to actual interest rate expectations. As mentioned, this premium can be identified using a variety of methods. For our purposes, here, we chose the most direct method: the forward rates are compared to the interest rates that actually materialised later on. If a systematic bias of the forward rates' prediction can be identified, this forecast error may be interpreted as an estimate of the term premium.

The 10-year period between January 2004 and December 2013 was chosen as the sample, since reliable data on interbank FRA rates have been available since 2004.

Chart 7 shows that the **term premium was positive on average and it was increasing with maturity both in the case of the government securities and the FRA market.** However, it should be noted that the calculated premium varied in a wide range (illustrated by the 1 standard deviation bands), i.e. the values calculated based on different periods may differ significantly from one another. It is also worth noting that **in the case of FRA yields the average premium was only half as large and at shorter maturities it was close to zero.** Our results are in line with the conclusions of Gábriel and Pintér (2006), which found similar (somewhat larger) systematic bias in the case of the government securities yield curve (FRA yields were analysed) based on an earlier period (2001–2006).

In assessing the predictive power of the three alternative methods (government bond forward rates, FRA yields,

Chart 7
Average term premium in the government securities market (left panel) and in the FRA market (right panel)

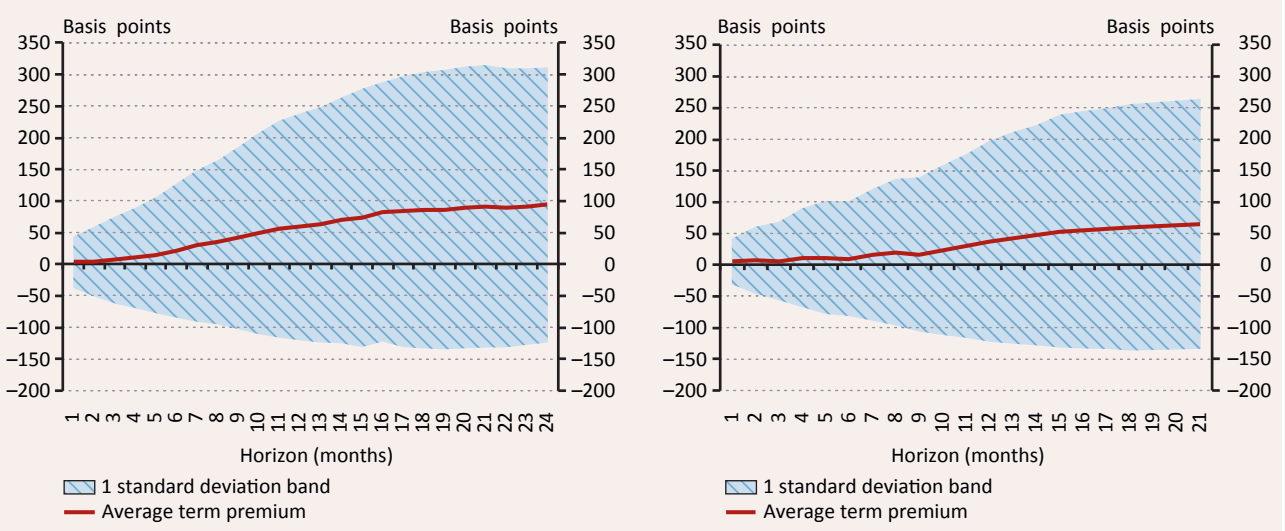


Table 1
Results of the Diebold–Mariano forecasting test in the different maturity segments

1-6 months	Random walk	FRA	Gov't
Survey	–3.49*	0.53	–1.86*
Gov't	–7.15*	1.28	
FRA	–9.47*		
7–12 months	**Random walk**	**FRA**	**Gov't**
Survey	–2.75*	1.07	–2.34*
Gov't	–0.91	3.03*	
FRA	–2.63*		
13–18 months	**Random walk**	**FRA**	**Gov't**
Survey	–1.96*	–0.47	–1.94*
Gov't	–2.25*	2.19*	
FRA	–2.52*		
19–24 months	**Random walk**	**FRA**	**Gov't**
Survey	–3.54*	–0.48	–1.56
Gov't	0.34	4.35*	
FRA	–1.82*		

**The values indicate results significant at a 5 per cent significance level. Negative values indicate a greater predictive power of the method in the row heading, while positive values indicate a greater predictive power of the method in the column heading.*

analysts' survey) we used the Diebold–Mariano test (DM) introduced by Diebold and Mariano (1995).[9] This test aims at examining whether either one of a pair of forecasting methods is significantly more accurate than the other. The two-year forecasting horizon under review was divided into four six-month sub-horizons and the methods were tested in these segments.

As a first step, each of the three methods was tested against the *random walk* assumption. This way we could assess whether the given method had a significant forecasting ability at all. Our results show that the interest rate paths estimated based on analysts' surveys and FRAs had significant predictive power for all maturity segments. In the case of government bond yields, the forecasting ability was significant only in the six-month and the 18-month segments out of the four horizons.

After testing the three alternative forecasting methods against each other, no statistically significant difference was found between the forecasting accuracy of FRA yields and analysts' estimates at any time horizons. By contrast, interest rate expectations derived from yields on government securities proved to be less reliable forecasts than the other two alternatives, in three out of the four forecasting horizons.

In theory, the weaker performance of government yields may primarily be a consequence of higher liquidity risk in this market. Interbank transactions (FRAs, IRSs) have significantly lower liquidity requirements since, in the case of such transactions, the principal amount is not transferred between the parties. Moreover, government securities markets are less exposed to short selling, and therefore nearly all investors bear interest rate risks of the same direction (in that a yield increase results in losses) which may more easily lead to a systemic liquidity shock. In the case of the above-mentioned interbank transactions, however, positions are symmetric. Thus, when market yields change some market participants suffer a loss, but others obtain a profit. As a consequence, at a systemic level, the liquidity need does not change as dramatically. Accordingly, the government securities market has experienced more turbulences in recent years than the interbank market, and yields on government securities have been more volatile than interbank yields even during calmer periods. Chart 7 shows that the term premium varied in a higher and wider range than in the interbank market. A more detailed analysis also demonstrates that the 2008–2009 crisis and the partial dry-up of the government securities market also contributed to the poorer forecasting potential of government bond yields.

It can be concluded that, in view of experience accumulated over the past ten years, **FRA yields and the interest rate expectations identified by the Reuters survey have significant forecasting ability regarding the central bank base rate**. By contrast, the forecasting ability of **government bond yields is more uncertain** and it was found to be typically weaker

[9] The Diebold–Mariano test compares forecasting errors of two different methods. It tests the average of the difference between the forecasting errors, taking the overlap between the forecasting periods (errors are autocorrelated) into account.

Box 2
Identification of interest rate expectations in practice

Although the predictive power of analysts' surveys does not materially differ from that of FRA yields, it is worth discussing the special individual characteristics of the two different forecasts in order to be able to exactly map interest rate expectations. FRA yields are, theoretically, comprised of two elements: the expected average interest rate path and the term premium. If therefore there is an estimated term premium, subtracting it from the FRA yields provides the true average interest rate expectations. On the other hand, it is difficult to work out a dynamic estimate of the term premium and thus in practice this is usually not a feasible approach. Since the average term premium is lower at shorter maturities, unadjusted FRA yields may also prove to be a suitable tool in forecasting short-term yields, as has been confirmed by the results of the forecast tests. However, it is important to note, that in certain cases term premium can distort short yields considerably.

There are two additional factors that should be taken into account when gauging short-term interest rate expectations from FRA yields. Only expectations concerning the three-month interbank rate (BUBOR) are reflected directly by FRA yields. However, in recent years the BUBOR has been closely connected to the base rate – or it deviated by a nearly constant value. Therefore, it is possible to infer the expected change in the interest rate from the difference between FRA and BUBOR rates (rather than from the difference between FRA rates and the base rate). **Based on empirical experience the short-term interest rate expectations derived from FRA yields should be adjusted by the nearly constant difference between the BUBOR and the base rate.** It should also be noted that interest rate expectations are calculated on the basis of three-month yields, which should be converted to the – two-week – maturity of the base rate to produce a more accurate estimate. We did not make these two adjustments in our analysis, although experience shows that taking this into account adds to the forecasting ability of forward rate agreements.

On the other hand, instead of the expected average, it is the most likely interest rate outcome (the mode of the expected probability distribution) that appears in analysts' surveys (for more details, see Gábriel–Pintér, 2006). Therefore, in the case of asymmetric expectations (when the mode departs from the expected value) analysts' surveys are, on average, biased. This typically occurs when the probability of alternative scenarios increases in some direction around the expected baseline scenario. Examples may include an increase in the risks of exchange rate appreciation or depreciation, or the possibility of a higher- or lower-than-expected inflation path. The difference between FRA yields and analysts' estimates may therefore increase for two – interrelated – reasons: owing to an increase in the asymmetry of the expectational distribution or owing to an increase in the term premium. Therefore, when the methods outline different interest rate paths, this also informs about expectational asymmetries and the degree of risks.

than the other two alternative methods, **partly due to higher liquidity risk and partly due to anomalies observed during crisis periods.**

SUMMARY

From a central bank and economic policy perspective, financial market yields are important sources of information. The observed yield level is comprised of two factors: the component resulting from baseline expectations of future yields and a term premium component. The latter may be made up of a variety of factors, including the uncertainty of future expected yields, as well as structural and liquidity factors.

Based on the US government securities market, empirical studies have typically found a significant relationship between the term premium and the uncertainty of the macro environment and – consequently – yield expectations. Moreover, effects of structural factors can also be identified in relation to the quantitative easing programmes of the central bank. Such relationships are confirmed by the co-movement between the variables monitored in this study.

Emerging market experiences have not been extensively analysed so far, partly as a result of the absence of the data required for usual techniques. In this article, we have identified common rate expectation and term premium factors of emerging market yields via principal component analysis. Our findings show that the emerging market term premium component responded more strongly to global risk shocks than the interest rate expectation component. The general yield increase observed in emerging markets in mid-2013 was also more closely related to the increase in the term premium. Furthermore, a close co-movement was found between respective emerging market and US yield components.

Interest rate expectations and the term premium in Hungary co-moved with the respective yield components of emerging markets in some periods, while in others there was no such

correlation. The Fed's announcement in May 2013 concerning the tapering of its quantitative easing programme appears to have affected yields in Hungary primarily via the increase in the term premium.

Our results show, that the Hungarian term premium was positive on average and was increasing with maturity, in accordance with the relevant theory. Based on experience accumulated during the past ten years, interbank (FRA) yields and the interest rate expectations in analysts' surveys have significant forecasting ability regarding the central bank base rate. By contrast, yields in the market of government securities did not provide such a reliable tool for prediction.

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Tamás Ilyés, Kristóf Takács and Lóránt Varga: Changes in the fees on payment services and the structure of payments following the introduction of the financial transaction tax

Payment service providers passed the transaction tax on to their clients in several steps and to a significant degree, both in the spring, upon introduction of the tax, and in the autumn, when the rates of tax were raised. For cash withdrawals and bank transfers, the tax was typically passed on by being charged against the transaction directly. The tax was passed on directly at a much lower average rate among card purchases; however, the annual fees of payment cards were increased considerably. Moreover, in contrast to the claims made by banks in their communication, the tax was passed on in full or, for some banks, at an even greater rate in both spring and autumn. In the period between December 2012 and October 2013, total increases in payment fees exceeded the level justified by the transaction tax.

Payment statistics for Hungary for the first half of 2013 do not suggest a deviation from the trends of earlier years, as electronic transactions continue to slowly gain ground and the use of cash declines. Accordingly, the introduction of the transaction tax did not affect the development path of the payments structure in Hungary either positively or negatively in this period. There appeared to be no significant adjustment among corporate payments in the first half of 2013 following introduction of the transaction tax: the data reported by Hungarian banks shows no signs of relocation of payments abroad or the merger of transactions in order to reach the tax threshold. Nevertheless, on account of the increase in the transaction tax rate in August 2013, the analysis of adjustment should be repeated once the figures for the second half of 2013 become available.

INTRODUCTION

Hungary introduced a financial transaction tax in January 2013. There has been debate ever since regarding how and, most importantly, to what extent payment service providers pass on the tax to their clients. It is all the more difficult to answer the latter question because banks incorporated the tax into their payment fees only gradually (owing partly to the legally stipulated 60-day term for disclosures) and because the rate of the tax has changed in the meantime. As of 1 August 2013, the tax on electronic transactions was raised from 0.2 per cent to 0.3 per cent and the tax on cash withdrawals from 0.3 per cent to 0.6 per cent, with the HUF 6,000 per transaction cap also removed in the latter category.

A similar degree of interest is triggered by the question as to how clients' payment habits will change as a result of the introduction of this tax. Some believe that the tax may curb cash use, as cash withdrawals are more expensive than electronic payment transactions. Others maintain that the overall increase in the cost of payment transactions will push clients towards cash use, as a withdrawal will incur the tax once, after which the money will circulate in the economy free of tax.[1]

In this article, we propose to contribute to the effort of offering precise answers to the above questions. To do so, we looked at the information available at the time of writing this article and analysed the degree to which payment fees changed

[1] In this case, household clients will withdraw their income received on their payment accounts and use the money primarily for purchasing goods and services with cash. Once the cash reaches the corporate sector, businesses will use a larger-than-before chunk of such amounts for payments among themselves and to their employees. As a result, the cash used in retail transactions as a first step will remain in the economy through several rounds of payments, resulting in a reduction in deposits of cash and, at assuming an unchanged rate of cash withdrawal, the potential for increasing cash in circulation and thus a higher weight for cash transactions.

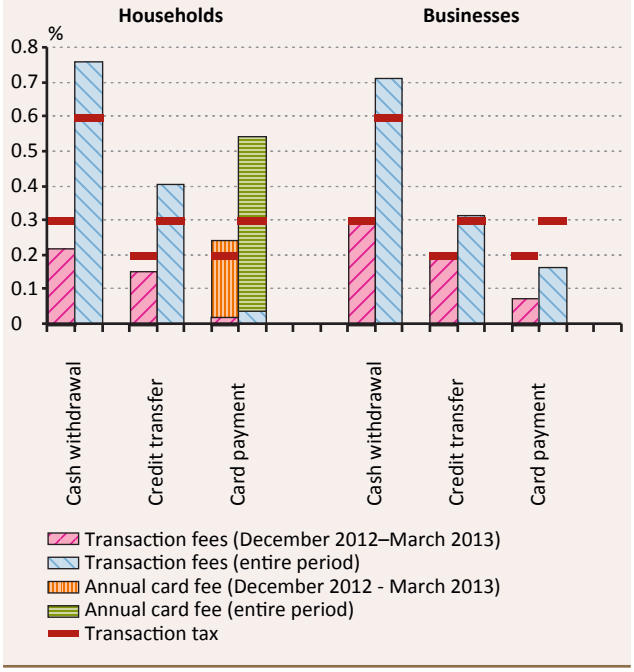
between the end of 2012 and October 2013, as reflected by banks' publicly available lists of terms and conditions, and also looked at the changes in turnover for different methods of payment in the first half of the year in 2013.

