MAGYAR NEMZETI BANK

MNB Bulletin

APRIL 2008

MNB Bulletin

April 2008

Contents

Summary

DEAR READER,

The Magyar Nemzeti Bank ascribes great importance to making available for the wider public central bank analyses which deal with various economic and financial developments of general interest. This publication is the first issue of the third volume of the MNB Bulletin and contains five articles. Two of the studies presented herein discuss the global and domestic impacts of the US sub-prime crisis, as well as the tightening of liquidity on the financial markets; while each of the remaining articles deals with a current issue of the Hungarian economy, such as tax avoidance and tax changes, the impact of fiscal policy on economic growth and the structure of external financing.

An analysis by Cecília Hornok, Zoltán M. Jakab and Gábor P. Kiss draws attention to the fact that the Hungarian fiscal expansion, which lasted for several years, boosted the economy via a number of channels. As a result, while the global economy suffered a temporary slowdown in 2001–2003, growth in Hungary remained steadily high and the image of Hungarian potential growth was also artificially distorted upwards. Without fiscal expansion, growth in Hungarian GDP would have been on average 1 percentage point lower than actually achieved in 2001–2003 and the Hungarian economic cycle would have correlated more closely to the European one.

In his article András Komáromi demonstrates that the recent growth of the ratio of debt-creating external financing in Hungary does not necessarily increase sustainability risks. On the one hand, debt-creating financing grew to record levels in 2007 mostly due to one-off items and, on the other hand, the decrease in the role of net non-debt-creating sources is due primarily not to the decline in inflows, but rather increased capital exports by residents. This picture is rendered even more complex by the fact that, as recent research indicates, the positive features associated with non-debt-creating forms of financing cannot always be corroborated, and empirical experience suggests that more developed economies are often characterised by a higher ratio of debt-type external financing.

In their analysis of tax evasion in Hungary, Judit Krekó and Gábor P. Kiss estimate that tax evasion in recent years resulted in a transfer of income between tax evaders and tax-payers equivalent to 7.9 per cent of GDP. As a result of the introduction of measures to reduce tax evasion, this transfer fell to 6.7 per cent of GDP. A difference in the contribution burden on labour and capital income partly explains tax evasion. International experience suggests that this can be improved by either a control of splitting labour and capital income or bringing their contribution burdens closer to one another. The impact of administrative measures is often temporary as they fail to improve the tax-compliance attitude. It is extremely difficult to improve taxpayers' attitude, although one possible way is to shift in the tax burden in favour of local taxes.

In their article, Márton Nagy and Viktor E. Szabó discuss how the high risk appetite of recent years has prompted the global spread of a high volume of underpriced risk. Turbulence starting from the US mortgage market last year resulted in a repricing of risks, which caused investors considerable losses and triggered the temporary failure of certain niche markets. Besides incurring direct losses, US and European banks have had to face an increase in the cost of funds and a credit crunch. The Hungarian banking sector did not have any direct exposure in products connected to the US mortgage markets, but as the risk premium grew globally, the Hungarian financial markets experienced several instances of minor turmoil and the expected yield on Hungarian assets rose. It is a negative development that, should the sub-prime crisis persist, Hungarian banks may be faced with growing financing costs, a tighter supply of funds and a reduction in financing facilities.

Judit Páles and Lóránt Varga introduce in their article the financial market liquidity indices calculated by the MNB. These liquidity indices are related to the most important Hungarian financial markets and rely on indicators quantifying the various dimensions of market liquidity. Liquidity on the Hungarian market continued to grow uninterruptedly until the middle of 2006, but this trend of liquidity growth did not carry over into 2007. Over the past six months or more, the liquidity of the Hungarian financial markets abruptly shrank on a number of occasions during turbulent periods, with an especially sizeable decline measured in early March 2008, when the government bond market experienced liquidity problems. The liquidity shrinkage in these periods primarily caused a decline in market tightness, i.e. a rise in trading costs, while market turnover generally did not fall considerably.

The Editorial Board

Cecília Hornok–Zoltán M. Jakab–Gábor P. Kiss: 'Through a glass darkly': Fiscal expansion and macro-economic developments, 2001–2006

For several years after 2001, fiscal policy in Hungary was characterised by expansion, boosting the economy through several channels. As a consequence, while the global economy slowed down temporarily between 2001 and 2003, economic growth remained stable at high levels in Hungary. Due to fiscal expansion, the picture formed of potential growth in Hungary was artificially biased in an upward direction. The growth rate of Hungary's GDP would have been 1 per cent lower than it actually was between 2001 and 2003, and then between 2004 and 2006 it would have been similar to what was actually recorded. Accordingly, the business cycle would have moved more in conjunction with its European counterpart. The extent of slowdown in future potential growth is likely to have been smaller though.

INTRODUCTION

In our article, we set out to quantify how fiscal policy distorted macro-economic processes in the period from 2001 to 2006. One of the questions is how the size and structure of economic growth would have developed if it had materialised along a sustainable path, i.e. a neutral fiscal path which we have defined. Another issue is the extent to which, along the neutral path, our estimations of potential GDP and the perceived cyclical position of the Hungarian economy would have been modified during the period under review. In other words, to what extent was the slowdown actually 'hidden' by fiscal expansion while maintaining stable growth? The importance of this simulation lies in the fact that estimated potential GDP and its difference from actual GDP (i.e. the so-called output gap) is a key issue for the central bank.

Such a simulation is rendered difficult by the mutually complex relationship between fiscal variables and the business cycle. The fiscal impacts of the cycle (P. Kiss and Vadas, 2007) and the cyclical impacts of the fiscal policy are identified more reliably by means of the MNB's Quarterly Projection Model (NEM), which describes the Hungarian economy and mainly comprises estimated equations. The NEM is capable of capturing the Keynesian impacts typically exerted over the short or medium term. Its fiscal block allows us to study the effect of a number of policy interventions. For a comprehensive description of its fiscal multipliers, see Horváth et al. (2006). However, simulations with the NEM alone cannot grasp the indirect impact of fiscal policy on potential growth. In our study, we seek to answer the question as to how the growth rate of the Hungarian economy would have evolved under an alternative (neutral) fiscal path.

THE ACTUAL MACRO-ECONOMIC PATH

Hungary's GDP grew consistently at an annual rate of approximately four per cent for six years, despite the fact that there was a downturn between 2001 and 2003 in European economies, which constitute the most important export markets for the Hungarian economy. Such cyclical behaviour, diverging from that of the euro area, is surprising at first sight, as studies on the co-movements between business cycles had previously revealed that within the Central and Eastern European (CEE) region it was the Hungarian business cycle that moved most closely with its counterpart in the euro area (Fidrmuc and Korhonen, 2006). The contribution to growth of foreign trade, which better reflects external upswing, was rather low before 2005. The contribution of domestic consumption to growth, however, reveals that it was sustained at high levels. Within domestic consumption, the dynamics of capital investments fell behind the historical average, while consumption grew consistently at an annual rate of more than 8 per cent. In 2001 and 2002, one of the underlying reasons for this was that, in contrast with the earlier 3 to 4 per cent growth, real wages in the private sector rose at a rate of 7 to 8 per cent. One reason for the sharp increase in real wages can be traced back to the disinflation process. After years with inflation stuck at 10 per cent, unexpectedly rapid disinflation occurred, but nominal wage inflation adjusted to this development more slowly. Another reason is likely to have been the impact of the increase in the minimum wage in 2001 and 2002. It is difficult, however, to discern whether this generated additional income (and consumption) or only helped shift wages from the informal economy into the formal sphere. However, one of the contributors to acceleration in consumer demand was undoubtedly fiscal policy.

In respect of the growth effects of fiscal policy, there is general consensus that it is the positive, i.e. neo-Keynesian type impacts, which are dominant in the majority of cases, especially over the short and medium term (Horváth et al. 2006). The period we studied (i.e. 2001–2006) can be regarded as medium term, and thus we can assume that the Keynesian impacts of fiscal expansion were dominant. The dominance of the positive growth impact of fiscal expansion is also underpinned by GDP figures. It is highly likely that the impact of an expansive fiscal policy 'smoothing' the global downturn is also reflected in the fact that, based on actual data for the period, the volatility of Hungary's GDP was expressly low by CEE standards and in comparison with the EU Member States at the time (Benczúr and Rátfai, 2005).

THE ACTUAL FISCAL PATH

In determining the fiscal path and making our estimates, we relied on the data defined in accordance with the augmented SNA methodology applied by the MNB. On the one hand, this methodology augments government projects with capital investments made under PPP schemes. Similarly, it augments expenditures with the losses incurred by state-owned companies (e.g. the Hungarian Railways, Budapest Public Transport Company) rather than – similarly to the official accounting treatment – recording them only at the date of subsequent debt assumption.

Most fiscal policy variables were relatively stable between 1997 and 2000. Although the impact of the election year can be identified in 1997 and 1998, except for the effect of the termination of temporary customs surcharges, this could be attributed to the usual pattern in fixed investments prior to elections. Developments in most fiscal variables remained broadly stable between 1997 and 2000. Thus, for instance, an increase in public sector wages was counterbalanced with a reduction in employment and lower tax rates with measures broadening the tax base.

In 2001 and 2002, however, there was a shift in all of the components of fiscal policy towards expansion. Employment and wages in the government sector increased sharply, income tax rates decreased and the tax base narrowed, moreover household transfers in cash and capital expenditure increased simultaneously. As a result, the augmented primary balance deteriorated by 6 per cent of GDP. Because of the full-year effect, public wages continued to rise and income taxes continued to fall in 2003. The increase in cash transfers was steady in 2003 and 2004, which was offset by the drop in capital expenditure, to a lesser extent, the reduction in public employment and the increase in indirect taxes as from 2004. As a result, the primary balance improved by 1 per cent of GDP in 2003–2004. Prior to the general elections,

between 2005 and 2006 Q3, the primary balance deteriorated by 2.3 per cent of GDP. The underlying reason was that both indirect taxes and employer's contributions were lowered, household transfers in cash increased rapidly and the usual temporary increase in fixed investment occurred again. The only deficit decreasing measure was a reduction in public employment. After the elections, the rates of nearly all taxes and contributions were raised, as a result of which the primary balance improved in the final quarter by 0.6 per cent of annual GDP. Tax bases were also broadened by measures taken against tax evasion, which led to a further decrease in the deficit.

THE NEUTRAL FISCAL PATH

We opted for 2001 as the starting year of the period examined, since on the whole in 2000 fiscal developments still shifted towards a balanced position. Similar to the paper by Ohnsorge-Szabó and Romhányi (2007), we considered the year 2000 as neutral. This does not, however, mean that we find either the deficit-to-GDP ratio or the structure of the general government in 2000 to be an appropriate benchmark; rather, we consider the trends during the temporary period between 1997 and 2000 to be the correct benchmark.

In establishing a neutral fiscal path, we regard the specific fiscal variables of the NEM as our starting point. Based on expert assumptions and technical rules, we define a 'no policy change' scenario for these specific variables, i.e. in the case of the fiscal variables which we can model, we define shocks for each variable in a different way. We interpret the individual shocks determining the neutral path as the difference between the neutral path of fiscal variables and their paths that actually evolved. As fiscal expansion was reflected in nearly all instruments, most of the shocks to the neutral path are restrictive fiscal shocks in themselves. Based on the classification adopted by Horváth et al. (2006), fiscal shocks can be classified into four groups.