CHANGES IN FEES ON PAYMENT SERVICES FOLLOWING THE INTRODUCTION OF THE TRANSACTION TAX

For the purpose of this analysis, we relied on the lists of terms and conditions valid in the period between December 2012 and October 2013 of the 11 Hungarian credit institutions with the largest payment turnover to assess the degree to which they passed on the transaction tax on three payment services (cash withdrawals, credit transfers, payments by payment card). In addition to the above specified period, a separate analysis was carried out focusing on the first few months following the introduction of the tax. By subdividing the period under review, we were able to examine banks' pricing responses as they unfolded and to separately analyse the impacts of the introduction of the tax and its increase in August. Nevertheless, we did not analyse the consequences of the one-off supplementary transaction tax liability stipulated by the amendment to the Act on Duties effective as of 1 August 2013. Since this will not increase the transaction-related costs for payment service providers permanently in the long run, it is assumed that they passed on this one-off expenditure to a smaller degree through minor adjustments to transaction fees. However, its impact may have been reflected in part in higher transaction charges.

In our calculations, we took the most frequently used payment services and the turnover data available from each bank to obtain the market's average transaction structure. We then converted all the fixed fees incurred on these services into value-proportionate percentages to allow comparison of the different types of fees and commissions among the banks and against the rate of the transaction tax. We differentiated between basic and premium account packages at each bank and between the related payment cards furnished to basic and premium clients. We performed a weighted aggregation of the results for the two types of products, taking into account the assumed distribution of clients between the account packages and then calculated the average of the individual data of the 11 banks, weighted by turnover figures. Two of the credit institutions under review only have a corporate business line, therefore we excluded these banks from our calculations of changes in household fees. As has been their practice in recent years, most payment service providers did not cross-charge their costs to bank card payments at the transaction level on retail services even after the introduction of the tax, which is why we also investigated the changes in annual payment

Chart 1
Changes in payment fees in the period from December 2012 to March 2013 and December 2012 to October 2013



card fees, assuming that the impact of the tax on purchase transactions would primarily translate into annual card fees.

We did not examine potential rises in monthly account management fees in this study. Since the changes in these fees can also stem from related services and government measures, these fees cannot be accurately subdivided among individual services. Consequently, our estimates of the pass-through may be lower than actual figures if a particular bank under review responded to the rise in its costs in the wake of the tax in part by raising its monthly account management fees.

We estimated the degree to which the transaction tax was passed on across the entire period under review, for which we used the December 2012 and the October 2013 rates, and also specifically for the period before the tax was raised, up to and including March 2013 (Chart 1). The change across the entire period under review is significantly higher than justified by the transaction tax and the gap is wider in the household segment than in the corporate segment, where the banks essentially did not raise fees in excess of the transaction tax. Most banks passed the tax on card purchases by raising their fixed annual card fees, with only a few examples of fees charged proportionate to turnover. In the corporate segment, fees proportionate to turnover are even charged for bank card payments, therefore we did not analyse the changes in fixed charges in this segment. This may slightly distort downward the calculated pass-through; however, the fact that companies

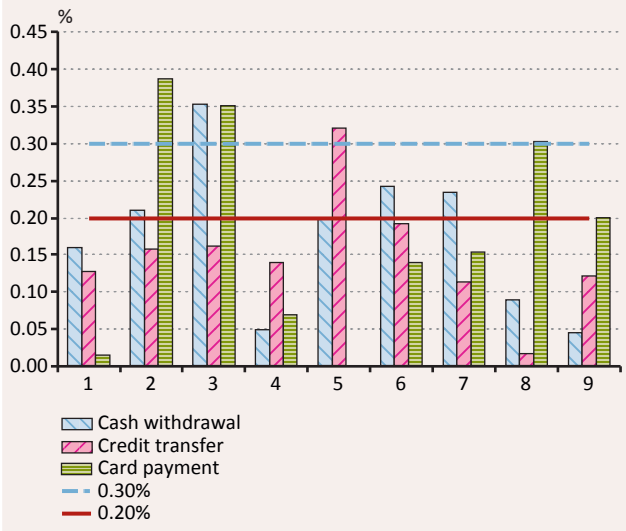
with high payment turnover are typically granted lower transaction fees compared to those published in the list of terms and conditions exerts the opposite effect.

It is important to emphasise that from early 2013 onwards, other factors may have also affected the changes in fees over the entire period under review, such as the regular annual inflation-indexed rise in fees and the impacts of other events and government measures. Thus, the accuracy of the estimate decreases over a longer time horizon and the calculations might suggest a somewhat higher pass-through than was actually the case. Nevertheless, the timing and the rates of the fee increases demonstrate that by October 2013 all of the banks had passed on in different ways the increase in costs stemming from the introduction of the transaction tax to their household clients, and moreover, the increase in fees was higher in some instances than the rate of the tax.

By contrast, the transaction tax on cash withdrawals and bank transfers was only partially passed on to household clients in the period up to March 2013, whereas bank card payment fees rose at a rate exceeding the tax (Chart 1). During the same period, the tax was passed on almost fully in the corporate segment. Analysing the changes for each particular bank rather than the average pass-through, we observed significant differences among the rates of the 11 largest banks.

The data for individual banks demonstrate strongly diverging adjustment processes in the first phase of introduction of the tax and in the period following the raising of the tax. An analysis of the individual figures reveals that most of the banks passed on the transaction tax at a below-average rate in early 2013, since the sector average was lifted by the extremely high pricing of a few banks (Chart 2). However, there were considerable differences in the methods and rates of pass-through applied by different banks.

Chart 2
Changes in household payment fees by individual bank in the period from December 2012 to March 2013



Note: Two of the 11 banks under review do not have a household business line.

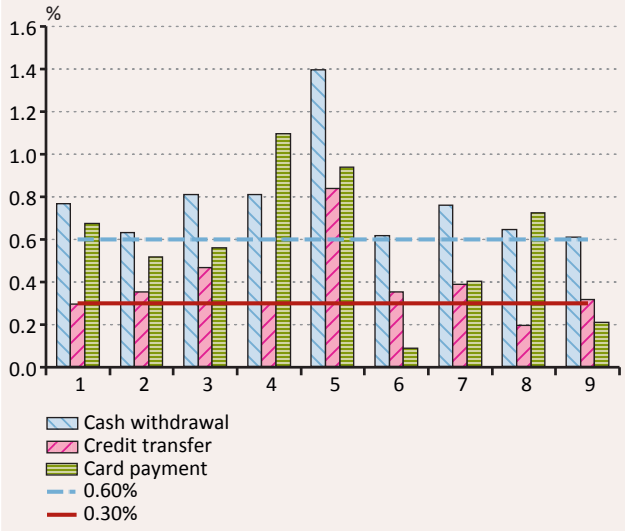
Three banks under review – marked on the chart as numbers 2, 3 and 8 – raised their annual card fees considerably, but did not cross-charge the tax to individual transactions. Four other banks (4, 6, 7, and 9) passed on the tax proportionately to a certain extent, but, with the exception of one, they did so at a rate below the transaction tax. The remaining two banks (1, 5) practically did not change their pricing for card purchases. For credit transfers, the majority of banks raised rates by 0.1–0.15 per cent in the first half of 2013, which covered 50–75 per cent of the transaction tax. One bank (5) raised its bank transfer fees to an extremely high degree, while another (6) passed on the tax almost in full. We found only one bank (8) among the nine under review operating a household business line that essentially did not cross-charge the transaction tax in its credit transfer fees. Similarly, there was a great degree of divergence among the banks in terms of cash withdrawal fees. Most of the banks cross-charged to their clients 40–60 per cent of the tax in early 2013, with one bank (3) introducing a rise exceeding the rate of the tax and two banks (4, 9) practically not passing on the transaction tax in their cash withdrawal fees in the first half of the year.

In summary, we found that the banks only partly passed on the transaction tax in their bank transfer pricing, cash withdrawals and card purchases, but that annual card fees contributed to a significant rise in payment fees already in the first half of the year.

For the entire time horizon under review, there is less variation in individual banks' figures than observed in our analysis of the rate of pass-through in the initial phase (Chart 3). In the second half of the year, the banks typically adjusted pass-through which was lower than the tax in the first phase and their total fee increases were much closer to the exact rate of the tax. This means that the banks which fully passed on the tax in the first half of the year raised their fees further to reflect the new rate of the tax, whereas the providers that had only partially cross-charged the transaction tax to their clients also passed on almost the entire tax, raising their rates steeply as the tax was increased.

Each bank under review incorporated in full the increased transaction tax in their pricing for cash withdrawals, and most banks' overall fee increases were even slightly higher than the tax. One of the banks under review (5) raised its fees substantially. Whereas the transaction tax was reflected in credit transfer pricing only in part in the first half of the year, the increase in the rate of the tax in August prompted the banks to pass on the tax in full. The high sectoral average

Chart 3
Changes in household payment fees per bank in the period December 2012 to October 2013



Note: Two of the 11 banks under review do not operate a household business line.

Chart 5
Changes in the corporate payment fees of individual banks in the period from December 2012 to October 2013

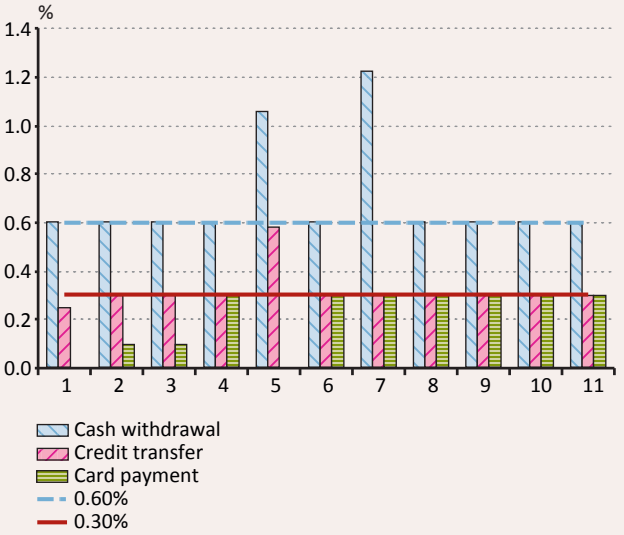
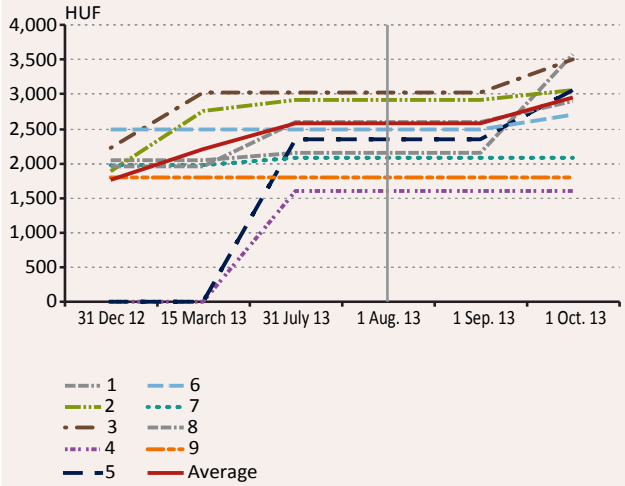


Chart 4
Changes in annual basic household debit payment card fees at individual banks in the period from 31 December 2012 to 1 October 2013



Note: The horizontal axis on the chart is not the same as a chronological axis; the chart shows fees as of the particular points in time under review. The vertical line denotes the date the increased rates of tax were introduced. Two of the 11 banks under review do not operate a household business line.

is mainly explained by increases considerably in excess of the tax by two banks (3, 5). Fundamentally, there were no shifts in pricing for card purchases, and the extreme increase in fees was caused by the dramatic rise in annual card fees. The methods of passing on fees remained unchanged across these two periods: banks that had previously cross-charged the tax to purchase transactions raised their proportionate fees higher, whereas banks that had passed on the tax via their annual card fees continued to opt for this solution.

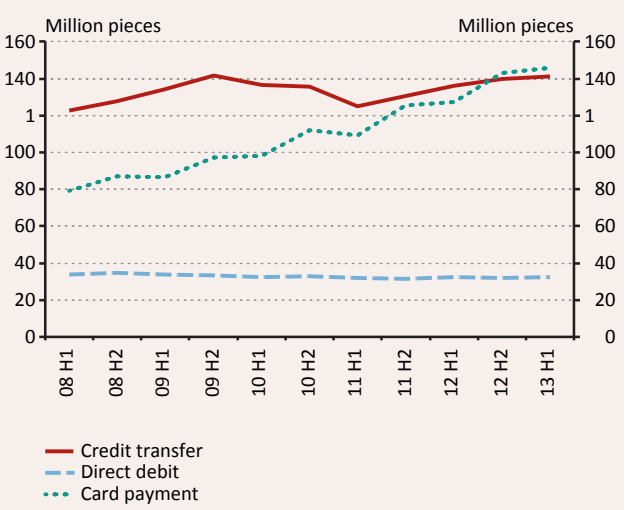
An analysis of annual card fees reveals that the lion's share of banks raised their fees immediately after the tax was introduced (Chart 4). Not a single one of the nine banks reviewed maintained their offer for free bank cards after July 2013.[2] As a result, the weighted average of annual card fees grew considerably over the past year, jumping from HUF 1,700 to HUF 3,000. Banks implemented the fee increase in two steps: gradually after the introduction of the tax in the first half of the year and then in September and October, following the raising of the tax. Projected onto the average annual total of card purchase transactions, the average rate of increase of fees was 0.54 per cent, far higher than the transaction tax. This sharp hike in fees is not explicable by other factors either.[3]

[2] To analyse the annual card fees, we took into account the card fees for the years following the first one for household debit payment cards offered in the basic account packages analysed. The annual fees for payment cards in premium client account packages changed in a similar way in the period under review.

[3] For instance, the expected annual rate of inflation represents only a marginal proportion of the excess of the fee increase over and above the rate of the transaction tax. Similarly, the extreme increase in annual card fees cannot be attributed to the reduction in interchange fees announced in September, because (i) the relevant regulation was published in September whereas the changes in the lists of terms and conditions we analysed related to the period ending in August and (ii) the reduction of interchange fees took effect only as of 1 January 2014, therefore the banks cannot have cited this as a reason for raising their fees in the autumn of 2013.

The publicly available terms and conditions reveal that fees were raised at a higher rate than the tax in the corporate segment (similarly to the household segment) in the period between December 2012 and October 2013, but only a few banks applied sharp increases (Chart 5). Six of the 11 banks under review (4, 6, 8, 9, 10, 11) passed the tax directly on in full to the affected transactions. The remaining five banks (1, 2, 3, 5, 7) changed their fees to varying degrees. Two banks (2, 3) passed the tax only partly on to bank card purchases. One bank (7) raised the fees on every item by the rate of the tax and introduced also a fee on card purchases that changed in proportion to value, but increased its ATM cash withdrawal charges by three times the rate of the tax. Two banks (1, 5) did not pass the tax on to card purchases, but did so with all other items. Moreover, the latter bank raised every other item at a rate well above the tax. Our finding overall is that, with a few exceptions, banks passed on the full cost of the tax in the corporate segment as well, and in some instances they increased their fees at an even greater rate.

Chart 6
Changes in turnover in the main electronic payment methods



When examining corporate terms and conditions, it should be noted that corporate clients with high turnover are usually eligible for discounted payment service charges compared to the rates specified in publicly available terms and conditions, and this segment is also assumed to feature a greater degree of cross-pricing.

CHANGES IN PAYMENT TRANSACTIONS IN THE FIRST HALF OF 2013[4]

Prior to the introduction of the transaction tax, payment market participants had discussed in the press and different fora the assumed impact of the tax on Hungarian payment transactions and on the payment habits of economic agents. Regarding the projected change in household client payment habits, both a fall and a rise in the use of electronic payments were likely scenarios, depending on which factor – the overall increase in payment charges or the higher tax on cash withdrawals – was deemed more significant. A decrease in electronic transactions was generally predicted in the corporate segment, stemming in part from the relocation of certain transactions abroad (primarily foreign currency transactions) and from a trend of merging transactions to reach the tax threshold. In the next part of our article, we look at the changes in the key attributes of payments in Hungary in the first half of 2013 in the light of the above assumptions. In general, the figures from the first half of the year suggest neither adjustment by either household or corporate clientele to the higher payment charges nor any resulting changes to the structure of payments (Chart 6).[5] It is important to emphasise, however, that the gradual passing on of costs and the increase in tax rates in August may have triggered a greater degree of adjustment in the second half of 2013, or may do so in the future, therefore it may be worthwhile to analyse the figures for the next six-monthly periods once they are available.

Household payments

Prior to the introduction of the transaction tax and in early 2013, two contradictory forecasts emerged regarding the impact of the tax on the payment habits of household clients. One assumption was that the higher tax rate on cash withdrawals and the resulting elevated cost of these transactions would boost electronic payments compared to the previous trend, along with a fall in total cash withdrawals. By contrast, the other assumption predicted that the overall increase in payment transaction costs would spur cash holding as economic agents' preference shifted to cash for the payments made to them. As a result, less cash would be channelled back into the banking system than before, i.e. net cash withdrawal would grow. In such a scenario, the increase in currency in circulation and cash transaction totals reduces electronic payment totals. However, payment figures from the first half of the year demonstrate that neither household client payment habits nor the totals in the various payment methods changed compared to earlier trends.

[4] We used figures available as of 30 September 2013 to analyse the changes in payment transactions.
[5] This analysis focuses primarily on the changes in the turnover figures in the main payment methods. The detailed turnover and infrastructural figures are available in the Payment Table Sets regularly published on the MNB website.

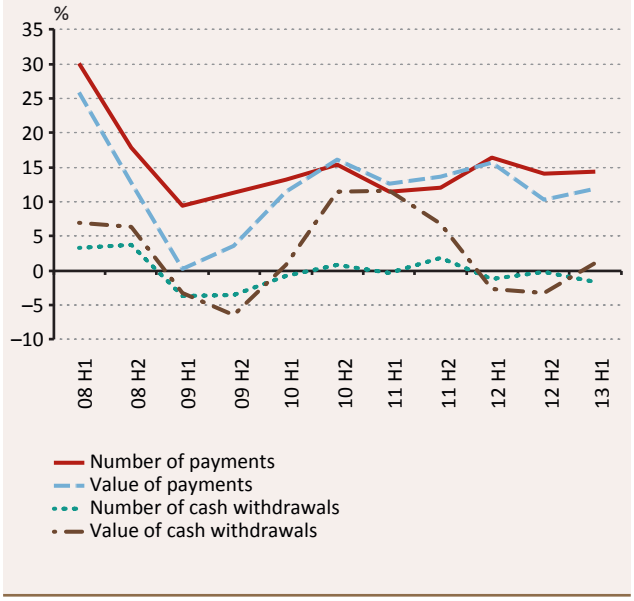
As cash withdrawals are subject to cyclicality, similarly to card purchases, with turnover rising in the second half of the year, a year-on-year comparison of payment totals is justified. The number of cash withdrawal transactions declined by 1.7 per cent from H1 2012 to H1 2013, but their total value increased by 1.2 per cent. In the first half of 2012, the number of transactions also decreased slowly, but at that point in time their total value was also lower in year-on-year terms. The average value of cash withdrawals with payment cards issued in Hungary was in excess of HUF 49,000 in the first half of 2013, HUF 1,400 more than in the same period in 2012. The number of cash withdrawals from ATMs in Hungary, which represent the bulk of transactions, decreased by 1.3 per cent in the first half of 2013, while their value grew by 6.1 per cent compared to the first half of 2012. A comparison of the figures to the changes in turnover observed in the first half of 2012 reveals that the number of transactions fell at the same rate in the first half of 2013, while the value of transactions grew to a greater degree. A greater fall can be observed in cash withdrawals at domestic branches using payment cards for identification. This category tends to comprise higher-value cash withdrawals and the number of these transactions decreased by 8.1 per cent and their value fell by 20.9 per cent in the first half of 2013 compared to the first half of 2012. This does not represent a major deviation from the relevant trends in the first half of 2012, when transaction numbers contracted by half this rate, but values fell by a similar degree.

Figures on cash withdrawals with cards tend to yield highly volatile, seasonally fluctuating time series. As for ATM cash withdrawals, there is an increasing trend of using domestic cards in Hungary as well as abroad. The value of cash withdrawals abroad is increasing above the linear trend, whereas the domestic trend is roughly linear. The value of cash withdrawals using cards in bank branches is similarly volatile, but the time series are difficult to explain with seasonal fluctuations, and the trend is typically decreasing both domestically and abroad.

There is no linear relationship between value and volume data for cash withdrawals, because the average transaction value continued to rise steadily during the period under review. If we assume linearly increasing and seasonally fluctuating average values, there is no significant relationship between the two variables. There was no breakpoint in recent years in either of the variables observed, and the decreases and increases are most likely attributable to accidental changes and the high degree of volatility.

Purchases with Hungarian-issued payment cards have been characterised by seasonality in recent years: stronger increases in turnover in the second half of the year were followed by stagnation or only a moderate increase in the first half of the subsequent year, therefore it is advisable to compare the six-monthly figures to the same period in the preceding year. Accordingly, the number of transactions grew by 14.4 per cent and their value by 12 per cent compared to the first half of 2012. This is in line with, and does not deviate considerably from, developments observed in recent years. While the number of domestic purchases in retail stores increased by 12.5 per cent, the number of such transactions abroad grew by 34.3 per cent. Developments in online and other remote card purchases are worth noting: their number grew by 30.7 per cent and their value by 29.5 per cent. Notably, the growth figures in 2012 were very similar for purchases abroad and online.

Chart 7
Year-on-year changes in payment card transactions



The time series of card purchases fall into two categories. The value of conventional, in-store transactions shows an upward trend domestically as well as abroad, subject to high seasonal fluctuations. Online purchases also show an upward trend, but with no significant seasonal fluctuation.

The data observed demonstrates that domestic in-store purchases follow a linear trend, whereas purchases abroad are rising dynamically, following an exponential trend. There is an opposing trend among online purchases: growth in domestic purchases is steadily high and an exponential trend is a good approximation for it, whereas foreign purchases only show a linear trend. Both of these trends were uninterrupted in the first half of 2013.

Average transaction values for merchants and online purchases abroad continued to fall in recent years, meaning

that customers are now using their bank cards for smaller purchases as well; domestic online purchases are an exception to this trend.

No major change compared to previous periods has emerged among direct debits, the electronic payment method used for utility and other bill payments. Transaction numbers were only 0.3 per cent higher than in the first half of 2012, but the transaction value grew by 2.7 per cent. This means that payments changed in terms of both quantity and value at a rate similar to the preceding periods.

In summary, the changes in these figures reveal that the number and the value of electronic transactions has continued to rise and the number of cash withdrawals has fallen (Chart 7). Accordingly, there has been a continuation of the favourable trends of increasing efficiency in payments in Hungary, as the dynamics of these developments did not deviate in the first half of 2013 from the trends observed in recent years and there is no break in the trend, i.e. the introduction of the transaction tax did not have an observable impact on the payment habits of households in this period.

Corporate payments

The expectations voiced in the past regarding the consequences of the transaction tax on corporate payments presumed that the increase in payment charges would result in the relocation abroad of some of the transactions, primarily foreign currency transactions, as well as the merging of transactions in order to reach the HUF 6,000 transaction tax threshold. However, the analysis of the payment methods typically used by corporate clients does not reveal major deviations from earlier trends in this segment either, and thus the earlier expectations regarding changing payment habits have not materialised for the time being.

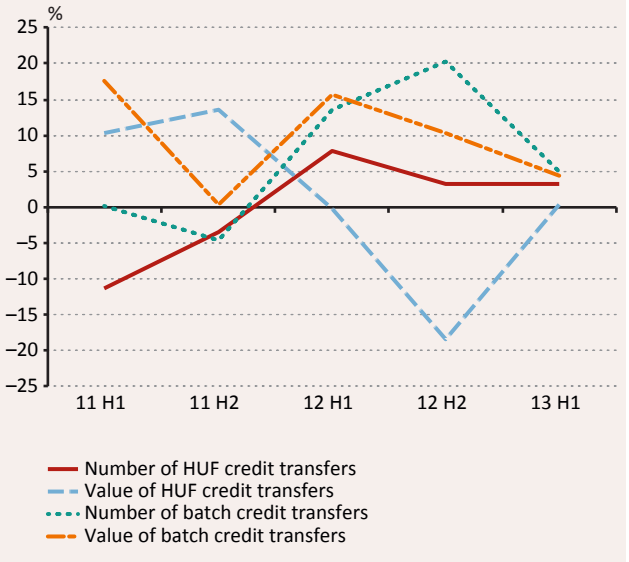
In the first half of 2013, the number of foreign currency credit transfers was 3.8 per cent higher than in the first half of 2012, but their value decreased by 5.7 per cent. Had foreign currency transactions been relocated abroad to a significant degree, the transaction value would have fallen more sharply and the number of transactions would have also contracted. The average value of transactions decreased by close to HUF 2 million compared to the first half of 2012, which means that the data available also do not suggest mergers of transactions.

The number of HUF credit transfers increased by 3.3 per cent and their value by 0.9 per cent compared to the first half of the previous year. The average value of credit transfers decreased year-on-year by nearly HUF 54,000 to HUF 2.3 million in the first half of 2013. Had a significant proportion of transactions been merged, the number of transactions would have presumably fallen given the nearly unchanged transfer total and the average transaction values would have risen. But turnover figures from the first half of the year do not suggest that corporate clients merged a significant volume of their credit transfers.

The number of credit transfers initiated in batch increased by 5 per cent over the same period in the previous year, and total value grew by 4.4 per cent. This meant that batch credit transfer turnover increased at a rate lower than previously, but the turnover figures today do not suggest a major rechanneling of salaries or other regular incomes to cash from the electronic payment methods. The average value of batch credit transfer transactions was nearly HUF 152,000, which is not significantly different from the relevant figure in the first half of 2012. We can infer trends from the aggregated domestic and intrabank batch credit transfer and direct debit figures only to a limited extent. The value of direct debits and credit transfers initiated in batch has grown constantly over recent years, whereas this value stagnated and was highly volatile in intrabank turnover. No breakpoint can be observed in these trends.

The number of cash withdrawals from bank branches without a bank card, which are mostly corporate clients transactions, decreased by 12.4 per cent year-on-year in the first half of 2013, while their value fell by 20.5 per cent. The average value of transactions was nearly HUF 570,000 in the first half of 2013, nearly HUF 58,000 less than in the second half of 2012. The number of transactions fell at a higher rate than before, but their value contracted year-on-year in 2013 at the same rate as in 2012. These figures indicate that there were no mass mergers of corporate cash withdrawals in the first half of 2013

Chart 8
HUF credit transfers and credit transfers initiated in batch year-on-year turnover comparison



in order to minimise the amount of tax. The analysis of the payment methods most frequently used by corporate clients reveals that, similarly to households, corporate clients did not change their payment habits to any significant extent in the first half of 2013, i.e. no adaptation to higher payment costs can be observed among corporate clients (Chart 8). The figures from the first half of the year do not allow us to infer the merger of transactions or their relocation abroad.

In the above analysis, we formulated our conclusions based on the payment figures for the first half of 2013 directly available. It should be noted, however, that the MNB's data on changes in the currency in circulation suggest that currency in circulation has increased in the second half of 2013 at a greater rate than in previous years.[6] This trend may have been influenced by the composite effects of a number of factors, and further analysis will be required to identify the exact underlying causes. Nevertheless, the contribution of a greater degree of adaptation in the second half of the year to the higher payment costs in the wake of the introduction of the transaction tax should not be excluded as a possible driver. The analysis of payment statistics for the second half of the year, expected in spring of 2014, may provide an accurate response to this question.

CONCLUSIONS

The analysis of the terms and conditions of Hungarian banks reveals that by 2013 they had passed the transaction tax on to clients in a number of increments and practically in full. Payment service providers hiked annual bank card fees substantially, by almost double the size of the transaction tax. According to advance forecasts, the rising payment costs may have had a major impact on payments in Hungary even over the short term. Given the structure of the tax and the nature of its pass-through, there were contradictory expectations regarding household payment habits either for a decline in cash use or, on the contrary, an increase in currency in circulation and cash holding. In corporate payments, the possibility was suggested of merging some transactions to reach the tax threshold and the relocation abroad of mainly foreign currency transactions.

Nevertheless, our analysis of Hungarian payment figures in the first half of the year reveals that, for the time being, neither of the client segments under review has changed its payment habits, i.e. there are no signs of rapid adjustment by economic agents to the increased payment charges. Earlier trends in payment method usage continued and the impact of the introduction of the tax on these trends cannot be identified. The absence of quick adjustment to higher payment charges may stem from the fact that clients first encountered the new terms and conditions for payment services presumably only in the spring of 2013. Once tax rates were raised in August, payment terms and conditions were amended again and other regulatory changes suggest that further price modifications can be expected for payment services in the first half of 2014, which is why we will continue to monitor the changes in pricing and the impacts of the same on payments.

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Miklós Luspay and Annamária Madarász: The effects of the introduction of intraday clearing on turnover in Hungarian payment systems

This article investigates how turnover has changed in the Hungarian payment system over the almost 18-month period since the introduction of intraday clearing (2 July 2012). A development exercise of a similar scale took place in Hungarian payments when VIBER was introduced in 1999, which allowed the central bank to estimate the effects on payment turnover and bank liquidity in preparation for this project. This article once more poses the questions most frequently encountered during the development project and offers answers based on the experience available today. Even before the introduction of intraday clearing, it was clear that this new clearing system would be beneficial for retail and corporate clients alike, but it is only now, after more than a year, that we are able to assess the changes in turnover and the effects on liquidity. This article presents the types of transactions that have moved from VIBER to the intraday clearing system and the extent of such, and it also looks at how the agents of the Hungarian banking system have grappled with the liquidity aspects of the introduction of the new system and what additional mechanisms are available to them to improve their liquidity.