The first group affects product markets; this consists of purchases of goods and services and fixed investments. In the case of these variables we considered such a hypothetical path to be a neutral one along which real growth rates in variables were identical with their average real growth (with growth in real GDP in the case of fixed investments) experienced in the years prior to 2001. As regards government purchases, from 2002 the neutral path was significantly lower than the actual one, while the corresponding difference regarding government purchases persisted during the period under analysis. As for capital investments by the government, the neutral path only differed from the actual one in 2001 and 2002.

The second group of shocks affects aggregate demand through households' disposable income. For the purposes of personal income tax, we regarded the effective tax rates fixed at end-2000 to be the neutral path. Relative to the baseline, this means a 2 to 3 percentage point increase in the effective income tax rates and a corresponding decrease in households' disposable income. The neutral path of cash transfers (mainly pensions and unemployment benefits), an important fiscal variable affecting household income was determined on the basis of the results of the model simulation concerning wages, inflation (Swiss indexation) and unemployment (endogenously) rather than by us (exogenously).

A further shock affecting the households' income is the shock of household investments through the government's housing subsidies, which boost not only housing investment, but partly consumption. In addition to preferential housing loans, an expansion in housing investment is likely to have been driven by other factors, e.g. demographic developments, increase in real income and the availability of FX loans with favourable terms. Therefore, we determined the neutral path of household investment by assuming that it would have reached the level of the actual path by end-2005 (by which time all the incentives of housing subsidies had already lost steam at the level of completed investment as well), while setting a steady pace for it, without the temporary increases reflected in the actual data. The housing subsidy scheme, based on the estimates by Kiss and Vadas (2005), increased household consumption by approximately 15 per cent of the increase in housing loans between 2001 and 2003. Therefore, we also supplemented the shock of housing investment with a corresponding negative consumer demand shock.

The third group of shocks is shocks emerging on the supply side of the economy. We determined a neutral path for corporate tax rates, the taxes and contributions payable by employers, the employment in the government sector, the labour supply of the economy and wages in the government sector. For the first two, in determining the neutral path, we opted to fix them at end-2000 levels, for the sake of simplicity and transparency. As regards corporate tax rates, a neutral path would not have meant a significant change compared to the actual path, but in the case of employers' contributions a neutral path with fixed rates would have already exceeded the level of actual taxes and contributions markedly towards the end of the period.

A neutral path for public sector employees means significant reduction in employment compared to actual employment.

We determined this neutral path by assuming that employment would have decreased at a steady pace from end-2000 to end-2006 to the level of January 2007 of 750,000 persons. We created a shock for the labour supply of the economy with the assumption that at least half of the 40,000 increase in employment in the public sector in late 2002 and early 2003 was due to the entry into the labour market of the otherwise economically inactive rather than unemployment or a fall in the number of those employed in the private sector. Accordingly, if the rise in the public employment had not happened, half of the employees concerned would have been left outside the labour force, i.e. a neutral path would have meant lower labour supply during the period.

Finally, we defined a neutral path for wage increases in the public sector conditional upon wage developments in the private sector, i.e. we applied an endogenous solution. Taking as a basis that at the end of the surveyed period nominal public sector wages are approximately 20 per cent higher than those in the private sector, we modelled the convergence of public sector wages to this level along a stable path.[1] Due to this approach, the ratio between public and private wages follows a pre-determined convergence path even in the neutral case, while private sector wages change in accordance with labour market impacts that correspond to a complex fiscal shock.

The fourth group of fiscal shocks includes changes in indirect taxes (VAT, excise duties), which directly affect prices (exchange rates). The factor of the indirect tax content of the CPI was fixed in the neutral path at the end-2000 level, i.e. the most important changes in indirect taxes that occurred during the surveyed period (increases in the VAT rates in early 2004 and in the autumn of 2006 and the decrease in VAT in early 2006) have been excluded from the neutral path. In contrast with all of the previous shocks (fiscal expansion), the non-occurrence of VAT increases (tightening) is not a restrictive shock. Rather, through lower inflation, it boosts demand, and if it is not implemented, it does not contribute to fiscal sustainability.

THE MACRO-ECONOMIC PATH IN AN ENVIRONMENT CREATED BY A NEUTRAL FISCAL POLICY

In carrying out the simulation exercise, we assumed an active monetary policy operating in accordance with the Taylor rule estimated on Hungarian data for the period between 2001 and 2005 (Hidi, 2006). We used a forward-looking

---

[1] The 20 per cent difference disappears or even reverses if we compare white collars. In 2001 the general government sector wages were 25% lower. This difference had shrunk to 15% by 2006.

Chart 1

GDP growth: facts and simulation

GDP growth (per cent)

Deviation of level of GDP from facts (per cent)
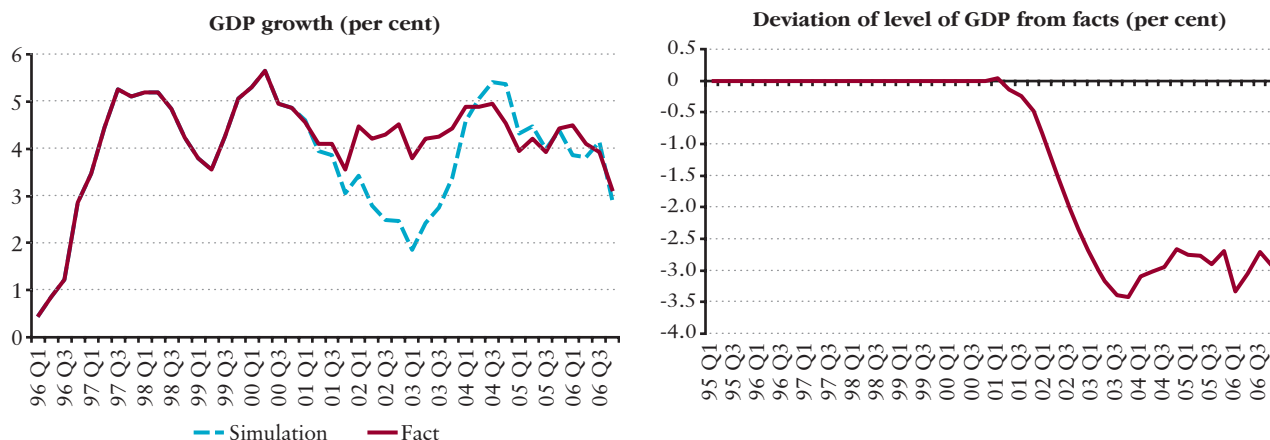
Source: CSO and own calculations.

uncovered interest parity to describe the correlation between interest and exchange rates. The applied monetary reaction function does not show an optimal policy, rather – as an estimated rule – it reflects the empirical description of the past decisions of the Hungarian monetary authority.

We also defined a neutral path for the model variable corresponding to the risk premium on the HUF exchange rate. The shock represents a situation where – assuming a sustainable fiscal policy – expected premium on HUF assets would not have increased in 2003 or 2004. On the contrary, in keeping with the process of nominal convergence and with entry into the euro area approaching, a path representing steady moderation would have emerged. Given a neutral path, this indicator of the risk premium – which is, in our model, a simple technical variable derived from the 3-month HUF/EUR interest rate differential – fell to 3 per cent by the end of 2006. If we assume that with a neutral fiscal policy 2008 as the euro adoption date, a target date still valid at the beginning of the period, had been met, then this value would have been identical with the short-term interest rate differentials prevailing in the less advanced EU Member States in the years prior to the adoption of the euro.[2]

Economic growth

Supposing fiscal policy had been neutral, GDP growth would have been 1 per cent lower in 2001 to 2003, slightly higher in 2004 and roughly identical with actual growth in 2005 and 2006. Such dynamics of economic growth would have been

more in line with external economic conditions: economic growth in Europe slowed down temporarily after 2001, and then picked up gradually. Nevertheless, the level of GDP would have remained permanently lower by approximately 2.5 per cent to 3 per cent at the end of the period than it actually was based on actual data.[3]

The 1 per cent lower economic growth on average in the neutral fiscal path in the first half of the period (2001–2003) is attributable to a major extent to an average 1.8 per cent decrease in consumer spending. Such fall in consumption would have occurred because of household transfers in cash, on the one part, and slower growth in households' wage income, on the other. The underlying reason for that is the combined effect of lower wage dynamics and employment in both the public and private sectors. The impact of the negative shock on households' disposable income is further aggravated by the fact that, given the neutral path, the cut in the effective rates at which income is taxed would not have occurred. Meanwhile, household transfers in cash would have risen at the beginning of the period due to an increased amount of taxes and contributions attributable to higher unemployment. Naturally, in accordance with the shocks to the neutral path, other contributors to growth, such as household and government capital investments and government spending, would also have generated more modest growth. However, at the same time slower growth could have been counteracted somewhat by better net exports through lower import demand which was due to subdued internal demand. Accordingly, the real economic balance would have

---

[2] See Csajbók–Rezessy (2005), p. 20.

[3] The MNB carried out a similar study on the macro impacts of fiscal expansion in the first years of the expansion. The simulation at that time was performed with the NiGem model and, obviously, could take account only of the trends in 2001 and 2002. The test for these two years shows an increase very similar to the one presented here (impact of 0.5 per cent of the GDP in 2001 and 1.4 per cent of the GDP in 2003). See 'The macro-economic effects of fiscal policy – model calculations' in the Quarterly Report on Inflation, February 2003.

Table 1

Impact of a neutral path on the main macro-economic indicators

	Fact					
	GDP (per cent)	Household consumption (per cent)	Investments (per cent)	Net export contribution to GDP	CPI (per cent)	Change in balance of goods and services (per cent of GDP)
2001	4.1	6.3	5.2	1.8	9.2	2.3
2002	4.4	10.6	10.2	-2.2	5.3	-0.7
2003	4.2	8.3	2.2	-2.1	4.7	-1.9
2004	4.8	2.5	7.6	0.8	6.8	0.7
2005	4.1	3.4	5.3	2.8	3.6	1.7
2006	3.9	1.9	-2.8	2.8	3.9	2.3
2001–2003	4.2	8.4	5.8	-0.8	6.4	–0.1
2004–2006	4.3	2.6	3.4	2.1	4.8	1.6

	Simulation					
	GDP (per cent)	Household consumption (per cent)	Investments (per cent)	Net export contribution to GDP	CPI (per cent)	Change in balance of goods and services (per cent of GDP)
2001	3.9	5.9	2.8	2.2	9.4	2.7
2002	2.8	8.6	5.3	-1.3	5.5	0
2003	2.6	5.3	6.1	-2.3	4.4	-2.1
2004	5.1	4.4	5.7	0.5	4.7	0.8
2005	4.3	3.5	7.2	2.5	2.2	1.6
2006	3.8	0.9	-0.4	2.5	3.5	2.3
2001–2003	3.1	6.6	4.7	-0.5	6.4	0.2
2004–2006	4.4	2.9	4.2	1.8	3.5	1.6

Source: CSO and own calculations.

deteriorated more slowly, at a rate corresponding to 0.3 per cent of GDP on average, i.e. as a third factor, lower GDP would have put a brake on the real economic balance.