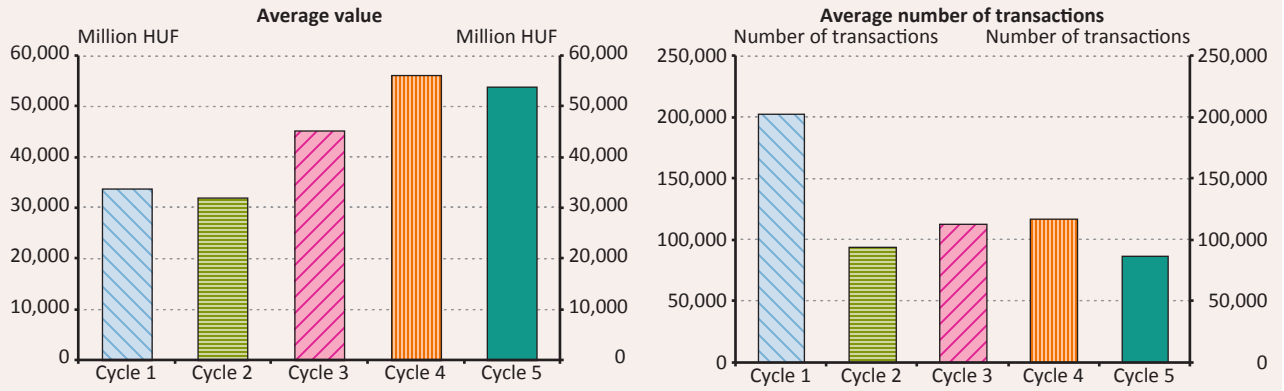
A BRIEF DESCRIPTION OF THE HUNGARIAN PAYMENT INFRASTRUCTURE

Interbank payments are essentially transacted via three clearing and settlement systems in Hungary: the Real-Time Gross Settlement System (VIBER), the Interbank Clearing System (ICS), and the securities clearing and settlement system operated by the Central Clearing House and Depository (KELER) Group. Transactions in the latter are connected to securities trading, which was not affected significantly or directly by the introduction of intraday clearing and is therefore not addressed in this article.

VIBER is a real-time gross settlement system operated by the MNB, which primarily serves the purpose of clearing high-value and time-critical payment transactions. Forint-denominated and foreign currency payments, the cash side of capital market transactions and other urgent, time-critical customer transactions (such as home purchase payments) are cleared in this system. The clearing and settlement of transactions is not separated in the system. The system is real-time, therefore if the funds are available (gross principle), the transactions are executed finally and irrevocably, in central bank money (on payment accounts managed by the MNB).

ICS is a domestic low-value gross payments system operated by GIRO Zrt.; the transactions are submitted to the system, and thus accounted for, in batches. The gross principle of operation means that credit risk is not incurred in the clearing process, since transactions submitted by the participants are cleared only up to the amount of funds available. In ICS, the clearing and the settlement of transactions are separate. ICS "merely" performs the clearing of the payment transactions (determining the mutual payment positions of the banks), whereas settlement (the actual funds transfer) is the responsibility of the MNB as settlement bank. Under the standard conditions of overnight clearing, settlement takes place in the MNB's InFoRex account management system. If items are queued due to lack of funds or if the participants submit the message late (after 1:00 am), clearing is completed in an extraordinary clearing phase. Settlement for this phase then takes place in the morning in VIBER. Consequently, ICS as payment system is dependent on the MNB's systems at three points of the process: it receives the participants' liquidity data from the MNB (in the evening); the items from overnight

Chart 1
ICS intraday turnover figures per cycle
(July 2012–September 2013)



clearing are settled in InFoRex (in the morning, before start-of-day in VIBER) and its transactions cleared in the morning (i.e. transactions that were not cleared overnight due for instance to queuing) are settled in VIBER.

Introduced in July 2012, the new ICS intraday clearing system offers five cycles during the day for clearing transactions instead of the earlier overnight clearing solution.[1] In the new clearing arrangement, clearing and settlement continue to be distinct processes. In the past, when only overnight clearing was available, the transactions were only completed the following morning, whereas the new system now offers the possibility for executing low-value payments (primarily retail and corporate transactions) within the day. In addition to significantly accelerating payments in Hungary, the new system has, for certain transactions, created a sort of competition for VIBER owing to its lower transaction fees and faster administrative processes among other factors.

In the following section, we present ICS intraday turnover values and quantities across a day and a month, discuss how members have adapted to the newly introduced system and what opportunities they have for further adjustment (in terms of liquidity management). We investigate whether there are any signs to confirm banks' preliminary concerns regarding the liquidity difficulties expected from the intraday clearing system, whether there have been any symptoms of this, such as queues, rollovers from one cycle to another or non-executed transactions. We shed light on the effects of the deployment of intraday clearing by addressing the questions frequently asked prior to introduction.

TURNOVER

How did turnover change within each day and within each month after the new clearing arrangement was introduced in ICS?

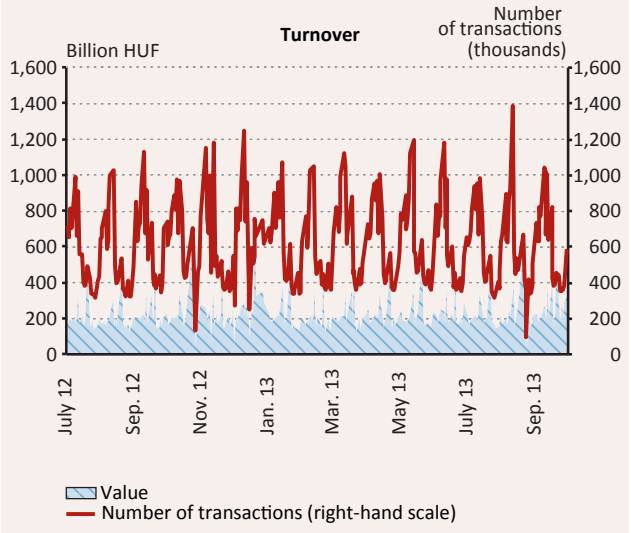
Clearing in ICS takes place in five cycles, at predefined points of time during the day. Following the introduction of intraday clearing, almost half of all ICS items and four fifths of the total value were executed in the intraday clearing system. Transactions submitted on paper, direct debits and the outgoing items of the Hungarian State Treasury continued to be executed in overnight clearing. Daily turnover is spread over the cycles unevenly, with major differences in terms of value as well as quantity. The average number of items is the highest in the first cycle, when high-value and low-value transactions are executed. One reason is that, for example, this is the cycle for clearing those retail transactions that the banks had accepted after their deadline for processing within the particular day and forwarded to the payment system only on the following day; forward-dated orders are also cleared in this cycle. In contrast to the first cycle, the last two cycles have much lower quantities and significantly higher values. This is presumably due to the fact that a large portion of high-value (primarily corporate) transactions and regular tax payments (e.g. VAT, tax advances) are executed in the 4th cycle, which is clearly demonstrated by the fact that this is the cycle with the highest average transaction value (Chart 1).

ICS intraday turnover features major outliers from time to time, mostly on the days when taxes and contributions are paid.

[1] Cycles and post-cycle settlement periods: Cycle 1: 06:30 am – 08:30 am (08:30 am – 09:40 am), Cycle 2: 08:30 am – 10:30 am (10:30 am – 11:40 am), Cycle 3: 10:30 am – 12:30 pm (12:30 pm –1:40 pm), Cycle 4: 12:30 pm – 2:40 pm (2:40 pm – 3:50 pm), Cycle 5: 2:40 pm –4:30 pm (4:30 pm – 5:55 pm).

Compared to other days, banks' debit turnover increases on the 12th and 20th[2] of each month (or if these are non-banking days, on the first following workday) across all five cycles due to the payment of tax advances, with the highest turnover being transacted in cycles 4 or 5. The highest outgoing turnover figure after the introduction of intraday clearing was observed on 20 December 2012, which was attributable to the deadline for topping up advance tax payments. In intraday clearing, banks are unable to estimate in advance the amount of turnover in their system for a particular day or a particular cycle. This may represent a problem primarily on days with intense movements of funds, because if banks do not have sufficient liquidity, they have to obtain the missing amount. The situation may be particularly critical on days when taxes are paid, because on such occasions every actor across the entire sector is making tax payments to the Hungarian State Treasury, which represents a liquidity outflow from the system that might cause hiccups in liquidity management for banks (making it difficult for them to obtain funds from one another). Major fluctuations in ICS intraday clearing turnover may reach as much as HUF 300 billion on days when tax is paid.

Chart 2
ICS intraday daily turnover
(July 2012 – September 2013)



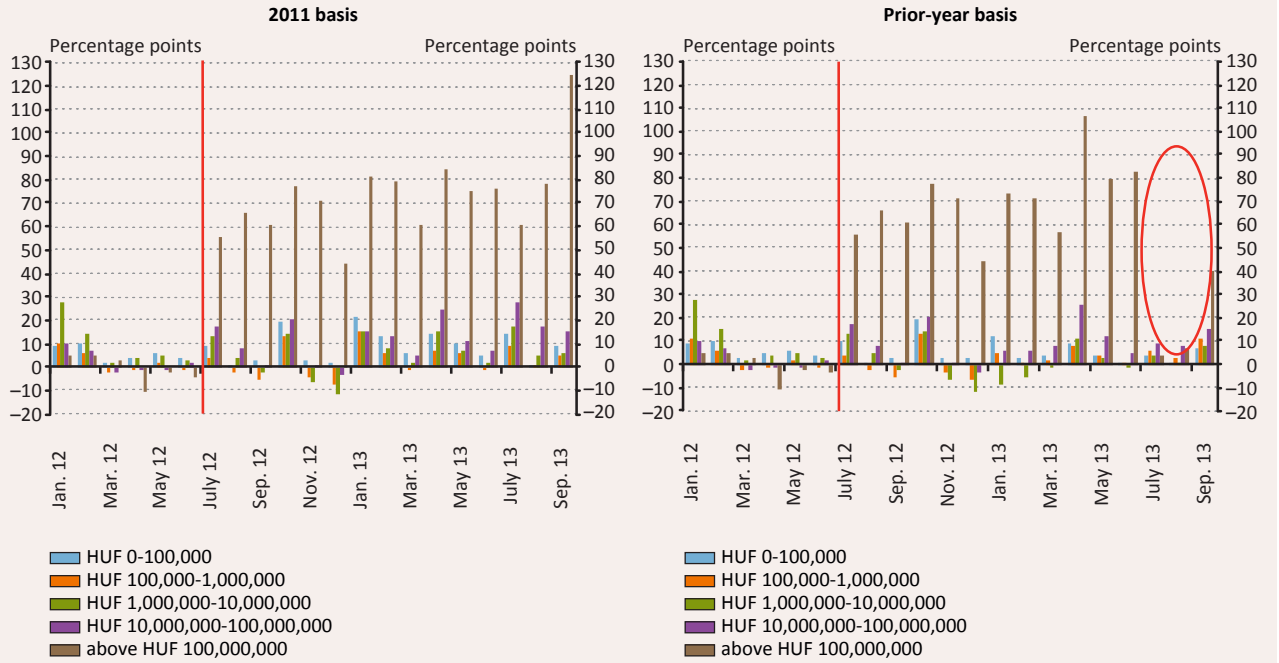
For what VIBER transactions would intraday clearing serve as a realistic alternative?

Following the introduction of ICS's intraday system, there is no crucial need to use VIBER, the Hungarian high-value payments system, whenever the parties to a time-critical transaction wish to submit it for execution within the day. In the new system, the payment orders submitted electronically by banks' clients must be executed within no more than four hours.[3] However, intraday clearing only offers a genuine alternative to transacting via VIBER only for certain types of transactions, because certain types (foreign exchange market transactions, interbank transactions) have specifics limiting their prompt execution in VIBER. The difference between the diverging "rationales" for ICS and VIBER is demonstrated clearly by the fact that the annualised average item value was approximately HUF 780 million in VIBER and HUF 250,000 in ICS in 2011.

The central bank does not have clear information about which items were cleared in ICS rather than VIBER after the implementation of intraday clearing; therefore, we had to resort to a simplified estimate in an effort to arrive at this information. In our analysis, we have reduced VIBER turnover to transaction types which may potentially shift to ICS and compared those to one of the transaction types in intraday clearing (the simple credit transfer). We assumed that if there are transactions that have shifted from VIBER, then these are very likely to have been VIBER customer transactions, seen in ICS as simple credit transfers.[4] Accordingly, we chose the simple credit transfers from the entire intraday turnover in ICS for our analysis, since this is the transaction type most easily matched to specific VIBER client items. In our comparison, we only took into consideration the executed transactions among all the simple credit transfers, i.e. we subtracted items rejected from transactions initiated. In this way, we arrived at the actually cleared and executed intraday ICS turnover.[5] Our analysis considers the highest value band of over HUF 100 million separately, because this is the segment that corresponds best to VIBER's customer transactions of considerably higher average value. We assume that if there is a shift from VIBER turnover to intraday clearing, then it will have primarily involved these items.

[2] With the exception of one or two minor public finance revenue items, these two days are stipulated as payment deadlines; personal income tax and VAT due dates are both on this day.
[3] This only holds true if the credit institution managing the client's account executes the transaction by the deadline and in the manner stated in the general terms and conditions.
[4] We are able to make this simplification in the light of the special nature of the rest of the transaction types.
[5] We could have investigated the initiated transactions separately, since the likelihood of error is always higher when a "new system" is put to use, in this case when banking transactions are submitted to intraday ICS rather than VIBER, resulting in a higher ratio of rejected items. Initiated transactions may express "intention", and the analysis of intentions may also be significant following the introduction of an intraday clearing system. We did not opt for this alternative due to the low rate of rejection.

Chart 3
Simple credit transfers in terms of the 2011 basis and the prior-year basis
(January 2012–September 2013)



How did ICS turnover change after the introduction of intraday clearing?

The analysis reveals that after the launch of intraday clearing the total value of simple credit transfers in ICS grew significantly from the 2011 basis levels in the above HUF 100 million value band. Prior to the introduction of intraday clearing, ICS's simple credit transfer turnover for items exceeding HUF 100 million practically decreased in the period January to July 2012, after which the rate of value growth was between 40 and 120 percentage points in the period July 2012 to September 2013. Comparing the turnover figures to the previous year as a basis, we find that turnover in July and August 2013 was nearly equal to the turnover in the year of introducing IG2 (Chart 3).

The number of transactions in excess of HUF 100 million also grew significantly after the introduction of intraday clearing. The only difference identified by the analysis of the number of items versus the transaction values is that the introduction of intraday clearing had a smaller impact on the number of items exceeding HUF 100 million (growth between 20 and 60 percentage points). This clearly demonstrates that the expansion was generated by the large-amount, high-value transactions, which, knowing the average size of VIBER customer transactions, once again confirms the assumption that the increase in ICS turnover in 2012 was caused by a shift of some of VIBER turnover to that system (Chart 4).

The process of shifting is presumed to have mostly ended by the middle of 2013 and a similar degree of turnover expansion is not expected in the future. An analysis of simple credit transfers in excess of HUF 100 million reveals that turnover continued to expand considerably until June 2013, but grew more moderately afterwards. This may mean that by mid-2013 banks and clients will probably have moved the items for which intraday clearing is a genuine "replacement product" for VIBER to ICS and that this led to a slowing in the rate of growth (Charts 3–4).

In all probability, HUF 600–1000 billion in turnover value shifted per month from VIBER to ICS intraday clearing. Analysing the shift from VIBER turnover, we looked at trends in changing turnover in previous years to identify how the value and number of transactions in excess of HUF 100 million would have changed, *ceteris paribus*, if intraday clearing had not been introduced (Chart 5). This involved identifying the growth in ICS turnover in 2010 and 2011, which then served as the basis for our calculation of how much turnover would be "justified" in 2012. The results indicate that ICS turnover predicted by earlier trends would have been below the turnover actually realised by the system. In terms of value, the difference between estimated and actual turnover appears to show HUF 600–1200 billion surplus over the 2010 trends, whereas the figure on the 2011 basis is around HUF 600–800 billion. This means that the introduction of intraday clearing has caused turnover in ICS to exceed by this amount the turnover

Chart 4
Number of simple credit transfers on a 2011 basis and a prior-year basis
(January 2012 – September 2013)

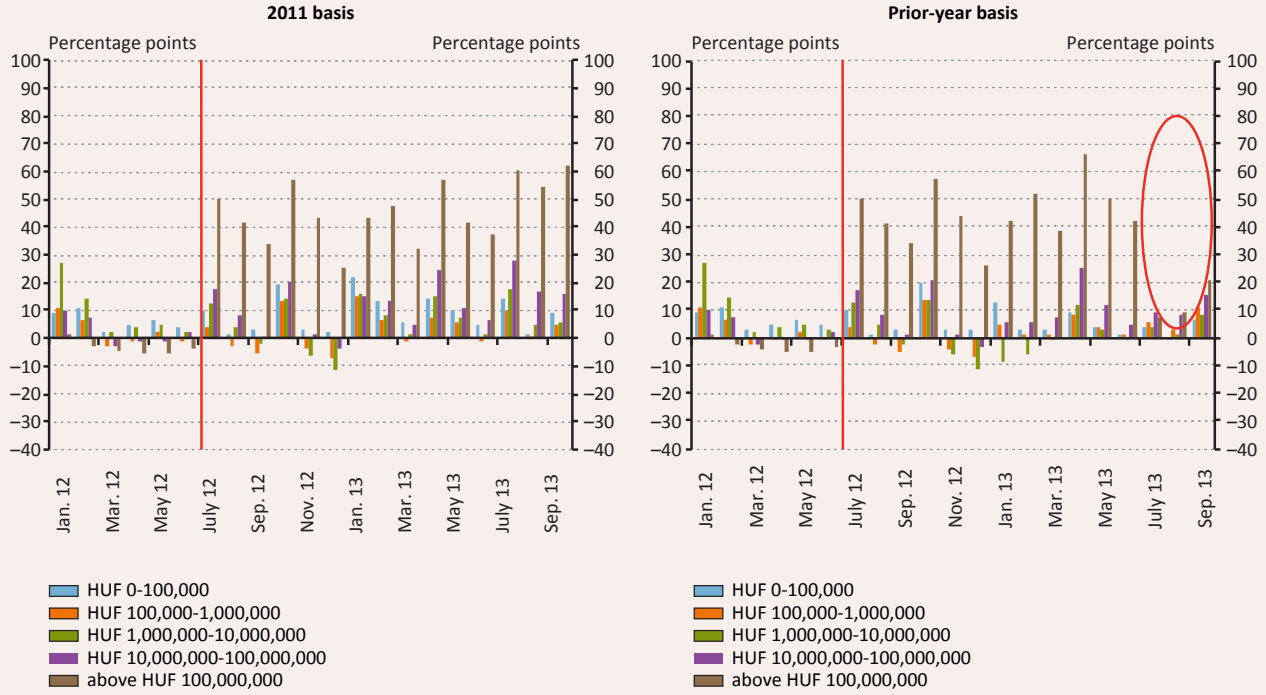
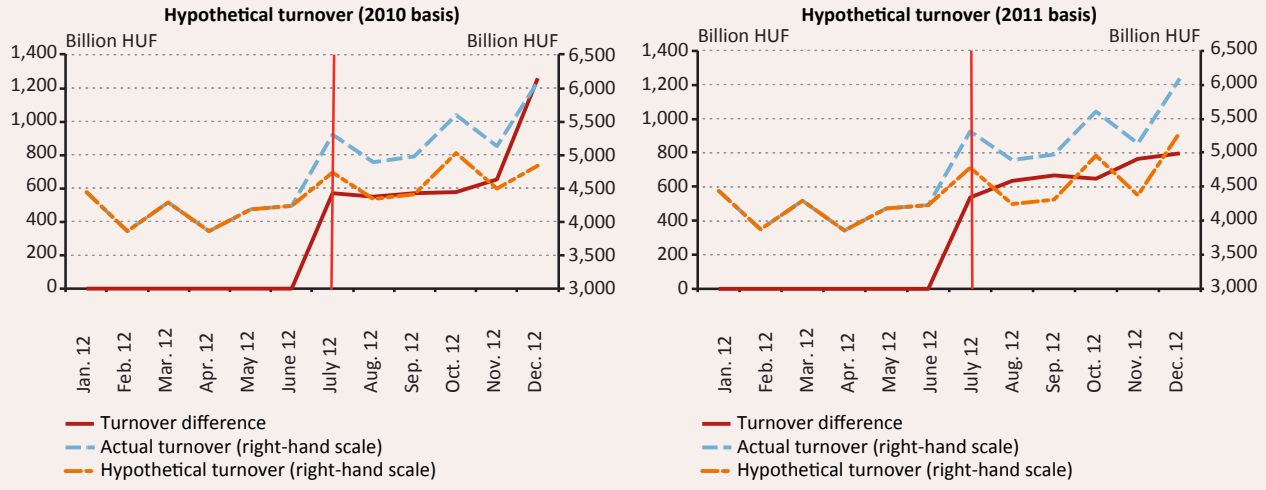


Chart 5
Actual and hypothetical ICS intraday clearing turnover in the case of transactions in excess of HUF 100 million
(2012)

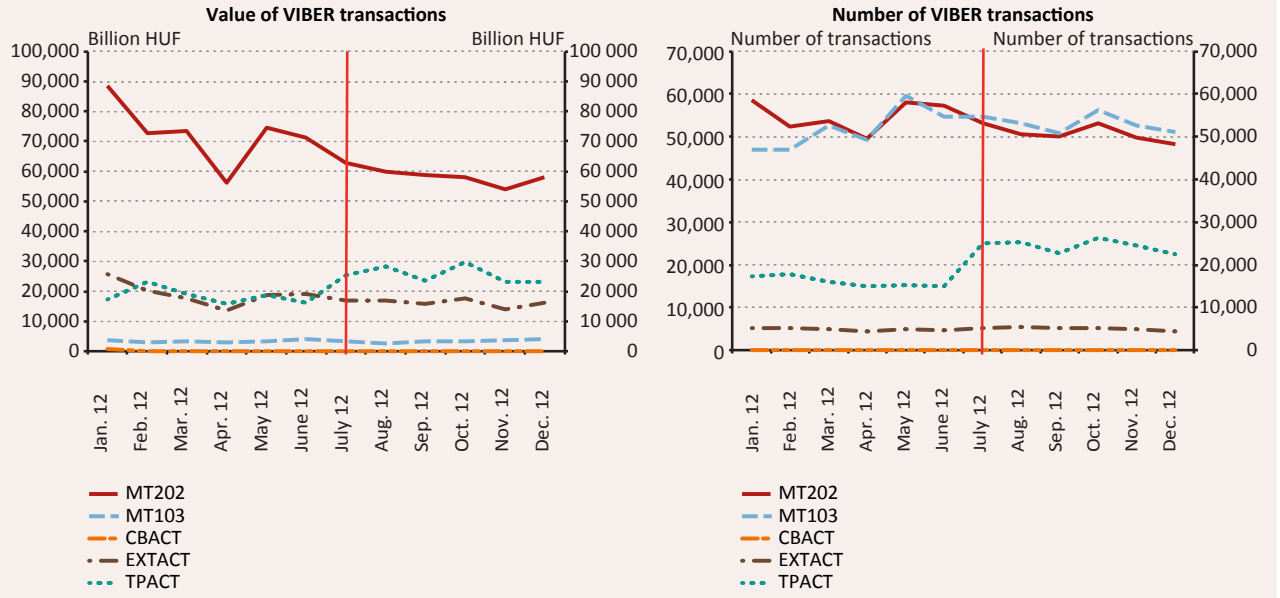


forecast from trends in prior years. Assuming average monthly turnover growth of HUF 700 billion, annual growth in turnover will exceed HUF 8000 billion and if all this represents shifts from VIBER, then a similar amount of decrease will have materialised in VIBER.

The shifts due to the introduction of intraday clearing do not have a marked effect on the level of turnover in VIBER (Chart 6).

The customer transactions presented above represent only a smaller part of VIBER turnover. The larger part of VIBER turnover (approximately 60 per cent) comprises interbank transactions. These are the transactions embodying the forint side of interbank transactions (swaps, depos). DVP items, which represent the execution of the forint side of securities transactions, account for 15 per cent of total transaction value. By contrast, customer transactions account for only 5

Chart 6
Changes in VIBER turnover per message type
(2012)



Note: MT202: Interbank transactions, MT103: Client items, CBACT: Transaction for manually posted central bank transactions, EXTACT: Automatically posted central bank transactions, TPACT: Securities transactions posted by KELER.

per cent of total VIBER turnover, while in terms of the number of transactions they are the predominant transaction type, accounting for nearly 40 per cent of total volume. It is primarily high-value retail and corporate transactions that are executed as customer transactions in VIBER. The average item size of these transactions (around HUF 100 million) is considerably below the average item sizes of interbank transactions (around HUF 1.2 billion) and DVP items (around HUF 670 million). These items, which are low-value from a VIBER perspective, are the ones that may potentially appear, and have indeed appeared, in ICS as simple credit transfers.

In summary, the total value and the number of items in excess of HUF 100 million have both grown in ICS since the introduction of intraday clearing. This clearly indicates that growth in ICS turnover originated from the high-value transactions, which – recognising the average size of VIBER customer transactions – confirms the assumption that the shift of some of VIBER turnover was the underlying cause in the increase in this segment of ICS turnover. However, while there is significant growth in terms of value (nearly 140 percentage points over the 2011 basis), the increase in terms of the number of items is much smaller (70 percentage points). Nevertheless, the items already shifted or potentially shifting in the future will not have a substantial effect on turnover in VIBER in terms of either value or quantity.

What might explain the shift of some of VIBER turnover to ICS?

One reason for the shift may be the significantly lower fee charged by banks to their clients for submitting transactions to ICS as opposed to VIBER. At most banks, VIBER fees are an order of magnitude higher[6] than the fees charged for simple credit transfers,[7] making it far cheaper for clients to submit to ICS rather than VIBER any transactions that are urgent but for which the 4-hour deadline for execution is still sufficient. This leads to the conclusion that clients may have had financial reasons for switching some transaction types previously submitted to VIBER over to ICS after the launch of intraday clearing. It is of course possible that banks negotiate non-standard fees with some of their clients, fees that are lower than the published prices. Even so, it would be hard for these prices to compete with the fees charged by banks for ICS services.

Another reason for the shift might lie in the fact that it may be technically easier and faster for banks to submit certain items to ICS. Part of the transaction clearing process that

[6] The minimum fee per transaction is approx. HUF 10-13,000 for retail clients and HUF 10-20,000 for corporate clients.
[7] The minimum fee per transaction is approx. HUF 100-300 for retail clients and HUF 100-500 for corporate clients.

used to be limited to VIBER due to the time constraints can now be executed in ICS as well, and while VIBER client items are processed manually at many of the banks, ICS is fully automated at most of banks, which speeds up processing.

Banks' liquidity management considerations may also underlie the shift. If ICS rather than VIBER is selected for clearing items by setting the gross parameter,[8] the liquidity effect may be positive, since some of the liquidity (incoming transactions) will be credited within a maximum of 10 minutes after GIRO's end-of-cycle removal of funds. This would benefit the bank, as the case may be, since it would need to cope without the liquidity for only the duration of clearing (around 10-15 minutes). The liquidity impact might be even more favourable if the parameter were set to net funds. In this case, ICS will take liquidity only to the extent that debit turnover exceeds credit turnover. In terms of a bank's liquidity therefore, it may appear a rational solution to submit certain items to ICS instead of VIBER, with the parameter set to net funds request, which may explain some of the shift of VIBER turnover. This last liquidity consideration is unlikely to serve as sufficient motivation for the members of the clearing systems, since only two clearing members have selected the net and two the net+ funds request parameters since the launch of intraday clearing, with the rest opting for the gross parameter setting (this is covered in depth later in this article).

What type of transactions may boost ICS turnover further?

The increase in intraday clearing turnover may be attributable to a number of other factors in addition to the shift from VIBER. In some cases, the use of intraday clearing may have resulted in the integration of many transactions previously executed in cash. These are items where the most popular and fastest solution used to be cash in order to make the payments within the same day. With the introduction of intraday clearing, however, these transactions can now be executed in the payment system within the same day. Still, these potentially shifting items are presumably low-value transactions, since it is only in the case of these transactions that high VIBER charges would have prompted a decision to carry out the transaction in cash (as VIBER would have facilitated intraday execution as well). Nevertheless, the analysis of the existing ICS data does not provide evidence of this type of shift.

Another factor driving the increase in turnover may be the fact that clients used to cluster their transactions in a single bank to achieve faster and cheaper execution. Many, especially corporate clients, selected their account manager so that their incoming and outgoing payments were on an intrabank basis, i.e. their own account manager should be the same as that of their partners. This would have been a rational decision in terms of cost as well as liquidity. After the introduction of intraday clearing, the former cost and liquidity advantages were in part lost or at least considerably reduced and it is no longer necessary to select a bank as account manager for reasons of payment rationalisation, which opens up the possibility for switching banks motivated by the bank's other services. After the introduction of intraday credit transfers, transactions between banks can also be executed within the same day, quickly and considerably more cheaply than before (VIBER).

LIQUIDITY

What features of intraday clearing can help banks' liquidity management and how?

The liquidity impact of intraday turnover in ICS on the entire payment system (its liquidity requirement) is highly dependent on the choice of liquidity parameters by the clearing members. In the intraday clearing system, clearing members are required to make available on their account with the MNB, for the period specific to the particular cycle, the funds necessary for settling the payments in the given cycle. Each month, clearing members can select whether they wish to provide the funds on the basis of (1) their net position vis-à-vis clearing members, as calculated by GIRO Zrt. for each cycle; or (2) their total debit/outgoing turnover (on a gross basis) or (3) as a combination of the aforementioned two options, on a net plus a given amount (net+) basis. If the gross funds parameter is set, then the items will be definitely cleared, regardless of the behaviour of the other clearing members, whereas in the other two cases the clearing will be dependent in part on the funds of the other clearing members, via the items received from them.