Maintaining our assumption of a neutral fiscal path, we can see a completely different picture when we look at the second half of the period (2004–2006). From 2004 onwards, the negative effect of the neutral path on the pace of growth began to wear off, although GDP remained consistently lower than it actually was. Between 2004 and 2006 the growth rate would have been similar: as there was no increase in VAT rates in 2004, the increase in households' real income and consumer demand would have been higher; furthermore, in the absence of an expansion in housing investment similar to the one seen in earlier years, a fall in capital investments similar to the one experienced later would not have emerged either. In 2006 there would have been practically no difference in growth. However, its

structure would have been very different: against a background of lower consumer spending, there would have been a rise in capital investments and government consumption. Nevertheless, the growth rate of expenditure and capital investments is very low even if we assume a neutral path, which suggests that our simulation may not have filtered all the impacts of fiscal policy. In 2006 circumstances could have been ripe for another, indirectly adverse impact on economic growth to evolve. We will address this issue below.

Labour market

A dominant part of the growth effect originates from changes in households' disposable income. Lower income is mainly due to a fall in wage type income, thus, it is mainly an analysis of labour market trends which can best capture its underlying reasons.

One component of the labour market effect is the direct effect of the increase in public employment and wages against the background of a neutral fiscal path. A steady lowering of employment in the public sector and the gradual convergence of public sector wages with those in the private sector would have raised the public wage bill to a much lower extent.

However, private sector processes would also have generated less growth in household wage income. During the two years immediately following 2001, the slowdown caused by economic downturn would have caused a drop in employment and a lower real wage increase in the private sector as well. Although the nominal wage increase was lower during the entire span of the simulation period, from 2004 onwards, lower inflation would, in part, have restored the real value of wage income. Overall, given a neutral fiscal path, a tight labour market would have eased considerably and the unemployment rate would have stabilised at around 8 to 9 per cent in 2005 and 2006 after a paced increase.

In 2006, it was stagnating income that curbed consumption. The underlying reason for this was that the increase in wage income was offset by a fall in non-wage type (mixed) income. Measures taken to curb tax evasion may have played a role in this, but our simulation cannot account for their impact. Therefore, we adjusted our results for 2006 for the estimated effect of the steps engineered to eliminate the informal economy (Eppich and Lőrincz, 2007; Krekó and P. Kiss, 2008).
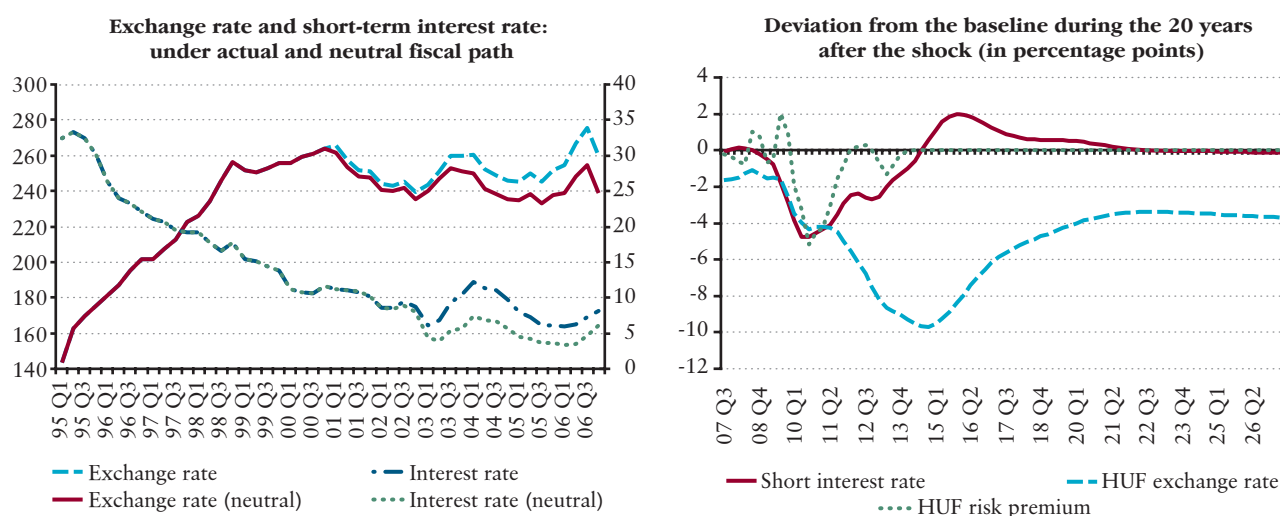
Inflation and monetary conditions

A neutral fiscal path influenced inflation even if monetary conditions are left unchanged, especially after 2004. Had a neutral fiscal path been available, inflation would have been one or two percentage points lower in 2004 and subsequently than it actually was. This would have been attributed, in part, to the disinflation impact of much more subdued domestic demand caused by the neutral path, with the disinflation impact felt a year or two later, and, in part, to the non-occurrence of the 2004 VAT increase with a strong inflationary impact.

A neutral fiscal path would also have changed monetary conditions. Had the neutral path that we defined for the risk premia on HUF instruments (HUF risk premium shock) materialised, the HUF/EUR exchange rate would have been 8 per cent to 10 per cent higher at the end of the surveyed period. A stronger exchange rate would have enabled the central bank to lower the base rate without endangering achievement of the inflation target, in order to somewhat counteract the slowdown in the global economy in 2001–2002. Ultimately, the exchange rate would have remained consistently stronger and short-term interest rates lower along the simulation path. In 2005, when the beneficial effects of global disinflation were felt the most, inflation would have dropped to 2.2 per cent, only to start to edge up again in response to a less benign inflation environment in 2006 (end of global disinflation, increasing food and regulated energy prices).

Chart 2

Monetary conditions

Exchange rate and short-term interest rate: under actual and neutral fiscal path

- - - Exchange rate
— Exchange rate (neutral)
- - - Interest rate
······ Interest rate (neutral)

Deviation from the baseline during the 20 years after the shock (in percentage points)

— Short interest rate
- - - HUF exchange rate
······ HUF risk premium

Source: MNB.

Table 2

Estimates of potential GDP growth

Average annual increase (per cent)	1996–2006		2001–2006	
	Fact	Simulated	Fact	Simulated
Actual data	4.1	3.9	4.2	3.7
HP-trend	4.3	4.0	4.3	3.8
BP-trend	4.2	3.9	4.3	3.8
Production function-based trend	**4.1**	**3.8**	4.2	3.7

Exchange rate and short-term interest rate: under actual and neutral fiscal path Deviation from the baseline during the 20 years after the shock (in percentage points)

Potential growth

Estimates for potential GDP between 1996 and 2006 have been around 4 per cent in recent years (see the updated estimates by Benk et al. [2005] in Analysis of the Convergence Process, December 2006).

Assuming a neutral fiscal path, we used the NEM to obtain a production function-based assessment of potential growth witnessed in the past. Furthermore, in order to be able to grasp the upward trend in GDP, we also used straightforward trend filtering techniques (Hodrick-Prescott and Band-Pass filters), which, on the whole, yielded robust results.

In this paper we only seek to estimate the extent to which our perception and estimates of potential growth were distorted by the fact that fiscal policy was expansive for nearly half of the assessment sample. Our calculations reveal that, without fiscal expansion, the very fact that fiscal policy was expansive between 2001 and 2006 would have led to an approximately 0.2 to 0.3 percentage point measurement error. The estimate for the upward trend would have been much lower, and, within that, our forecast would have been 0.4 percentage point lower during the period of fiscal expansion (2001–2006).[4]

However, amongst other things, the impact of fiscal policy on potential growth depends on the distortions caused by the tax system as well as the structure and efficiency of expenses. As our simulation did not exclude these effects, fiscal expansion may also have curbed potential growth through other channels even further. Based on unfavourable trends in production factors, our projections predict lower potential growth in the future. The underlying reason for this is that, with the factors of production taken into account, signs suggesting a slowdown are reflected in the rate of employment, which will not grow, the fall in capital investments experienced since 2005 and the lower growth of corporate-level total factor productivity (TFP) since 2000.[5]

SUMMARY OF RESULTS: THE OUTPUT GAP

As shown, against a background of a fiscal path neutral prior to 2006 the growth rate would have been 1 per cent lower compared to the 2001–2003 average, and subsequently, it would have edged up slightly. This means that the measure of the output gap, i.e. the difference between potential and actual growth, was also biased. As fiscal policy would not have been able to counter the effects of a global downturn after 2001, a markedly negative output gap would have materialised in 2002 and 2003. In contrast, the business cycle in 2000 and 2001 would also have been perceived as a stronger upswing. Providing an estimate of the output gap on

Chart 3

Cyclical component of GDP
(Calculated by the Band-Pass filter; departure from trend in percentages)

---
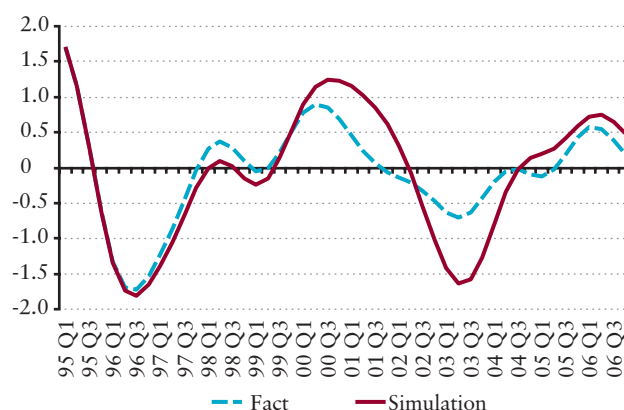
[4] Both the time series method and the one based on the estimate of the production function, especially in short-term samples, are rather sensitive at the end of the data series. Moreover, in our case, the GDP along a neutral fiscal path is an estimated data series itself, which is affected by other limitations of historical simulation, thus, mainly by the specification-related and parameter assessment errors of the QPM.

[5] For details, see Analysis of the Convergence Process, Chapter 2, December 2006.

the assumption of a lower potential growth rate both for the past years and for the future, a box in the November 2007 issue of the Quarterly Report on Inflation was devoted to quantifying such a scenario.[6]

Overall, we may conclude that had the fiscal path been a neutral one, the fluctuations in simulated GDP would have been larger than what was actually measured; furthermore, they would have moved in closer conjunction with the business cycle in the euro area.

REFERENCES

Benczúr, P. and Rátfai, A. (2005): "Economic Fluctuations in Central and Eastern Europe – The Facts", *MNB Working Papers* No. 2005/2.

Benk, Sz., Jakab, M. Z. and Vadas, G. (2005): "Potenciális kibocsátás-becslések Magyarországra különféle megközelítésekben" (Estimates for Hungary's potential output from various perspectives), *MNB Occasional Papers* No. 2005/43.

Csajbók, A. and Rezessy, A. (2005): "Hungary's eurozone entry date: what do markets think and what if they change their minds?", *MNB Occassional Papers* No 37.

Eppich, Gy. and Lőrincz, Sz. (2007): "Három módszer a bérstatisztika fehéredés okozta torzítottságának becslésére" (Three methods to estimate the whitening-related distortion of the wage statistics), *MNB Occasional Papers* No. 66.

Fidrmuc, J. and Korhonen, I. (2006): "Meta-Analysis of the Business Cycle Correlation Between the Euro Area and the CEECs", *CESifo Working Paper Series* No. 1693.

Hidi, J. (2006): "Magyar monetáris politikai reakciófüggvény becslése" (An estimate for the Hungarian monetary policy reaction function), MNB manuscript.

Horváth, Á., Jakab, M. Z., P. Kiss, G. and Párkányi, B. (2006): "Tények és talányok: Fiskális kiigazítások makrohatásai Magyarországon" (Facts and puzzles: The macro-economic effects of fiscal adjustments in Hungary), *MNB Occasional Papers* No. 2006/52.

Kiss, G. and Vadas, G. (2005): "A lakáspiac szerepe a monetáris transzmisszióban" (The role of the housing market in monetary transmission), *MNB Background Studies* No. 2005/3.

Krekó, J. and P. Kiss, G. (2008): "Adóelkerülés és adóváltoztatások Magyarországon" (Tax minimisation and tax changes in Hungary), *MNB Bulletin* No. 2008/1.

Magyar Nemzeti Bank (2006): *Analysis of the Convergence Processes,* December 2006.

Magyar Nemzeti Bank (2003): *Quarterly Report on Inflation,* February 2003, Chapter V.1: "The macro-economic effects of fiscal policy – model calculations".

Magyar Nemzeti Bank (2007): *Quarterly Report on Inflation,* November 2007, Box 3-1: "The output and consumption gap".

Ohnsorge-Szabó, L. and Romhányi, B.: "Hogy jutottunk ide: magyar költségvetés, 2000–2006" (How did we get here: Fiscal policy in Hungary, 2000–2006), *Pénzügyi Szemle* (Financial Review) 2007/2.

P. Kiss, G. and Vadas, G. (2007): "Filling the Gap – An International Comparison of the Cyclical Adjustment of Budget Balances", *Comparative Economic Studies, Palgrave Macmillan Journals,* vol. 49(2), pages 259-284.

---

[6] See Box 3-1 on the output and consumption gap in the *Report on Inflation,* November 2007.

András Komáromi: The structure of external financing: Is there a reason to worry about financing through debt?

Hungary's external balance indicators improved a great deal in 2007. Simultaneously, however, the external debt ratio also rose which, in an international climate of uncertainty stemming from the sub-prime crisis, drew investors' attention to the structure of the country's external financing. This study argues that the recent increase in debt-creating external financing does not necessarily increase risks associated with sustainability. On the one hand, the record rise in debt-creating financing in 2007 is largely due to one-off items. On the other hand, the waning significance of non-debt-creating financing is not attributable to declining inflows but rather mostly to residents' stepped up capital exports, which is partly a result of the development in the institutional investor sector, and partly of the foreign expansion of a few large resident companies. The picture becomes even more intricate as according to recent research, the advantages generally associated with non-debt-creating financing are not always supported by findings, and empirical experience indicates that more developed countries are often characterised by a higher share of debt-type external liabilities. Naturally, and irrespectively of the structure of financing, Hungary's high level of net foreign liabilities in an international comparison continues to be a strong risk factor.

INTRODUCTION

Simultaneously with the decrease in the budget deficit, Hungary's external balance indicators also improved significantly in 2007. At the same time, the net non-debt-creating capital inflow reduced drastically compared to previous years, which – despite the moderating external imbalance – resulted in a marked rise in external indebtedness. In an economic environment of decreasing risk tolerance as a result of the sub-prime crisis, the spectacular rise in debt-creating financing has shifted the attention of analysts and investors to the structure of external financing.

Many saw a correlation between the fall in non-debt-creating financing and Hungary's poorer prospects for long-term growth and deteriorating competitiveness. Nevertheless, the processes deserve a more elaborate approach in many respects. Public thinking, for example, has a considerably unilateral view of the advantages of foreign direct investment, while we tend to interpret the rising role of debt-creating financing a sign of shattered investor confidence. Analyses only examining net capital flows also tend to oversimplify the question as they do not pay attention to the potentially different motivations behind the funds entering and leaving the country. Another important factor to be considered is that the structure of external financing can only

be evaluated in conjunction with the given level of external imbalance and the level of development of the economy and the country's institutions.

The first part of the study presents a brief overview of the conceptual framework within which external imbalance and the structure of external financing can be analysed. We look at the stylised facts in Hungary, and also examine the development of FDI flows in a regional comparison. This is followed by an attempt to put the structure of external financing into a wider framework with the help of theoretical and empirical findings in the relevant literature. Finally, an evaluation will be given of the recently accelerated restructuring of Hungary's external financing with some forward-looking conclusions as well.

EXTERNAL FINANCING REQUIREMENT AND THE STRUCTURE OF FINANCING[1]

The financial savings of a country, i.e. the part of its gross national disposable income (GNDI),[2] which is not spent on consumption (C) or on capital formation (I), is known as the net external financing capacity (NFK). If we take into account that capital formation can be realised not only from disposable income, but also from net unilateral capital transfers in the *capital account* (KA) of the balance of payments, then we can demonstrate that the external

---

[1] A detailed elaboration on the contents of this chapter can be found in Antal (2006).
[2] Gross national disposable income (GNDI) is the sum of gross domestic product (GDP), the net foreign income (NFI) and the balance of current transfers (NFTC).

financing capacity equals the sum of the current account (CA) and the capital account balance:

$$NFK = GNDI + KA - (C + I) = [GDP + NFI + NFTC] + KA - (C + I) =$$
$$= [(C + I + X - M) + NFI + NFTC] + KA - (C + I) =$$
$$= [(X - M) + NFI + NFTC] + KA = CA + KA$$

When a country spends more than its income – as is the case in Hungary – then its net external financing capacity is negative, which is also called the external financing requirement.[3] The financial transactions between foreigners and domestic agents, i.e. the financing of the country's external financing requirement, are shown in the *financial account* of the balance of payments. Here, we can monitor the asset-type breakdown in which domestic sectors attracted external resources.

Foreign resources can be classified according to whether they embody debt-type (*debt-creating*) or ownership-type (*non-debt-creating*) liabilities. Debt-creating funding generates principal or interest payment obligation to the foreign funder, whereas via non-debt-creating financing foreign actors acquire domestic property and are hence entitled to the income generated by the property.[4] A further consideration for categorisation may be to see if the investment manifests itself in a financial instrument easily negotiable on the organised markets (so-called portfolio investment) or represents a less 'impersonal' and less easily transferable legal relationship (Table 1).

The net external financing requirement is covered by the domestic sectors' foreign borrowing, therefore it is expedient to examine the typical types of external resources which the domestic sectors rely on. The corporate sector may absorb both debt-creating and non-debt-creating foreign funds.

Non-debt-creating capital inflow may take the form of foreign direct investment[5] or portfolio equity investment.[6] The general government primarily relies on debt-creating resources from abroad, but the government's privatisation revenues are not-debt-creating funds. Generally households do not borrow directly from abroad, but this sector – similarly to enterprises – may still rely on debt-creating resources through credit institutions which merely act in such transactions as mediators.[7]

The mere fact that a country partly relies on external resources is not a problem itself. It is only natural that fast-growing, converging economies raise foreign capital to finance their abundant investment opportunities. However, a constantly high level of financing requirement is generally considered by investors as a risk factor which reduces a country's resistance to external shocks, and may also be indicative of the long-term unsustainability of economic processes. For this reason the development of the external financing requirement is monitored by economic policy makers, credit rating agencies, market analysts and investors, who use this information to formulate their opinions on the level of risk associated with the given country.

In respect of assessing sustainability, the level of external financing requirement is the primary factor; however in case of a significant external imbalance, the structure of financing may also come to the fore. Analysts generally tend to consider one set of resources more favourable from the recipient country's point of view, and find other forms of capital flows less healthy as they may increase the country's vulnerability. FDI is usually considered especially 'good' in this respect as it is thought to stimulate growth in the recipient country through various channels. On the other hand, many analysts consider portfolio investments more

Table 1

Groups of external resources

	Debt-creating	Non-debt-creating
Portfolio type	bonds, money market instruments	shares
Non-portfolio type	loans, bank deposits, currency	foreign direct investment (FDI)

[3] This study primarily deals with processes in Hungary, and therefore the statements made herein are valid in an environment of negative external financing capacity (external financing requirement).

[4] In contrast with the standard structure of the balance of payments, this analysis places no particular importance on international reserves, which is treated as an item reducing debt-type liabilities.

[5] Consistent with the practice adopted in the Balance of Payments Statistics, parent company loans are also taken into account as part of FDI, because according to experience, the crossover between parent company loans and equity FDI is relatively easy and may take place without any fundamental reason and without any impact on market processes.

[6] The separation of FDI and portfolio-type equity investment is very difficult empirically. Macrostatistics apply a very simple rule: any stake in foreign ownership exceeding 10 per cent is construed as FDI.

[7] A good example is the increasing corporate and household FX lending of recent years, which greatly contributed to the rise in the absorption of foreign funds by the banking system.

volatile, and think that they may exaggerate swings in the business cycles, and may lead to or at least intensify financial crises.

THE STRUCTURE OF EXTERNAL FINANCING IN HUNGARY: STYLISED FACTS

Hungary's external financing requirement compared to GDP increased remarkably towards the end of the 1990s and fluctuated quite a bit until 2006 in the extremely high band of 6 to 8 per cent. In addition to the steadily high level of external imbalance, there was also a marked shift in the structure of financing, i.e. the ratio between debt-creating and non-debt-creating resources changed (Chart 1).[8]

The period lasting to the early 2000s was characterised by high non-debt-creating capital inflow and broadly insignificant outflow: hence, the net volume of non-debt-creating financing always tended to exceed the external financing requirement. Early, quick privatisation played a direct role in the strong FDI and portfolio share inflow in the 1990s, and the general scarcity of capital and the economic policies that were designed to encourage investment by granting significant allowances made Hungary an attractive investment destination (Sass, 2003). Meanwhile, the direct

Chart 1

Structure of external financing in Hungary, 1995–2007 (as a percentage of GDP)
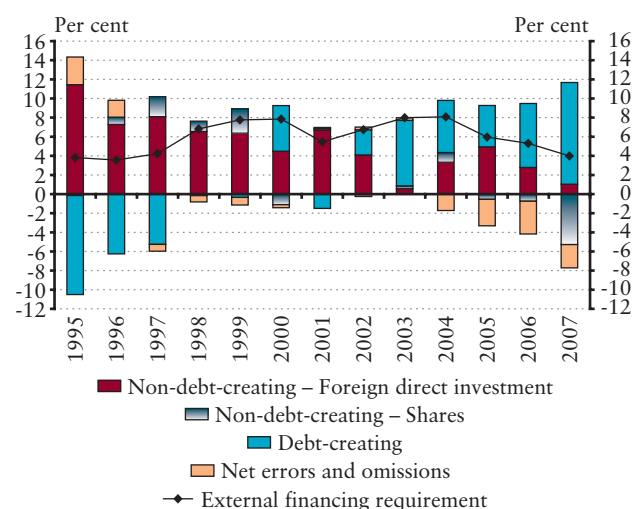
Source: MNB.

capital export of resident companies was insignificant, and the level of foreign equity investment was suppressed by the underdevelopment of the institutional investor sector (investment funds, pension funds, insurance companies).