Beyond a choice of funds collection parameters, GIRO offers the banks a number of other means for making liquidity management easier. ICS accepts the transactions it receives after several rounds of validation and then clears them within the cycle boundaries (by a predefined time). After processing the transactions received for a given cycle, GIRO informs the clearing members of the liquidity required for the given cycle. On its account in VIBER, GIRO initiates the collection of the funds against the accounts of the clearing members also in VIBER. Prior to submitting the order for collecting the funds, ICS notifies in advance the clearing members of the liquidity required for the given cycle (their gross and net positions), which may help the clearing members in settling the turnover of the particular cycle in the event of a liquidity shortage.

[8] The parameters will be discussed later.

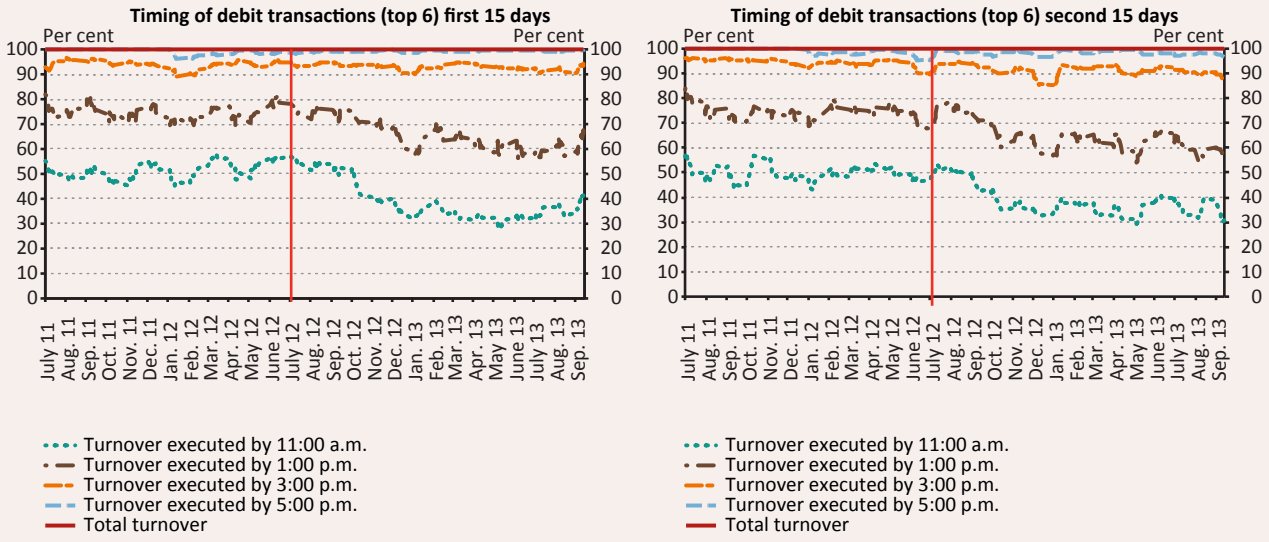
Furthermore, at the end of the last cycle, ICS sends a circular message to the clearing members, informing them of the total-bank lack of funds figure. Also useful for the clearing members in managing their liquidity is the InterGIRO monitor, in which they can follow at all times the statuses of the orders submitted by them. The system makes real-time data available to the clearing members at all times, helping them manage their liquidity. In addition, VIBER has tools supporting intraday item and liquidity management (SWIFT inquiries, VIBER monitor, etc.). VIBER's most important tool for supporting liquidity is the blocking of not-yet blocked central bank eligible securities and thus increasing the intraday credit line.

The liquidity that banks have for payments primarily consists of the current account balance and the credit line made available for up to the total of the securities blocked for the benefit of the MNB. The credit line is used if the bank's current account balance does not cover its outgoing payments (negative current account balance). In addition to the above two sources of liquidity, banks can also rely on incoming items as contribution to their funds. This is additional for the banks, since a bank experiencing a potential liquidity shortage will release its outgoing items only if it has accessed sufficient funds from its partners (incoming items). This behaviour can be analysed by inspecting the timing that the banks follow in submitting their items. If the banks wait for transactions to accumulate, then item submission behaviour is postponed to a later time, which offers them greater leeway to transact within the limits of the amount of liquidity available (the total of the current account balance plus the credit line).

Has the introduction of the new clearing method caused liquidity difficulties in the payment systems?

Introduction of intraday clearing brought about a major change in the intraday item and liquidity management of credit institutions, but the transition did not generate liquidity problems. Following the introduction of intraday clearing, Hungarian credit institutions must manage the transactions of two clearing systems at practically the same time. In addition, intraday clearing settlement is a scheduled, i.e. time-critical process, which has posed an additional challenge for credit institutions actively managing their liquidity and their items in VIBER. In the initial period, the participants needed some time to adapt to the new operating conditions. If a system member does not have sufficient liquidity in VIBER during an ICS cycle (the transactions are executed ultimately in VIBER), then its transactions will roll over into the next cycle. Such temporary roll-overs of transactions occurred more frequently in the initial period following the launch of intraday clearing and only sporadically after six months, in 2013. Roll-overs occurred most frequently in the first cycle. These events represented merely momentary liquidity shortages, which is illustrated by the fact that all transactions rolled over were cleared in the next cycle (the roll-overs did not progress down a series of cycles). Rolling over from cycle to cycle does not in and of itself represent

Chart 7
Timing of debit transactions* in VIBER in the first and the second half of each month
(July 2012–September 2013)



** As of 1 January 2012, VIBER operating hours were extended by one hour.*
Note: Item timing behaviour on the basis of the 10-day moving average of transactions.

a problem or jeopardise the stability of operations, but it is a sign of potential problems in the liquidity management of certain system members. The analysis of the specific cases revealed that each and every one of the momentary liquidity shortages and instances of rolling over would have been avoided if the system member had blocked some more of the securities available for blocking in their balance sheet, adding to its credit line available for payments. Thus, roll-over events were always motivated by a temporary liquidity shortage in the period after the introduction of intraday clearing. The reason was most likely the fact that intraday liquidity management (e.g. the management of central bank credit lines) and item management (e.g. the submitting and timing of items) had to be adapted to the time-critical VIBER items as arising from intraday clearing, which is confirmed by the analysis of banks' behaviour in the timing of their items.

The analysis of banks' timing behaviour in VIBER reveals that the banks now place considerably greater emphasis on liquidity management than in the period before the introduction of the new system and that the financing role of incoming items has also grown. This is demonstrated by the fact that a significantly larger proportion of outgoing items is now executed later as compared to previous periods (Chart 7). This applies to participants with high turnover and with low turnover in VIBER, although the change is more striking in the case of the major participants (the top 6 banks).

In the period since the introduction of intraday clearing, there has been sufficient liquidity in the payment systems both at the total-system level and at the level of the individual banks. Liquidity shortages have only occurred sporadically since the introduction of intraday clearing and only temporarily, within the day. This was due primarily to the fact that the banks hold a considerable free portfolio of securities in their balance sheet which they can block for the benefit of the MNB and they can achieve immediate intraday liquidity by blocking these. If the current account balance, which incorporates the items already received as of the given point in time, is not sufficient for executing the payments, then the current account balance may also take a negative value up to the limit of the credit line (intraday lending, overdraft facility). If a bank does not have a sufficient blocked balance to cover the settlement of a cycle as of the moment of funds collection, then the transaction will remain unexecuted until sufficient volumes of incoming transactions arrive or the bank has sufficient securities blocked.

The ample liquidity in the system is clearly demonstrated by the fact that the overwhelming majority of the banks has asked GIRO to set the funds collection parameter to gross. Accordingly, GIRO "collects" the total ICS debit turnover from the bank's account in each cycle, which demonstrates, given the minimal level of item roll-overs, that the banks have the liquidity required for settlement. If this situation were to change, the banks could still opt for the net parameter to settle their intraday clearing transactions. In such a situation, however, they would run the risk of settling only a part of their transactions in the event that a liquidity shortage caused funds collection to fail at one of their partners. The positive impact of setting the net parameter can be observed only if the bank has incoming items too, not only outgoing ones. The favourable impact of the net parameter as an option is lost if there are no incoming items.

Overnight clearing turnover in ICS is marginal in comparison with VIBER turnover and liquidity. However, there have been several instances on tax payment days of the intraday clearing turnover exceeding more than 6 per cent of total bank liquidity. The analysis of the distribution of intraday turnover across cycles reveals that transaction values gradually increase towards the end of the day, as a result of which turnover is the highest in cycles 4 and 5. This does not cause a problem on an "average" day, as it does not affect the total liquidity in the system. However, this is true only to a limited extent on tax payment days, when there is a major transfer of funds (transfer of liquidity) to the Hungarian State Treasury, resulting in the removal of these funds from the system. If credit institutions are unable to calculate in advance the volume of outgoing items they are to expect, then they will have only about 1.5 hours to obtain the missing liquidity after the end of the last IG2 cycle upon the end of the day in VIBER (the last intraday clearing cycle is executed usually at around 4:30 pm). Since the tax payment days tend to "burden" the liquidity of the largest VIBER players the most, they are the ones in need of obtaining liquidity or, if they have sufficient liquidity merely to execute their own items, with their current account balance not falling below zero by the end of the day, the end result will be that they will be unable to lend to other banks due to a lack of surplus liquidity. The situation is further aggravated by the fact that tax payment days occur on or around the 20th of each month, a time when the banks are conducting the transactions at lower current account balances.

Since the introduction of intraday clearing, banks have exhibited a similar item submission behaviour in the second phase of the reserve period as in the first phase (Chart 7). Banks must adhere to the reserve level selected by them on average over a whole month, which offers them the opportunity to keep their end-of-day current account balances not permanently at the same level, which will evidently impact on the prevailing liquidity in the system. Most of the banks hold higher reserves in VIBER in the first half of the reserve period (i.e. they hold current account balances above the required level) and lower reserves in the second half of the month. In other words, they hold higher current account

balances in the first half of the month, as a result of which they have higher liquidity at an unchanged line of credit. In the second half of the month, the situation is reversed. The stability and liquidity in the system is demonstrated by the fact that the banks time their items in the second phase of the reserve period similarly to their timing in the first half of the month.

CONCLUSIONS

In the first period after the introduction of intraday clearing, some VIBER transactions shifted to the new clearing system, causing an increase in the total of ICS turnover on average by nearly HUF 700 billion per month. However, this "migration of items" did not have a negative effect on the operation of either VIBER or ICS. Since the shift in items applied to high-value transactions in terms of ICS, the change in the number of items was marginal in comparison with the change in total turnover. The most important reason for the shift was presumably the considerably different pricing applied by the banks to the two systems.

The introduction of intraday clearing in the Hungarian payment and clearing systems did not cause liquidity problems for the system or the individual banks. This is attributable to the fact that the banks adjusted quickly to the new clearing method and that there continues to be ample liquidity available to them for the smooth execution of their payments, both at the level of the individual banks and the system as a whole. If the shifting trend continues to intensify and the liquidity demand on the system increases as a result, then banks would be able to select the net funds collection parameter in intraday clearing, to ultimately net out their incoming and outgoing payments for liquidity considerations. However, there is currently no need for this and, according to the central bank's forecast, it will not be necessary in the future either.

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Interview with Professor Christopher D. Carroll

(Áron Kiss, István Kónya)

Christopher D. Carroll is an economics professor at Johns Hopkins University Baltimore and research associate at NBER. He obtained his BA from Harvard University in 1986 and his PhD from MIT in 1990. He first worked as an economist at the Federal Reserve Board and later took a job at Johns Hopkins University. He was also a member of the Council of Economic Advisors in 1997-1998 and 2009-2010.

His research field is macroeconomics, in particular the consumption and saving decisions of households. He is particularly interested in how theoretical models can be reconciled with household and aggregate data. He has several publications in leading economic journals, and he is also editor of the entries of Encyclopedia Britannica on consumption. He received the TIAA-CREF/Samuelson award in 1998 for his work on the precautionary saving motive.

– Your work emphasises heterogeneity of household behaviour. What role do you think household heterogeneity will play in the future development of macroeconomics? What are the key questions in the research on household heterogeneity?

– My forecast, and we all know how good economists' forecasts are, would be that 10 or 15 years from now some substantial degree of heterogeneity among agents, both households and firms, will be standard for macroeconomic modelling. And a macroeconomic model that doesn't incorporate a reasonable degree of heterogeneity will be viewed as hopelessly out-of-date and not to be trusted as a guide, especially for policy-making purposes. The reason for this is that (as I said in my lecture) it has become much more feasible: we have steadily and substantially improving techniques and tools for doing it. Computer speed is faster, we have better data, and the models that incorporate some degree of heterogeneity produce much more believable answers to our important questions. The most compelling example, I think, is the question what effects you might expect from the different fiscal policy experiments.

The representative-agent DSGE models give completely implausible answers that nobody believes even in the community of people who work on DSGE models. They introduce patches, or they just disregard the predictions of their own model when a question like that comes up, because they don't believe the answer. If you have a framework that has reasonable amount of *ex ante* and *ex post* heterogeneity in it, you can at least have a straight face when you answer a question like what effects would a change in the permanent tax rate on labour income be. So, I think heterogeneity will be a central part of future models even at central banks. I hope that there's the same degree of effort on pushing models of this kind in the next 10 or 15 years as there has been on DSGE models in the last 10 or 15 years.

– Do you think the main models in central banks will also take into account more heterogeneity than they do now? I am asking this because there are many types of economic models. One model may answer the question what effect a stimulus measure has on the economy; there may be a forecast model of consumption; and there is a central bank model that may serve another purpose. Do you think central bank models are also able to take into account more heterogeneity?

– What I hope happens is that central banks will return to the past. I remember when I worked at the Fed in the early 1990s, one of the things that was surprising to me, but then I came to see the wisdom of it, was that the forecast that is the official staff forecast of the Fed, which was produced by a forecasting group that I was part of, that was a separate group from the modelling group. And we used the output of the model as only one of many different kinds of input. We had a whole set of

topic-specific kinds of models that the experts in each of their fields used. And the individual experts would make their forecasts for the individual components which had fit together as a result of the national accounting identities. The forecast of the formal model was just one input into that process, but it wasn't a very important input frankly.

I think that was a better way of doing things than to say 'OK, here is our modelling section in our central bank and they produce a model and we tweak it a little bit here and there.' Because our modelling capabilities are so far from providing a plausible and useful picture of especially short-term economic dynamics, that I feel a little bit that it's almost like the situation described in the Vietnam war: where some soldier defended actions in his group in a particular village by saying 'we had to destroy the village in order to save it.' I think we might be better off destroying the DSGE models in order to rebuild them. Or not even necessarily have one model that everything has to be shoehorned into. The one thing that everything has to be shoehorned into is the national accounting identities. One of the surprising insights that I think really struck me in the process of helping to make the Fed's forecast was how useful the national accounting identities are as a forecasting tool. I am not sure that the structure provided by DSGE models aside from the fact that they close the national accounting identities really deserves to be taken very seriously. I believe imposing the national accounting identity is the critical thing.

– Macroeconomics has been heavily criticised for not being able to predict the crisis. Do you think this criticism is justified? What do you think were the main problems with pre-crisis macro?