Table 2

Development of FDI flows in neighbouring countries (as a percentage of GDP)*

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
FDI inflow													
Czech Republic	4.6	2.3	2.3	6.0	10.6	8.8	9.1	11.4	2.3	4.5	9.3	4.2	5.3
Poland	n. a.	n. a.	n. a.	n. a.	n. a.	5.6	3.0	2.1	2.1	5.1	3.4	5.6	4.2
Romania	n. a.	n. a.	n. a.	4.7	2.9	2.8	2.9	2.5	3.1	8.5	6.6	9.3	6.0
Slovakia	1.2	1.7	0.8	2.5	1.6	10.1	7.0	16.1	1.8	2.7	4.4	7.4	3.9
Hungary	11.0	7.3	9.1	7.1	6.9	5.8	7.4	4.5	2.5	4.4	6.9	6.0	4.0**
FDI outflow													
Czech Republic	0.1	0.2	0.0	0.2	0.1	0.1	0.3	0.3	0.2	0.9	0.0	1.0	0.8
Poland	n. a.	n. a.	n. a.	n. a.	n. a.	0.0	0.0	0.1	0.1	0.3	1.1	2.6	0.8
Romania	n. a.	n. a.	n. a.	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.3	0.0
Slovakia	0.0	0.2	0.4	0.6	-1.9	0.1	0.1	0.0	0.0	-0.4	0.3	0.7	0.3
Hungary	0.1	0.0	1.0	0.6	0.5	1.3	0.7	0.4	2.0	1.1	2.0	3.3	3.0

Source: Eurostat, MNB.

* Including parent company loans.

** The one-off Budapest Airport transaction reduced the FDI-to-GDP ratio by 1 to 2 percentage points.

---

[8] The balance of payments – similarly to all macroeconomic statistics – contains a certain degree of statistical uncertainty. This is demonstrated by the fact that the official net financing requirement (the sum of the current and the capital account) and the financial account that covers the former do not match numerically. The difference is shown on the line 'Net errors and omissions'. This difference in Hungary is extremely high, but the scope of this study does not allow us to dwell on the reasons.

In recent years, however, the rising non-debt-creating capital export of domestic agents has evolved as a new trend, which has gone hand in hand with an increase in the ratio of debt-creating financing. While there is no substantial decrease in the inflow of FDI (excluding privatisation revenues), the direct capital outflow generated by resident companies has significantly increased. There is a similar process concerning portfolio equity investments: Hungarian institutional investors are tending to buy foreign shares in increasing volumes, therefore the outflow of equity capital does in effect reduce net non-debt-creating financing.

Direct capital outflow from Hungary is also extremely high in comparison with neighbouring countries (Table 2). As far as the GDP-proportional FDI inflow is concerned, Hungary used to be number one in the region until the end of the 1990s, and then usually performed in a middle-rank position. This was largely due to the fact that privatisation in neighbouring countries was started much later.[9] At the same time, direct capital outflow usually exceeded the level characterising the region, and this difference has further increased in recent years (for more details on capital outflow, see the box below).

The reasons behind and long-term impacts of non-debt-creating capital outflow

Concerns about Hungary's competitiveness together with the general macro-economic uncertainty may have contributed to the accelerated outflow of non-debt-creating capital in recent years; it seems, however, that so far other motivations account for the larger share of the capital export which has been seen.

The major part of *FDI* outflow we have so far witnessed is attributable to a few large resident companies that are performing well on the domestic markets (e.g. MOL, OTP, MKB).[10] For these companies, the domestic market seems saturated, and therefore their capital export is motivated by regional expansion and acquisition opportunities which enable them to tap into new markets.

The rise in capital outflow in the form of *portfolio equities* reflects the growing international activity of domestic institutional investors. Non-bank saving alternatives are increasingly popular among households,

and legislative changes have also supported the development of the sector.[11] On the one hand, a large volume of savings has been channelled into various funds, while on the other hand, complete foreign exchange liberalisation made the purchase of foreign shares possible without any constraints. The introduction of the 'elective portfolio system' for private pension funds has also contributed to a rise in capital export, since funds are forced to increase the ratio of shares in their portfolio in order to satisfy legal regulations.[12]

At the same time, non-debt-creating capital export may have positive effects over the long run. Through foreign direct investment, the domestic companies may expand further and institutional investors may diversify their portfolios by buying foreign shares. Non-debt-creating capital outflow may thus contribute to reducing the deficit in the balance of income and hence to the growth of disposable income in the whole economy.[13]

In 2007, the role of debt-creating financing accelerated to an outstanding level, which was fundamentally due to one-off factors. At the annual level, we saw more than EUR 3 billion in outflows of net non-debt-creating resources, which led to a 6.5 percentage point rise in net external debt. This capital outflow was greatly facilitated by the following two specific factors which have little to do with the macroeconomic environment:

• MOL attempted to protect itself against OMV's take-over efforts by purchasing its own shares in a value of over EUR 2 billion. The majority of the company's shares traded on

the stock exchange was in the hands of foreign shareholders, hence the transaction showed up as non-debt-creating capital withdrawal in the Balance of Payments.

• There was a change in the ownership of the foreign-owned Budapest Airport and parallel to that a change in its financing structure. The previous owner financed the acquisition of the company 100 per cent from FDI, while the new owner financed the larger part of the EUR 1.9 billion sale price from foreign bank loans, and not from FDI. As a result of the above transaction, there was a

---

[9] The last larger wave of privatisation in Hungary (MOL, Budapest Airport) increased the volume of non-debt-creating financing for 2004–2005.

[10] It is obvious even from public data that the banking sector plays an important role in FDI outflow. In the period 2003–2007, more than 30 per cent of FDI outflow was the result of commercial bank activities.

[11] In recent years, the structure of households' assets has been constantly changing in favour of investment units and insurance technical reserves (life insurance, pension fund savings).

[12] The equity exposure of funds (private and voluntary pension funds, health funds) rose from 14 per cent in the beginning of 2005 to 29 per cent by the end of 2007, while their managed wealth increased by more than 80 per cent. Simultaneously, the proportion of the previously dominant Hungarian shares in the portfolio steadily fell to account for a mere 36 per cent by end–2007.

[13] Income revenue in connection with residents' non-debt-creating foreign investments was on a rising trend already in the last few years.

significant FDI outflow and an equal amount of debt-creating inflow recorded in the Balance of Payments Statistics.

The strong 2007 increase in Hungary's net external debt ratio is regarded as an unfavourable development by investors. Looking behind the aggregate indicators, it can be concluded that (i) the fall in the ratio of non-debt-creating financing is primarily a result of the increased outflow of such resources, while (ii) the inflow of FDI is around the average in regional comparison, furthermore (iii) in 2007 one-off factors resulted in a temporary acceleration in the spread of debt-creating financing.

NON-DEBT-CREATING FINANCING – QUESTIONABLE ADVANTAGES

The causes behind non-debt-creating capital outflow are likely to persist, and hence it is reasonable to expect a long-term shift towards debt-type resources in the structure of external financing even if we eliminate the one-off effects. This phenomenon may have a temporarily negative impact on investor sentiment, since investment banks and credit rating agencies tend to consider the ratio of external financing requirement covered by FDI or, more generally, by non-debt instruments a sort of vulnerability indicator.

However, the favourable properties associated with non-debt-creating foreign investment have been both theoretically and empirically challenged. In the following, we will examine the arguments most often cited in support of non-debt-creating resources with a critical eye. It is the aim of this section to demonstrate that most of these arguments are presented and embedded in public thought rather one-sidedly, even though, in the light of recent research, they are no longer held to be generally and widely valid.

1. Non-debt-creating external resources are connected to the investment expenditures of the corporate sector, hence they contribute to future growth.

The rise in external financing requirement is generally better received when it is associated primarily with an increase in investment rather than with a fall in domestic savings. If the stronger demand for external financing is closely related to increased corporate capital formation, it may improve future growth prospects and thus entail more moderate risks. If however, the rise in external financing requirement is a result of low household savings and fast consumption growth, or an increase in general government deficit, it is believed that external financing is less likely to contribute to future growth.

Non-debt-creating resources – particularly in the form of FDI – are often thought to be associated with corporate investment expenditure, although this is not necessarily the case. It is a fact that the general government and households (through the banking system) typically rely on debt-creating foreign financing, whereas corporations are capable of raising non-debt-creating resources by issuing shares or using FDI to satisfy their financial needs. However, there is no direct relationship between the form of financing and the purpose of the funds, hence non-debt-creating external financing does not necessarily go hand in hand with enhanced investment activities. This correlation seems rather weak in Hungary in particular (Chart 2).

Chart 2

FDI inflow and investments*
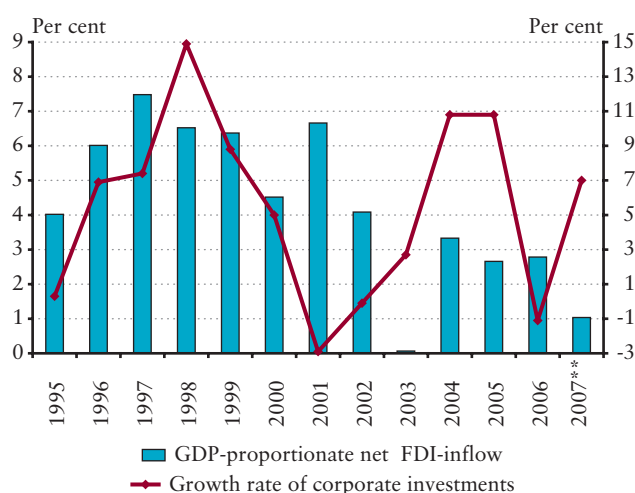
* Net inflow of FDI excluding privatisation revenues (MNB) and the investments of the economic entities operating as 'enterprises' (CSO).
** MNB estimate based on quarterly CSO reports.

2. Non-debt-creating resources – particularly FDI – are stable forms of financing and hence reduce the risk of a balance of payments crisis.

Foreign direct investment is traditionally regarded as a less liquid and therefore more stable form of financing than debt-type investments. According to common belief, it follows from this that these types of financing reduce the risk of a balance of payments crisis. Levchenko and Mauro (2006), for example, used simple descriptive statistics to demonstrate that under normal circumstances the volatility and persistence of the various forms of capital flows are not very different, but in 'sudden stop' periods, non-debt-creating resources – and particularly FDI – prove to be considerably stable. According to their conclusion, debt-type portfolio investments and, even more so, bank and commercial loans are held 'responsible' for the development of 'sudden stops'.