– My criticism would be not so much that macro models were not able to predict the crisis. I think the nature of financial crises in particular is such that they in principle ought to be hard to predict. What disturbs me more is that the kinds of DSGE models that prior to the crisis the profession, especially the central bank community, seemed to be using more and more was a set of models in which any crisis that of the kind that we had, was *impossible*. If you looked, for example at a model like the famous Smets and Wouters model and you tried to calculate what is the probability that events like the ones that we actually saw could ever happen in a model that's calibrated using the pre-2007 data. The answer is not in the history of the universe can anything like that ever happen.

When *Friedrich Hayek* won the Nobel-prize he gave kind of a sceptical lecture, his Nobel-prize acceptance speech, about the pretence of knowledge among economists, macroeconomists in particular. He talked about the dominant Keynesian modellers, who had their complicated, hundred-equation macroeconomic models that were based on loose econometric estimations and some loose Keynesian theory. He was interpreted as being unhappy about the Keynesian nature of the models. But I don't think that was really the heart of his point. His point was that a very complex structure that nobody clearly understands has been constructed and the basis on which we had confidence in the ultimate rightness of the implications of those models is very slim. He turned out to be prophetic in that those models blew up right at the time he was talking and in the subsequent ten years.

I think the DSGE modelling literature has got to a very similar point. The resemblance between the current state of DSGE models and the state of Keynesian models in the early 1970s is really remarkable. Hugely complicated models based on very flimsy evidence basis. Whenever anything happens that is not very well represented in the past data on which the model has been calibrated, the model has no useful interpretation. I think we have committed the same sins for which Hayek was criticising us and which ultimately destroyed the whole Keynesian enterprise in the 1970s.

My guess is that DSGE modelling will be viewed with the same degree of suspicion in 10 years and for the same set of reasons. We just got way ahead of ourselves. A set of simple, understandable models that looks at individual components of how the economy is working and makes a credible claim to actually being right (because the model matches micro data as well as macro data, it matches regional developments or it matches things that are going on in a number of different countries); a set of models of individual topics that have some reasonable degree of credibility, combined by a central bank staff that knows about national accounting identities I think is a much more appropriate way to carry out the tasks that central banks need to carry out: making plausible predictions of what's going to happen in the future. One that's plausible enough that policymakers ought to take it seriously.

– I'm wondering if this doesn't run counter to advocating heterogeneity. One attractiveness of the original RBC framework and the smaller scale DSGE models is that they are tractable, so you understand what is going on. When you have heterogeneity, it becomes too complicated to see what happens. I mean, there is a trade-off between simplicity and introducing heterogeneity? What do you think?

– I think that once you really plunge into models with heterogeneity the extent to which they are hard to use and hard to understand is not nearly as great as it seems from the outside. It's true that at the moment it may take a year or two of investment in human capital to learn how to solve these kinds of models, but once you have done that, it's not that hard to understand what's going on inside the models. It's true that you can't prove theorems in these models, but you can't prove theorems in DSGE models these days either.

What I do agree with is that a process in which one takes some existing DSGE model that has all the bells and whistles and has habit formation and four kinds of financial frictions and all that sort of stuff, and then you try to add microeconomic heterogeneity and calibrate and have the data on top of all that, that would be hopeless. What I would advocate would be not doing that, but instead going back to fundamentals with a set of more precisely targeted, well micro-founded models, one for the consumption analyst who needs to say something about the dynamics of aggregate consumption. The financial sector model can be much simpler. And then there might be more: a nicely micro-founded model of firm behaviour to forecast aggregate investment and there might be four, five, six of these models that are constructed by different people responsible for the different sectors of the economy. And then those people get together in a room and battle it out, if their forecasts conflict: the national accounting identities have to be imposed and the arguments have to be settled without fist fights. I think that's a healthier vision for how the process should work.

One reason I think this is a healthier vision, is that there is at least some hope, if this had been the way forecasting was conducted in the period before the crisis, then a lot more people might have noticed, and it might have been taken a lot more seriously, that there were a lot of people out there with mortgages that there wasn't any reasonable chance that they might actually repay. That's part of the job of a micro-oriented consumption forecaster to track the distribution of wealth, and debt and distribution of house values in order to figure out what's going on with consumption. That person would be in the right place to raise flags that were not raised… Well, interestingly actually, they were raised by some: *Ned Gramlich* was a Governor at the Fed and in 2004 he tried to alert the Fed to the subprime crisis and all of the problems that were happening there. But of course, there was no one else on a regular basis whose job it was to pay attention to the issues that we can all now see quite clearly because we have the microdata to look at and we say 'Oh my God, how could it be that nobody knew what was going on?' They *could* have known what was going on, but just no one was paying attention to the microeconomic data, and the evolution of the microeconomic data.

So I hope that not only will we produce conceptually satisfying models when we start paying attention to microeconomic heterogeneity, we also might be in a better position to see problems developing that are impossible to see if only looking at National Accounts data.

– I have a related question about these modelling strategies. In the DSGE approach, there is no heterogeneity, that's one thing, but then also it's a linear framework and you have these normally distributed shocks that never get big. I was wondering how you would weigh these three things. Could we have aggregate models, but with nonlinearity and big shocks? How far the mileage would go without heterogeneity? Which one is the most crucial?

– I don't think you get very far toward a deeper understanding of what's going on just by saying that the shocks are not normal. The reason the shocks look non-normal is that the model is wrong. I don't think the ways in which the model is wrong can be properly captured by changing the assumptions about the kurtosis, or the skewness or other aspects of the shocks. I think you have to go through the ways in which the model is wrong.

The biggest and hardest, one has to admit, issue outside of the kinds of heterogeneity of consumers and firms that I have talked about in my lecture, the largest problem that macroeconomists have had to deal with is complexities of finance. But, given the events of the past 3 years in which, arguably, blow-ups in the financial sector have caused huge destruction in the real economy. I think the urgency of having better things to say about finance is hard to deny. And any good finance model is a model in which the system is susceptible to panics. If it's not susceptible to panics, it's a bad model of finance. It's those kinds of panic situations that, I think, if you have a model that doesn't have any meaningful treatment of finance in it, produce outcomes that look like they are not coming from a normal distribution. But it's not that you've used the wrong distribution generator. It's you've left out the economics of finance. I don't have the right model of finance in mind, but I will point out that finance is essentially about one set of agents lending money to another set of agents. By definition that's not something

that can be dealt with in a model where there is only one agent. In the US the finance sector accounted for something like 40% of aggregate profits in 2007 and it accounted for 7 per cent of employment. So, the proposition that finance is sort of a transparent veil that doesn't really accomplish anything, is very hard to sustain. Especially now, of course, given that blow-ups in the financial sector nearly pushed us into a second Great Depression.

But the first step to having sensible models of finance is having the heterogeneity across different agents that leads to the motivation to have some group lending money to another group. So, there is a connection between the absence of heterogeneity and the absence of finance in DSGE models.

– In September 2008, writing about economists' reactions to the bail-out plan you referred to Alan Blinder's observation that "Economists have the least influence on policy where they know the most and are most agreed; they have the most influence on policy where they know the least and disagree most vehemently." Having worked at the Council of Economic Advisers for two different periods (1997-98 and 2009-10), what were your personal experiences about how the economics profession can influence policy?

– Economists have a lot of influence in some spheres, in particular in those spheres where the politics are not of overriding importance. Unfortunately the politics are of overriding importance in too many things.

The problem, in my experience, in the Obama and Clinton administrations is not so much with the President or the policy-makers not understanding the point that economists are trying to make. The problem isn't even necessarily with policy-makers disagreeing with the point on substantive terms. The problem is that often the thing that everybody knows needs to be done is politically difficult or impossible to get done. Because when I say everybody knows that it needs to be done, by that I mean internally, 'in the halls of government,' or whatever.

One problem that we have in the US political discourse right now, and maybe this is true in other countries as well, is that journalists have kind of abdicated any responsibility for making judgements about whether the things that politicians are saying are true or not. *Brad DeLong* puts this nicely on this section on his webpage,[1] it's entitled: *"Views differ on shape of the Earth"*, in which he castigates journalists who present completely factually incorrect political assertions, as equally plausible to the ones that are true. It's hard to know what could be done to fix that problem. If your journalists are not willing to say to politicians: 'What you just said is completely out to lunch and there is no evidence for it at all,' then politicians will continue to exploit the unwillingness of journalists to take a stand. Maybe it's changing a little bit in the USA. The nomination speech by vice presidential candidate *Paul Ryan* last week has attracted a lot of criticism for exactly these kinds of mumbo-jumbo, pseudo, 'they-sound-plausible-but-they-are-not-really-true' statements. I hope that the willingness of the journalists to say, 'Look, you said X, but, in fact, according to the Congressional Budget Office, what you just said is not true,' is a signal of a change in attitudes.

One other point to make on that subject is that I think a lot of the most ultimately useful and influential work that economists do is initially rejected by the political system for a variety of reasons. But eventually, if the responsible people keep working in the background and produce good plans for tax-reform, or for entitlement reform, or whatever, politicians attention to these issues is very episodic, and they will, you know, suddenly decide on Tuesday that they need a tax reform plan on Wednesday and whatever plans have been developed will be taken off the shelf. And, so I think an awful lot of good work can be done behind the scenes and dust it off when the political time is right. And if we don't, as a profession, produce those kinds of good analyses when nobody is watching us, then the plans that are on the shelf when the politician needs them, will be just half-baked, bad plans and we will have bad policies. So quietly we need behind the scenes to get things right and then just wait for the right opportunity is another response to the next urgent disaster.

– You mentioned truths that many people in government agree with, but think it's impossible to do politically. When they refer to these truths in newspapers, they are often related to entitlement reform, pensions or health care policy. Do you have a strong opinion on what the US should do in the next 10 years; whether entitlement reform should be on the table or not?

[1] http://delong.typepad.com/.

– I think there are a variety of good plans and ideas, many of them produced by staffs of various, different commissions that then get ignored. I will make a distinction between the pension system (the social security system) and the health care system.

The social security system, in truth, could be made permanently solvent without too much effort. A few tweaks here and there, tying the retirement age gradually to life expectancy, recalibrating the formula for how benefits are adjusted, to make that formula responsive to wage growth. Maybe increasing contributions to the system a little bit. A collection of ideas, all of which have been thoroughly explored, and which would not require substantively large changes to the program, would I think bring it into balance. I hope that when those reforms are carried out, that they are of a type that causes the system to be inherently self-adjusting. We all learn in the first year of graduate school that a pay-as-you-go type of social security system can pay benefits that match roughly the combination of wage-growth and population growth. So you need to have a system that inherently, intrinsically indexes benefits. Behind the scenes, so it doesn't have to become every 20 or 30 years a giant political battle. But I think there is a reasonable prospect of solving that problem, because the size of the problem is not really all that large, unlike in some European countries where something big is going to have to happen.

The other big entitlement problem for the budget, of course, is the medical insurance system: Medicare for the elderly and Medicaid for low income people. That is much more difficult to project, partly because we have just had this big reform, Obamacare as the Republicans like to call it. That was a very far-reaching change in the system. So any projections of what the cost of the new system (presuming that it stays largely intact, as I suspect it will: Republicans like to complain about Obamacare but they have not yet proposed any plausible alternative for what they would do if they were elected; I suspect they wouldn't change it very much if they were elected), so projections about the cost of that system are even more uncertain than usual, given that the whole structure is changing right now. Nonetheless, there is no question that something will need to be done to adjust the system for the aging population and the exploding cost of it. Something ought to be done: intergenerational justice requires that we not have a system that sucks too much of a blood out of the younger generation in order to pay unreasonable expenses for the older generation.

I think the nature and shape of the appropriate adjustments, though, is very hard to take a clear stand on it, at this point until how the new system works really becomes more clear. There is some reason to hope that some of the reforms instituted and some of the experiments that the reforms are funding will make it clear what the options are. One thing that I think is underappreciated about the Obamacare program is the extent to which there is a lot of research and development and experimentation that is an intrinsic part of what the system ought to work like to move forward. So, I hope that that underappreciated and not really ever discussed part of the reforms will help to guide the way for the necessary cuts, and outline the cuts that are most effective and least painful.

– Do you follow closely the current Euro crisis? Any thoughts you could share with us on this topic?

– I am glued to my TV screen! I am glad I am not in charge of preventing the Euro crisis from spiralling out of control. It's a very difficult problem. As we all know, all economists know, the countries that are currently member of the Euro zone are not anything close to an ideal optimal currency zone. And whether such countries can get together, well, it's a nice experiment for testing economic theory of optimal currency zones. I am not very optimistic that it's going to produce a pleasant outcome, but I will continue to be glued to my computer monitor.

– What is your view on the US policy response to the crisis? Do you think, in particular, that the bank bail-out, as implemented, ended up being good policy? Could the 2009 stimulus have had a better design? Is there a good policy solution for the foreclosure crisis in the US? How important is the housing market for the recovery?

– The response to the crisis reminded me of the characterisation of *FDR* in the New Deal in which he promised 'relentless experimentation'. Economics, macroeconomics is still not a science like physics where we all can agree on exactly the right thing to do. Especially given the magnitude of the crisis, trying all sorts of different things to see what works seems wise to me, rather than committing to one golden arrow, which maybe will turn out to puncture the balloon instead of to solve the problem. So, I think, even *ex post* it would be hard to get agreement on what would have been the best mix of policies to pursue. I think that pursuing a wide range of policies was actually the wisest approach that could reasonably be expected. I am in the *Krugman, DeLong,* etc., camp which says a larger stimulus package and one with a different mix would have been more effective, more appropriate, but there is a lot of reason to credit the view that it would have been impossible to get through the Congress

anything bigger than what the administration actually did get. So whatever we might think was the ideal package: 'politics is the art of possible,' as the saying goes, and I think they went pretty far subject to the constraints that they were subject to.

To go back and say with hindsight something I think was a mistake, was the extent to which the shape of the package was changed to try to get a few votes from the opposition party in the Senate. The administration was extremely eager to have a few Republicans sign on to the package and they shifted the mix from spending to tax cuts fairly substantially in order to get those 3 Republicans. I think the old Keynesian argument, that spending is more stimulative than tax cuts because – especially in a crisis like this – people might save a substantial portion of the tax cut, has a lot of force to it. I think in hindsight even the people who had the view that it was going to have a big political payoff to have some Republicans participate and vote for the package, would agree that that had not turned out to be true. I think there is no sense, in the political universe, that the Republicans participated in the stimulus, even though there were 3 of them that voted for it. So, I think probably not having distorted the package in order to get those 3 votes would have been better judgement, but you know it's a fairly difficult in real time to know the answers to these kinds of political economy problems.

– How do you see the problems of the housing market and the issue of mortgage debtor rescue?

– Well, I think we have finally hit bottom and the housing market will recover gradually. An awful lot of the bubble lending that happened was just misguided and the people that got those mortgages had no realistic prospect of ever paying them off. There is a set of people on the margin for whom somewhat more could have been done: somewhat more people could have been kept in their houses with an adjustment to the size of their loan, or something quick. But for a lot of the people, a lot of the bad mortgages that were made, I think there is basically no hope, and trying to extend the period in which everything is left to the suspense and nobody knows what the outcome is going to be, might not have really achieved a much better outcome.