Many studies, however, challenge the view that there is a point in separately examining the various forms of financing in terms of the volatility and predictability of the total external capital inflow. Companies may, at their own discretion, reshuffle the structure of their liabilities, therefore in the event of a crisis, capital outflow does not necessarily mean an exodus of FDI. If, for example, a foreign company would like to remove capital from a given country in fear of a crisis, it has the option not only to remove its own equity, but also to use domestic loans to purchase foreign assets, or to pay back foreign loans. In this case, 'whatever comes in through the door, leaves through the window in a different form', therefore the volatility of FDI in itself provides little information about the volatility of the entire financial account (Fernandez-Arias and Hausmann, 2000).

3. Non-debt-creating liabilities promote international risk sharing.

One favourable characteristic of non-debt-creating financing is that it may play a potentially greater role in international risk sharing than debt-creating funds. This stems from the fact that returns realised on equity are generally pro-cyclical, i.e. foreign investors are entitled to lower income when the domestic economy is facing difficulties, and to higher income in times of boom. Similarly, when due to a negative shock the exchange rate is depreciating, the foreign currency denominated external debt service rises, while FDI and stock yields presumably fall. In this sense, non-debt-creating liabilities can contribute to smoothing the country's disposable income.

The advantages of this potential risk sharing are strongly weakened by the fact that foreign owners may react to slowing domestic economy by reducing the share of reinvested incomes.[14] The total income generated by foreign-owned companies may in fact change according to the current general economic situation, but it is exclusively the owners' decision how much they choose to reinvest in the company and how much they take out from the country in the form of dividends, for example.

4. Non-debt-creating liabilities do not involve maturity and currency mismatches.

Theoretically, equity-type liabilities do not involve maturity or exchange rate risks since the owners' claim is the very cash flow – be it denominated in any currency – that is left over after paying out all the other eligible parties (creditors). Ideally, a company is capable of borrowing both short- or long-term in any currency and hence can adjust its liabilities to the maturity structure of its assets and the denomination of its cash flows. When this is not possible however – i.e. the market is not complete – the company's balance sheet will contain maturity and currency mismatches. In such a situation, a greater role of non-debt-creating financing is justifiable in the optimal financing structure of the company.

In this case, however, it would be a mistake to interpret the high share of non-debt-creating financing as a sign of economic stability, because this is probably a mere reflection of the investors' optimal reaction to the mismatches evident in the country's balance sheet. Empirical studies have, for example, indicated that countries suffering from 'original sin' – those that are unable to borrow in their own currencies – rely much more on FDI to satisfy their external financing needs (Hausmann and Fernandez-Arias, 2000).

5. Non-debt-generating financing – particularly FDI – contributes to economic growth through positive externalities.

Arguments in support of foreign direct investment very often state that FDI can accelerate growth and economic convergence in the host country. According to the traditionally accepted explanation, it is the associated positive externalities that make FDI different from investments carried out by domestic companies. Foreign-owned companies may bring with them new technology, know-how, managerial skills, and access to new markets which, when passing through into the recipient country may expand the production-possibility frontier.

It is important to recognise, that the above mentioned advantages attributed to FDI are, in fact, linked to the companies themselves rather than the manner of financing. When a foreign-owned company provides the host country with new technology, better management systems, or access to new export markets, then this is solely due to the company's activities and has nothing to do with direct capital. Direct capital is only one of the possible ways to finance a company – a macro-accounting concept – and has no external impact itself. The positive impact that foreign investments have on domestic economic growth – if it exists at all – cannot be restricted only to external financing in the form of FDI.

A large part of the empirical literature either finds no detectable relationship between FDI and growth in the host country, or the relationship seems to be evident only in countries with low levels of economic development

---

[14] When calculating gross national domestic income (GNDI), the reinvested incomes of foreign companies are also deducted as they are not linked to resident property. Still, it is considered more advantageous if foreigners reinvest a larger share of their profits realised in Hungary into their enterprises, as this amount reduces the country's need for 'new' or 'additional' external resources.

(Mileva, 2008; Herzer, Klasen and Nowak-Lehmann, 2008). These findings are consistent with the observation that in countries with relatively underdeveloped financial markets and weak institutions, foreign-owned companies tend to rely on FDI. For this very reason, in order to draw any far-reaching conclusions regarding the structure of external financing, it must be understood what factors foreign investors consider when choosing the form of financing. Economic theory may provide us with a starting point for this endeavour.

## THEORIES AND HYPOTHESES RELATING TO THE STRUCTURE OF EXTERNAL FINANCING

Although there is no widely accepted theory for explaining the external capital structure of firms, the vast majority of the literature sets out from the microeconomic models of corporate finance. The classic study by Modigliani and Miller (1958) demonstrated that in an environment of perfect information, and in the absence of bankruptcy costs and distorting taxes, the value of a firm is unaffected by how it is financed. The majority of subsequent analyses attributed the empirical failure of the 'irrelevance theorem' to the asymmetric information of actors. If, for example, external investors are less informed concerning the internal operations of a company, the market will underprice newly issued shares, and therefore raising funds through equity is more expensive for the firm than using internal funds. This train of thought takes us to a certain kind of hierarchy of the different types of financing, in other words, firms rank financial instruments in accordance with the extent of information asymmetry and the related mispricing.

The fundamental principles laid down in the literature of corporate finance are very useful in examining the external financing of countries, although other types of imperfections may also become decisive from a macroeconomic perspective. It follows from the analysis of the impacts of information asymmetry presented above, that share-buying investors require a higher return for accepting higher uncertainty (risks) than creditors do. This micro-level correlation stands true for the investments of foreigners as well (Chart 3).

At the macro level, however, the relevant question is how much of the country's external financing needs the foreign investors are willing to finance through debt, and how much through direct ownership. This decision is, however, very much influenced by factors that relate back to the fundamental differences between a firm and a country. On the one hand, the information asymmetry between residents

Chart 3

Implicit yield paid on Hungary's external resources*
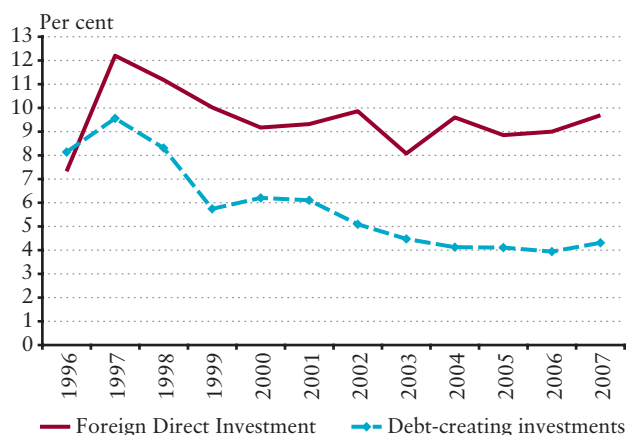
Source: MNB calculation.

* The implicit yield is calculated as the quotient of expenditure in the income balance and the gross average stocks.

and foreigners may be significant for obvious reasons (geographical distance, language, knowledge of the institutional system, etc.), while on the other hand, after the realisation of the foreign investment a sovereign state cannot always be forced by legal means to ensure the original conditions agreed on.

According to the first approach, foreign investors will favour financing forms that will help remedy their information disadvantages compared to residents, and also the mitigation of information frictions associated with a particular type of asset may increase its role in external financing. Neumann (2003), for example, presumes that equity-type claims (FDI, shares) also transmit a certain degree of control rights and thus convey some information about an investment. If ownership does indeed help reduce the costs of monitoring necessary due to information asymmetry, then non-debt-creating financing is a more favourable way of financing than debt, which transmits less information. Using the same logic, it follows that the more transparent and developed a country's capital market is – i.e. the smaller the information asymmetry between residents and foreigners, which may only be bridged by direct ownership – the greater the role played by debt in external financing.

The second approach focuses on the possibility of expropriation and the problem of imperfect enforceability of international contracts. A major difference between a country and a company is that governments may at any time expropriate the assets of the private sector, or refuse to repay their sovereign debts. When such measures are pursued, the claims of foreigners and residents are usually treated

differently – normally to the detriment of foreigners.[15] For this reason, foreign investors will prefer financing forms that are more difficult to expropriate either directly or indirectly. According to Albuquerque (2003), the vast share of FDI is intangible (technology, brand names), and is thus more difficult to expropriate. It follows from this, again, that countries with less developed legal and institutional structures – where the possibility of yields being expropriated is higher – can only finance themselves through direct investment, whereas in countries with developed capital markets, the ratio of debt-type financing – which in theory may be easier to expropriate – may be higher.

The above models suggest that the significant role played by non-debt-creating foreign investments (and particularly FDI) is not necessarily a sign of investors' confidence in the host country, but – quite on the contrary – may be a reflection of high risk and uncertainty associated with the legal system, or the weakness of the institutional system. Of course, such 'soft' hypotheses are difficult to test based on aggregate macro-economic data, but there is some evidence that the above relationships are, by and large, valid. Using various development and risk indicators, and institutional quality indices, many studies have succeeded in demonstrating that a more predictable economic environment and a higher level of development usually go hand in hand with a higher share of debt-type foreign investment (Albuquerque, 2003; Faria and Mauro, 2004; Faria, Lane, Mauro and Milesi-Ferretti, 2007; Daude and Fratzscher, 2006).

Looking at a wide range of European countries relying on external financing, it is striking that in many relatively developed countries debt-creating liabilities account for a large share of total net external liabilities (Chart 4).[16] Every country's international investment position is naturally affected by a number of other factors – often rooted in the country's history[17] – but the data are still broadly consistent with the conclusions of the theory. Taking into consideration the significant scattering of the values, we can certainly conclude that the share of Hungary's external debt in total foreign liabilities is not far off from countries with a similar level of development.

With regard to sustainability, therefore, it is not the structure of financing that is primarily decisive but the level of foreign liabilities. On the basis of the above, when evaluating different countries' dependency on external financing, it does not take us very far if we only focus on some selected types

Chart 4

Ratio of debt-creating liabilities in net external liabilities
*(31 December 2006)*
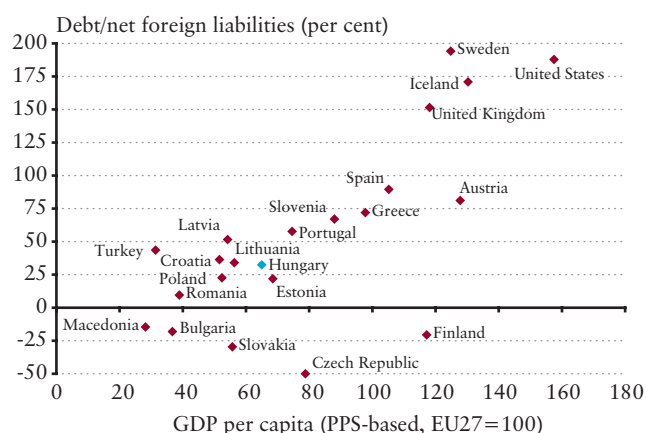
Source: Eurostat, International Financial Statistics (IMF). The sample includes those countries of the EU27 and countries presently negotiating accession whose net external liabilities are positive, together with the USA and Iceland. Ireland and Italy are not shown in the chart for practical representation reasons.

of foreign liabilities, as the country's total international investment position and its dynamics ought to be examined. While owing to the decreasing external financing requirement, Hungary's net external liabilities to GDP stabilised in 2007, the ratio is still extremely high by international standards (Chart 5). In the event of a renewed rise in external imbalance, the high starting base could have

Chart 5

Net external liabilities in international comparison
(2006, as a percentage of GDP)
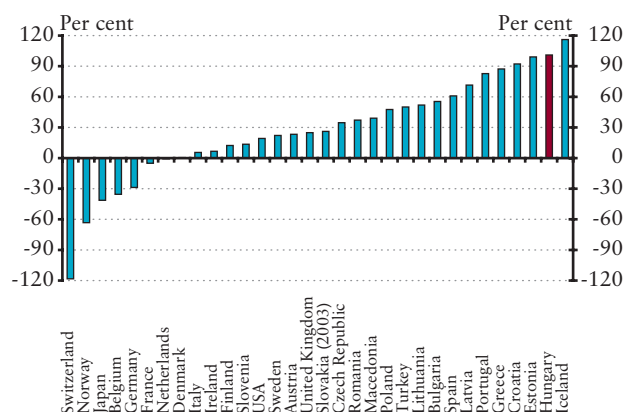
Sources: International Financial Statistics (IMF), MNB.

---

[15] Schnitzer (2002) points out that the host country's sovereign government may exercise negative impacts on the yields of foreign investments by means other than nationalisation as well. These may include changes in the tax system or the introduction of special import or export customs ('creeping expropriation').

[16] A similar conclusion may be drawn on the basis of the external debt-to-GDP data.

[17] It is a widely shared opinion that Ireland's impressive inflow of FDI was also due to the fact that there was a live relationship between Ireland and the management of US multinationals through the ex-patriate Irish community.

an exceptionally negative impact on the country's risk assessment.

CONCLUSIONS: DOES INCREASING DEBT-CREATING FINANCING PRESENT A PROBLEM FOR HUNGARY?

In 2007, Hungary's external debt-to-GDP ratio increased significantly, which in a period of fading global risk appetite drew attention to the gradually increasing role of debt-creating external financing.

In evaluating *recent* processes one must take into account the role of one-off factors and the fact that FDI inflow cannot be considered low compared to other countries in the region. In 2007, two one-off transactions related to MOL and Budapest Airport dramatically decreased the net non-debt-creating inflow of capital (by about 4 per cent of GDP). Meanwhile, FDI inflow which is considered a very important index by many analysts did not increase in any of the countries of the region, and there was a slight decline in most of them.

Over the long run it is worth taking into account natural reshuffling in the financing structure and the potential advantages of capital export. The rise in the capital export of domestic companies and institutional investors' increasing foreign share purchases indicates that the structure of external financing is likely to shift towards debt-creating resources in the long run. Although this may be temporarily disadvantageous with regard to investor sentiment, it does not necessarily represent a problem in terms of long-term sustainability and, furthermore, in some respects, it may be considered a natural part of the convergence process.

With the termination of privatisation and progress in economic transition, the drop in FDI inflow is partly a natural phenomenon. It is an empirically demonstrable trend that with the deepening of financial intermediation, economic development and the improvement of the institutional system, the structure of external financing of a country shifts towards debt-creating liabilities over the long term. Development of the domestic financial markets and the institutional system require foreign investors less and less to invest their capital in the country through direct ownership.

Increasing non-debt-creating capital outflow may, over the long run, contribute to the improvement of the balance of income and thus increase the gross national disposable income (GNDI) in the entire economy. Parallel to falling non-debt-creating capital inflow, as has seen recently, Hungary may become a jump-off point for FDI towards less developed countries (e.g. Ukraine, Romania, Bulgaria), and

institutional investors may diversify their portfolios by buying foreign shares. Equity-type investments can generate a greater income over the long run than debt liabilities, and hence we can expect a greater inflow in the balance of income than seen currently.

Accordingly, in the event of a permanent decrease in the budget deficit and concurrently in the external financing requirement, the rise in the share of debt-creating financing itself should not be considered detrimental. It is, however, important to point out that, independently from the structure of financing, the level of Hungary's net external liabilities is extremely high, which continues to present a serious risk to sustainability.

REFERENCES

ALBUQUERQUE, R. (2003): "The composition of international capital flows: risk sharing through foreign direct investment", *Journal of International Economics,* 61(2), pp. 353-383.

ANTAL, JUDIT (2006): "Külső adósságdinamika" (External debt dynamics), *MNB Occasional Papers* No. 51.

DAUDE, C. AND FRATZSCHER, M. (2008): "The pecking order of cross-border investment", *Journal of International Economics,* 74(1), pp. 94-119.

FARIA, A., LANE, P. R., MAURO, P. AND MILESI-FERRETTI, G. M. (2007): "The Shifting Composition of External Liabilities", *Journal of the European Economic Association,* 5(2-3), pp. 480-490.

FARIA, A. AND MAURO, P. (2004): "Institutions and the External Capital Structure of Countries", *IMF Working Papers,* No. 04/236.

FERNANDEZ-ARIAS, E. AND HAUSMANN, R. (2000): "Is FDI a Safer Form of Investment", *IADB Research Department Working Paper,* No. 416.

HAUSMANN, R. AND FERNANDEZ-ARIAS, E. (2000): "Foreign Direct Investment: Good Cholesterol?", *IADB Research Department Working Paper,* No. 417.

HERZER, D., KLASEN, S. AND NOWAK-LEHMANN, D. (2008): "In search of FDI-led growth in developing countries: The way forward", *Economic Modelling,* forthcoming.

LEVCHENKO, A. A. AND MAURO, P. (2006): "Do Some Forms of Financial Flows Help Protect from Sudden Stops?", *IMF Working Papers,* No. 06/202.

MILEVA, E. (2008): "The Impact of Capital Flows on Domestic Investment in Transition Economies", *ECB Working Paper,* No. 871.

MODIGLIANI, F. AND MILLER, M. H. (1958): "The cost of capital, Corporation Finance and the Theory of Investment", *American Economic Review,* 48(3), pp. 261-297.

NEUMANN, R. M. (2003): "International Capital Flows under Asymmetric Information and Costly Monitoring: Implications of Debt and Equity Financing", *The Canadian Journal of Economics,* 36(3), pp. 674-700.

SASS, MAGDOLNA (2003): "Competitiveness and Economic Policies Related to Foreign Direct Investment", *Ministry of Finance Working Paper Series,* No. 3.

SCHNITZER, M. (2002): "Debt vs. Foreign Direct Investment: The Impact of Sovereign Risk on the Structure of International Capital Flows", *Economica,* 69(273), pp. 41-67.

Judit Krekó–Gábor P. Kiss: Tax evasion and tax changes in Hungary

Tax evasion reduces the efficiency of the economy as unequal opportunities of tax evasion leads to an inefficient distribution of resources. In Hungary, based on data for 2005–2006, tax evasion resulted in a transfer of 7.9 per cent of GDP from taxpayers to tax evaders. Following measures aimed to reduce tax evasion, this transfer was estimated to be 6.7 per cent of GDP in 2006 and 2007. Underlying reasons for tax evasion are the different burdens on labour and capital incomes. According to international experience, either the control of splitting labour and capital incomes or bringing their contribution burdens closer to one another can help in this situation. The effect of administrative measures is often temporary, because they do not improve tax-compliance attitude. A positive change in taxpayers' attitude is an especially difficult task; one of its possible means can be a shift in the tax burden in favour of local taxes.

INTRODUCTION

Tax is a compulsory payment, in exchange for which the taxpayer does not receive immediate direct benefits (i.e. it is unrequited). Taxes cover the costs of allocation of public goods. Their other function is to provide for income redistribution together with transfers. There are various social preferences regarding redistribution, which are basically related to the issue as to what extent the groups with different levels of income should be beneficiaries or bearers of burdens. On the basis of fairness, usually a deviation from vertical equity (i.e. contribution in equal proportion to income, independent of income level) is preferred, in other words lower incomes should be taxed at a lower rate, while higher incomes should be taxed at a higher rate.

This article deals with two other dimensions of taxation: horizontal equity and efficiency, as well as the relationship between these dimensions and tax evasion. Conditions for horizontal equity hold true if taxpayers with the same income bear the same tax burden. A tax system is efficient if it ensures a given tax revenue at a minimum social cost. Social cost has three elements: the cost of tax administration, the cost of compliance and the excess burden caused by the distorting effects of taxes on economic behaviour. Excess burden is the welfare loss caused by taxation over and above the revenue it raises. The excess burden increases with the square of the tax rate. On the other hand, the higher is the tax elasticity of the commodity or income, the higher the loss. Therefore, in order to minimise the loss, tax rates should be inversely proportional to their elasticities. In this case, for example, there would be a lower-than-average tax burden on capital incomes and higher incomes and a higher-than-average burden on basic consumer goods.

Efficiency considerations, namely tax rates inversely proportional to elasticities, may conflict with the social preferences regarding vertical equity. While efficiency would require preferential rate for higher incomes, fairness would justify just the opposite. One possible solution is when taxation addresses efficiency considerations, while social transfers ensure fairness. The underlying reason is that fairness can be assured not only by progressive taxation, but also through social transfers. However, one must not forget that, depending on the specific design, a reduced tax burden and a transfer may have different effects.[1]

From the perspective of our analysis, it is a more interesting issue that tax burdens inversely proportional to elasticities may also violate the principle of horizontal equity. The underlying reason is that the tax burden on the income of corporations, entrepreneurs and employees of small companies is lower than that of other employees who earn the same income. On the one hand, the higher elasticity of the former incomes stems from the fact that the first group of taxpayers can respond to an increase in tax burdens with a real change of its activity (for example, by restraining its labour supply or relocating its activity in another country). On the other hand, they may also react with tax evasion, i.e. with an apparent change of activity, for example by underreporting the registered activity, hiding the profit and transferring it abroad.

The remaining part of the article first examines the issue of tax evasion and its magnitude in Hungary, followed by a review of how, on the basis of international experience, it would be possible to reduce the elasticity of tax bases allowed by tax evasion.

---

[1] The situation is similar in the case of the provision of family allowances in the forms of tax benefits and expenditure, where there is a significant difference between the two solutions in terms of fairness and incentives.

TAX EVASION IN HUNGARY

The concept of tax evasion is used below in a broader sense, including both tax avoidance, which exploits the loopholes in the tax system, and the clearly illegal tax evasion. However, it may be justified to distinguish them because they require different solutions. As tax avoidance is attributable to loopholes in taxation, the solution can be to change the tax system in such a way as to make it more difficult to circumvent the rules. In the case of the loopholes granted by a compromise between the authority and the taxpayer (e.g. in the case of the acceptance of a minimum payment), the question is to what extent the compromise can be considered as reasonable. Besides administrative efforts (controls, penalty) and improving the tax-compliance attitude, illegal tax evasion can also be reduced by adequately changing the tax system. International experience regarding the impact of tax changes on tax evasion are discussed in more detail in the next part.