I do think that if we could leave aside the political economy, if it had been possible to find a way to have more principal reductions for a set of people that were close to the margin would have been a better policy than the one that ended up happening. Although, I participated a little bit, I wasn't one of the policymakers, but I sort of knew what was going on in the internal debates about the housing relief packages. The structure of the packages was designed to help out people who were kind of the, in some sense, the kinds of people who in some sense made defensible decisions that just, things turned out to be worse than expected and, you know, house prices changed. They were responsible people, they were keeping up with their mortgages, and the sorts of people were the ones that you really want to rescue. You ought to be fairly generous about defining who that set of people is. I think part of the miscalculation, or part of the surprise that the administration experienced was that there were just a lot fewer people in that marginal area than they had expected. There was kind of a sense among certain analysts, and I think this was believed by the people who designed the program in the Treasury, that there was this enormous number of people who were, you know, right on the margin, that it wasn't really the case that all of this lending had been irresponsible and crazy, only a modest part of it had been irresponsible and crazy.

The failure of the administration's programs to make very much difference, I think, was partly due to the fact that it was calibrated to help only the people, relatively near the margin of responsible behaviour. It turns out if you really wanted to do something that would have a big effect, you needed to rescue a bunch of people who had made decisions that were even at the time pretty hard to defend. And that gets into the political economy, because there is a big danger, I think of being perceived as spending a lot of public money to bail out people who had bought a house that was bigger than they could afford or had refinanced to buy a nicer car for themselves, or something, when they really should have kept the old car. And so, there was a pretty evident and visible political barrier there that prevented the rescuing of people, who, maybe there would have been a macroeconomic case to rescue the irresponsible, but I think, the politics of that would have been pretty toxic.

– This brings us to our last question: Do you think many people were irresponsible? Was there an unsustainable consumption boom in the US of the early 2000s, even the 1990s?

– I think unquestionably. I have a paper that tries to decompose movements in the US personal savings rate back to the 1960s into 3 explanatory variables. One of them is the availability of credit, one is unemployment expectations (trying to capture the precautionary motive: when people are worried of becoming unemployed, they save more), and third, classic wealth effect (when wealth goes up then people don't feel the need to save as much; when wealth collapses they need to save more). What that empirical investigation suggests is that the personal saving rate in the mid-2000s, 2003 through 2007 personal saving rate

in that period was lower than it otherwise would have been, as a result of the ever expanding availability of credit. It was lower by about 2 percentage points. If we didn't add the sort of excess credit creation that we saw, we sort of had what looked like a more normal pace of credit creation, we would have had a saving rate that was a couple of percentage points higher. I think if we had had that more temperate pace of credit expansion, we wouldn't have had the crisis!

So I think that there was a sort of consumption boom that was not realistic in the sense of being a reasonable anticipation of anything that was going to happen to future income. It was, you know, a classic bubble. And the extent to which the economics profession was captured by the ideology that says, either there is no such thing as a bubbles, or you can never tell when a bubble is happening while you are in the middle of it, I think is one of the big failures of our profession. I think, actually that it is not as difficult to tell when a bubble is forming if you are someone who believes that it's possible to tell that a bubble is forming. If you are someone who believes that it's impossible, then you'll find reasons to deny the evidence of your senses.

I presented a paper at an academic consultancy meeting at the Fed in January of 2004 that was about housing wealth effects. My discussant was *Bob Shiller.* And he said a few nice things about my paper, but then did what everyone expected, which is to give his views of the state of the US economy. In January, 2004 Bob Shiller was saying we are at the early stages of inflating a housing bubble and thus the Federal Reserve should do something about this! *Ned Gramlich* was a governor of the Fed, and he was trying to convince his colleagues that subprime lending industry was sort of behaving increasingly irresponsibly. And the Board and the economics profession, basically, didn't pay attention to the, I think, pretty compelling evidence that was in front of us, because of a predisposition to believe that it was impossible that Bob Shiller could actually know that we were in the midst of a bubble. Even though, actually, Bob Shiller had testified before the Fed Board in a previous academic consultant's meeting in December 1996 saying that the stock market was in the midst of inflating a bubble. So he's got a pretty good record. I think, if you are more open-minded about whether or not it is possible to detect a bubble and you are willing to look at all sorts of different kinds of evidence, then it will be an easier task, than if you start off with the presumption that it is impossible and therefore you reach the conclusion that you can never tell. I think it's just a change of attitude that's needed and not really any development of radical new tools or methods or analyses.

I do think that part of the reason that Bob Schiller and Ned Gramlich were able to diagnose the early stages of the housing bubble is that they were willing to look at kinds of evidence other than, say, price-dividend ratios or a few aggregate statistics.

We all have read now the newspaper stories about the crazy mortgage-brokers who didn't have a high-school education and were earning 200-300-400,000 dollars a year pushing mortgages on people who couldn't add and multiply. If you are willing to keep your eyes open for those kinds of bubble-indicating phenomena, or even if you are willing to be constantly paying attention to good microeconomic data, then I think it's going to be easier to detect these kinds of things, than if you start off by saying the only tool for detecting a bubble is whether there is a price-to-earnings ratio that exceeds some historical value and since we have only a very limited amount of data on the price-to-earnings ratio, we can't tell whether there is a bubble or not. When you can tell that there is a bubble is when you have people without a high-school education, making 600.000 dollars a year, selling mortgages when their previous job was as a hair-dresser; when you have people who have no job, no income, and no assets, and they are able to buy a half-a-million dollar house. That's a bubble! And it's not that hard to tell that it's a bubble. But we need, I think as a profession, macroeconomists need to open their eyes to the existence of these kinds of evidence and not just focus on aggregate statistics.

Appendix

MNB BULLETIN ARTICLES (2006–2013)

8th year, special issue (October 2013)

Baksa, Dániel, Dániel Felcser, Ágnes Horváth, Norbert Kiss M., Csaba Köber, Balázs Krusper, Gábor Dániel Soós and Katalin Szilágyi (2013): Neutral interest rate in Hungary

Baksay, Gergely, Tamás Berki, Iván Csaba, Emese Hudák, Tamás Kiss, Gergely Lakos, Zsolt Lovas and Gábor P. Kiss (2013): Developments in public debt in Hungary between 1998 and 2012: trends, reasons and effects

Balás, Tamás (2013): Households: Indebtedness and Debt Service Ratio

Bauer, Péter, Mariann Endrész, Regina Kiss, Zsolt Kovalszky, Ádám Martonosi, Olivér Rácz and István Schindler (2013): Excessive household debt: causes, trends and consequences

Bodnár, Katalin, György Molnár, Gábor Pellényi, Lajos Szabó and Judit Várhegyi (2013): Dynamics of the trade balance and developments in exports and imports

Erhart, Szilárd, Gergely Kicsák, Zsolt Kuti, Zoltán Molnár and Zoltán Monostori (2013): Doing it differently or The impact of the financial crisis on central bank balance sheets in emerging economies

Fáykiss, Péter and Anikó Szombati (2013): Macroprudential supervision in non-euro area European countries

Hoffmann, Mihály, Balázs Kóczián and Péter Koroknai (2013): Developments in the external balance of the Hungarian economy: indebtedness and adjustment

Hosszú, Zsuzsanna, Gyöngyi Körmendi, Bálint Tamási and Balázs Világi (2013): Impact of the credit supply on the Hungarian economy

Korencsi, Attila, Melinda Lakatos and György Pulai (2013): Regulation on the prohibition on monetary financing – obligations and opportunities

Lehmann, Kristóf, Róbert Mátrai and György Pulai (2013): Measures taken by the Federal Reserve System and the European Central Bank during the crisis

8th year, issue 3 (October 2013)

Baksay, Gergely and Gábor P. Kiss (2013): Second Act – second thoughts: the Hungarian debt rule

Csortos, Orsolya and Zoltán Szalai (2013): Assessment of macroeconomic imbalance indicators

Gábriel, Péter, György Molnár and Judit Rariga (2013): Measures of underlying inflation

Hoffmann, Mihály, Kékesi Zsuzsa and Péter Koroknai (2013): Changes in central bank profit/loss and their determinants

Homolya, Dániel, Melinda Lakatos, Róbert Mátrai Róbert, Judit Páles and György Pulai (2013): Limit setting practices of banks in Hungary: Focus on counterparty limits

8th year, issue 2 (May 2013)

Csermely, Ágnes and Máté Barnabás Tóth (2013): Nominal GDP targeting: what are central bankers talking about?

Endrész, Marianna, Győző Gyöngyösi and Péter Harasztosi (2013): Corporate sector currency mismatch in Hungary

Gábriel, Péter and Gergő Motyovszky (2013): Possible impacts of the financial crisis on potential output

Horváth, Dániel, Zsolt Kuti and Imre Ligeti (2013): Is the CDS spread still a reliable risk indicator? The impact of the European regulation on uncovered CDS positions on market developments in the Central and Eastern European region

Krusper, Balázs and Katalin Szilágyi (2013): How can an interest rate rule reflect real economic considerations?

Blanchard, Olivier (2013): MNB panel discussion with Olivier Blanchard

8th year, issue 1 (January 2013)

Csermely, Ágnes (2013): Who pays the ferryman? The story of the euro area from recession to political crisis to the revision of the institutional structure

Divéki, Éva and István Helmeczi (2013): The effects of the introduction of the intraday credit transfer

Erhart, Szilárd, Imre Ligeti and Zoltán Molnár (2013): Reasons for the LI BOR review and its effects on international interbank reference rate quotations

Felcser, Dániel (2013): How should the central bank react to the VAT increase?

Martonosi, Ádám (2013): Factors underlying low investment in Hungary

Véber, Zita and Judit Brosch (2013): Can cash payment be limited in a modern payment system?

Uhlig, Harald (2013): Interview with Harald Uhlig

7th year, issue 3 (October 2012)

Divéki, Éva and Dániel Listár (2012): Better safe than sorry: views of the Hungarian public on the security of payment instruments

Felcser, Dániel and Kristóf Lehmann (2012): The Fed's inflation target and the background of its announcement

Holló, Dániel (2012): Identifying imbalances in the Hungarian banking system ('early warning' system)

Koroknai, Péter and Rita Lénárt-Odorán (2012): Developments in external borrowing by individual sectors

Szalai, Zoltán (2012): A crisis of crisis management? Debates over fiscal adjustments in the European Monetary Union

Stepanchuk, Serhiy (2012): 11th Annual Macroeconomic Policy Research Workshop at MNB: Microeconomic Behavior and its Macroeconomic Implications During the Financial Crisis

Canova, Fabio (2012): Interview with Fabio Canova

7th year, issue 2 (June 2012)

Divéki, Éva (2012): Card or print? How to issue cafeteria vouchers electronically?

Fábián, Gergely and Róbert Mátrai (2012): Unconventional central bank instruments in Hungary

Lehmann, Kristóf (2012): International experiences with unconventional central bank instruments

Pulai, György and Zoltán Reppa (2012): The design and implementation of the MNB's euro sale programme introduced in relation to early repayments

Rácz, Olivér Miklós (2012): Using confidence indicators for the assessment of the cyclicalposition of the economy

Turján, Anikó and Judit Brosch (2012): Single Euro Payments Area (SEPA): Full speed ahead!

7th year, issue 1 (February 2012)

Kiss M., Norbert and Zoltán Molnár (2012): How do FX market participants affect the forint exchange rate?

Rabitsch, Katrin (2012): 10th Annual Macroeconomic Research Workshop at MNB: Fiscal Rebalancing, Public Debt, and its National and Global Implications

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Széplaki, Valéria (2006): Reform of the Hungarian corporate insolvency regulation and its financial stability aspects

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Bodnár, Katalin (2006): Survey evidence on the exchange rate exposure of Hungarian SMEs

Csávás, Csaba and Lóránt Varga (2006): Main characteristics of non-residents' trading on the foreign exchange and government bond markets

Holló, Dániel and Márton Nagy (2006): Analysis of banking system efficiency in the European Union

Kiss, Gergely (2006): Fast credit growth: equilibrium convergence or risky indebtedness?

Párkányi, Balázs (2006): Myths and Maths: Macroecono-mic Effects of Fiscal Adjustments in Hungary

Publications of the Magyar Nemzeti Bank

All publications of the Magyar Nemzeti Bank on the economy and finance are available on its website at http://english.mnb.hu/Kiadvanyok. From 2009, the publications have been published only in electronic format.

Papers

MNB Bulletin / MNB-szemle
http://english.mnb.hu/Root/ENMNB/Kiadvanyok/mnben_mnbszemle
http://english.mnb.hu/Kiadvanyok/mnben_mnbszemle/mnben_szemle_cikkei
In Hungarian and English; published three or four times a year.
The aim of the short articles published in the Bulletin is to provide regular and readily comprehensible information to professionals and the public at large about underlying developments in the economy, topical issues and the results of research work at the Bank, which are of interest to the public. Private sector participants, university professors and students, analysts and other professionals working at central banks and international organisations may find the Bulletin an interesting read.

MNB Occasional Papers / MNB-tanulmányok
http://english.mnb.hu/Kiadvanyok/mnben_muhelytanulmanyok
In Hungarian and/or English; published irregularly.
Economic analyses related to monetary policy decision making at the Magyar Nemzeti Bank are published in the Occasional Paper series. The aim of the series is to enhance the transparency of monetary policy. Typically, the papers present the results of applied, practical research, review the technical details of projection work and discuss economic issues arising during the policy making process.

MNB Working Papers
http://english.mnb.hu/Kiadvanyok/mnben_mnbfuzetek
Only in English; published irregularly.
The series presents the results of analytical and research work carried out in the Bank. The papers published in the series may be of interest mainly to researchers in academic institutions, central banks and other research centres. Their aim is to encourage readers to make comments which the authors can use in their further research work.

Regular publications

Quarterly report on inflation / Jelentés az infláció alakulásáról
In Hungarian and English; published four times a year.

Report on financial stability / Jelentés a pénzügyi stabilitásról
In Hungarian and English; published twice a year.

Report on payment systems / Jelentés a fizetési rendszerről
In Hungarian and English; published once a year.

Annual report: Business report and financial statements of the Magyar Nemzeti Bank / Éves jelentés: A Magyar Nemzeti Bank adott évről szóló üzleti jelentése és beszámolója
In Hungarian and English; published once a year.

Féléves jelentés: Beszámoló az MNB adott félévi tevékenységéről (Semi-annual report: Report on the MNB's operations in a given half-year)
Only in Hungarian; published once a year.

Időközi jelentés: Beszámoló az MNB adott negyedévi tevékenységéről (interim report: Report on the MNB's operations in a given quarter)
Only in Hungarian; published twice a year.

Analysis of the convergence process / Elemzés a konvergenciafolyamatokról
In Hungarian and English; published yearly or biennially.

Trends in lending / Hitelezési folyamatok
In Hungarian and English; published four times a year.

Public finance review / Elemzés az államháztartásról
In Hungarian and English; published three or four times a year.

In addition to those listed above, the Bank also occasionally publishes other materials.

MNB BULLETIN Vol. 9 No. 1.

March 2014

Print: Prospektus–SPL consortium

6 Tartu u., Veszprém H-8200