As mentioned in the Introduction, taxes, on the one hand, cover the costs of allocation of public goods, and, on the other hand, ensure income redistribution together with transfers. Consequently, the tax-compliance attitude is partly determined by how – for services of what quality, at what rate of corruption – the paid taxes are spent according to the perception of taxpayers. The other determining factor is the perceived fairness of the tax system, i.e. to what extent it meets the distribution preferences regarding horizontal and vertical equity.

Tax evasion is a serious problem because it may result in a significant welfare loss by allowing transfers from taxpayers to tax evaders. This loss is due to an efficiency loss on the one hand and horizontal inequity on the other hand. Efficiency is reduced because the unequal opportunity of tax evasion leads to an inefficient distribution of resources. Enterprises exploiting the various opportunities of tax evasion gain unjustified advantage over their competitors, as they are able to pay wages which are consistent with the labour market equilibrium even if the labour is used at a much lower efficiency. Meanwhile, due to the loss of tax revenue, the tax burden on those who cannot avoid paying their taxes has to be increased, and thus the companies that are more efficient (i.e. by using one unit of labour, they produce higher added value and income which can be redistributed), but comply with the rules, may be not competitive in the labour market. Horizontal equity is violated by the fact that a group of taxpayers is able to hide their income; therefore, the other group of taxpayers pays instead of them as well, which results in a further deterioration of the tax-compliance attitude. It is hard to estimate these welfare losses, but it is certain that the loss is smaller than the size of the 'transfer' allowed by tax evasion. Since the costs of the fight against tax evasion (the costs of tax administration and compliance) may be very high beyond a certain point, an optimal level of tax evasion exists, where the total cost including welfare loss is minimal.

Not only the optimal level of tax evasion, but even its current magnitude is hard to estimate because in the case of a part of economic agents the actual sales and income remain hidden. In a statistical sense those activities belong to the hidden economy which, according to international methodology, constitute a part of production, but are missing from the statistical surveys and administrative data. In Hungary, the estimate of the Central Statistical Office (CSO) for the hidden economy reached 16 per cent and 12 per cent of GDP in 1997 and 2000, respectively.[2]

At the same time, there are several methods to estimate the size of the hidden economy: comparison with pieces of information independent of the tax returns, food consumption, representative survey of earnings, electricity consumption. In the case of Hungary, the estimates based on various methods determine the ratio of the hidden economy as 20-30 per cent of the official GDP. This estimated ratio in the 1990s and early 2000s can be classified as extraordinary high even when compared with the developed countries (Schneider, 2005, Lackó, 2000, Renooy et al., 2005). However, some estimates found an improving trend as well compared to the early 1990s. In the group of companies examined by Semjén and Tóth (2004) (which account for 70 per cent of GDP) the weight of the hidden economy declined between 1996 and 2001, but, according to their conclusion, this took place partly as a result of 'contracting out' the tax evasion. They found that its main form is employment at an extremely low level of wages, as a means of reducing taxes. According to the EU's comparative analysis, in 1998 the ratio of underreported work (black and grey labour) was 18 per cent, which is similarly high to the levels of Latvia, Lithuania, Romania, Bulgaria and Slovenia[3] (European Commission, 2004). According to more recent estimates regarding underreported work (Juhász et al., 2006) this ratio is higher again, between 20-30 per cent.

According to Szabó's estimate (2007) based on a comparison of expenditures and incomes from a household panel survey, 6 per cent of households may belong to the hidden economy.

---

[2] This is below the 15 per cent estimated for Poland and Slovakia, but exceeds the 7 per cent for the Czech Republic. At the two dates the Eurostat methodologies applied by the CSO were different; the differences may explain half of the decline. In the figure for 1997 even those were included who would otherwise not be subject to taxation under the relevant provisions of law; therefore, the figure for 2000 is more appropriate for estimating the degree of tax evasion.

[3] However, in Slovakia, Poland and especially in the Czech Republic and Estonia the estimated situation was more favourable.

In the author's opinion this ratio may be higher because participants of the hidden economy may have refused to answer, and even if they did answer, they may have shown their grey income as legal. A significant part of the hidden economy is concentrated in the group of small enterprises; the average hidden income of the self-employed exceeds that of employees by at least 24 percentage points. (Benedek and Lelkes, 2007) In the case of certain professions, 80 per cent of their total transactions may be related to the hidden economy, the weight of which is 52 per cent within their total expenditure (Semjén et al., 2001).

According to the findings of our earlier study (Krekó and P. Kiss, 2007), the total effect of the various channels of tax evasion may be around 21 per cent of revenues. This estimate, augmented with a review of developments in 2006 and 2007, is presented below. The starting point of the estimate was that the various channels of tax evasion are connected. An obvious solution is failing to issue an invoice; this way not only the tax on the income from the invoice value, but also the VAT can be saved. Based on this, we started from the assumption that at the level of the economy, the magnitude of the hidden domestic sales is equal to the magnitude of hidden income. We also assumed that all hidden income is missing from labour incomes, as taxes and contributions on the latter are much higher than the tax on income withdrawn as corporate profit. Moreover, the profit can further be reduced by inflated costs; therefore, its actual burden is minimal. The form of hiding labour income is that employees are paid (partly) 'under the table', while the self-employed report only a minimum income in the form of wages.

VAT EVASION

The efficiency of VAT and the magnitude of VAT evasion can be measured by a comparison of the actual and potential VAT revenues. Potential VAT revenues are calculated by multiplying the weighted average of nominal VAT rates with the potential VAT basis (purchased consumption in national accounts minus VAT revenues). The ratio between actual and potential revenues is called the VAT efficiency indicator. As the potential VAT basis is determined by the estimate of the CSO for the hidden economy, the ratio between the actual and potential revenues could reflect this estimate.

We carried out a comparison where we tried to determine the actual tax base on the basis of tax returns and the potential tax base on the basis of CSO statistics. Due to methodological differences, the contents of the VAT return – as they follow

the regulations of the given year – change every year. Moreover, the tax bases in the VAT return are so different from the CSO data that we could only find a quite aggregated breakdown (See Krekó and P. Kiss, 2007 for details). Our findings are presented in Chart 1, but we do emphasise that they should be interpreted with caution.

Another possibility for estimation stems from the fact that monthly VAT revenues on a cash basis are available starting from 1995, and their change can be divided into a part that can be explained with various factors and to a part that cannot be explained. This latter residual part can be considered as the effect of the change in tax evasion. We prepared our calculation for the change in the gross VAT revenue, as it is difficult to exclude the effect of the government discretionary timing of refunds (bringing them forward or delaying them) from the net revenue. Therefore, only a partial estimate can be prepared for the tax evasion carried out in the form of refund, as the gross VAT payment reflects only the effect of VAT deduction, but not its amount requested to be refunded in money.

In addition to the dynamics of household consumption, several factors explain the trends in gross VAT payments. The most important one of these factors is the estimated effect of changes in taxes; thus, for example, we deducted the total amount of the simplified entrepreneurial tax (SET) revenue from the VAT, assuming that the former completely replaced the latter. Second, the same net cash-flow revenue may evolve with different combinations of cumulated gross payments and refunds; therefore, it is also worth eliminating the effect of changes in their accumulation from the gross VAT payment.[4]

Chart 1

Results of the two estimates for evasion of VAT

— VAT-loss based on cash-flow data
-- VAT-loss based on CSO data for consumption
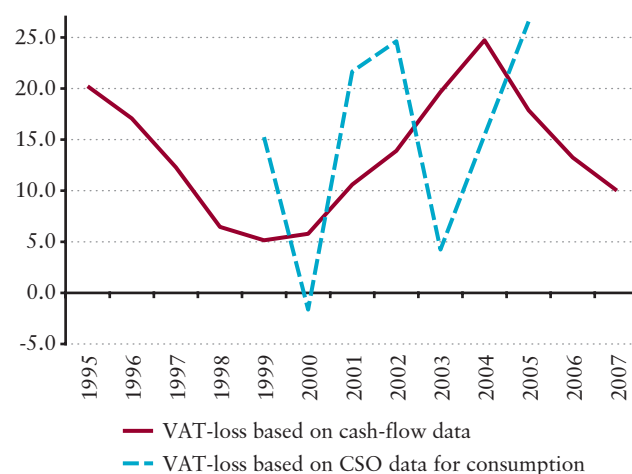
Source: own calculations.

---

[4] We made a correction for the fact that after 2004 the dynamics of gross VAT revenues was restrained by the termination of the collection at the border which reduced accumulation (and thus the refund as well).

Third, the comparison would be distorted by the fact that the weights of other smaller tax bases (housing construction, government purchase) also changed, and thus we also made corrections for the effect of this. There is only one explanatory factor the effect of which we did not estimate. This is the changes in the composition of household consumption, but we assumed that different VAT rates were not a considerable effect on the changes of revenue.

Chart 1 presents a comparison of tax returns and CSO figures on the one hand, as well as the estimate of the change in tax evasion from the revenues on a cash basis, on the other hand. As for the level of the cash-flow estimation, we assumed that the comparison between tax returns and the CSO figures provides a good estimate for the magnitude of tax evasion as an average of the period. This is an acceptable assumption, as thus the result for the level of the cash-flow estimation is that evasion did not decline below 5 per cent even in the most favourable year.

The chart shows that according to the cash-flow estimation VAT evasion declined significantly between 1995 and 1999, and then increased steadily between 2000 and 2004 before starting to decline again in 2005. Our earlier study followed the developments only until 2006. We have now prepared an estimate for 2007 as well, indicating a more than 3 percentage point decline in VAT evasion. The following is a review of the possible explanations of this strong fluctuation, first examining the domestic VAT, then the import VAT.

On the one hand, one of the ways of avoiding the domestic VAT is that reporting lower sales than the sale value threshold makes exemption from taxes possible. At times of sudden valorisations of this threshold (doubled in 1995, 1997 and 2003) it was more difficult to leave the group of taxpayers, while in the interim periods it became increasingly easier because of the lack of valorisation. On the other hand, those who became subject of VAT above this threshold could continue the evasion of VAT by underreporting their sales, while they could deduct the VAT of their purchases from this reported obligation. In 2003 and 2004, the increase in evasion may have been related to the introduction and expansion of the SET, which may have resulted in a bigger loss of VAT than the revenues from the SET were. Although the obligation to pay SET on the sales revenue replaces the VAT obligation, the possibility of VAT deduction ceased to exist only in principle. The underlying explanation is that by establishing affiliated companies, taxpayers requested the refunding of the VAT content of received invoices in another company belonging to them. This possibility ceased to exist as of 2006, when the reduced standard VAT rate (20%) became lower than the raised SET rate (25%).

The evasion of import VAT, which caused serious problems in the early 1990s, declined steadily from 1995. New companies did not have a chance to avoid paying the import VAT, because when they imported, they immediately had to pay a deposit. Later they could be exempted from this requirement, if they qualified as reliable taxpayers. After joining the EU, evasion increased again, as with the termination of the customs borders between Member States the imposition of taxes was replaced by self-assessment for those subject to VAT. Following our EU accession, cross-border transactions with chains of traders exploiting the rules of Community sales were identified in exports as well, where the trader can sell at favourable prices by the insertion of a fictitious 'missing trader', avoiding the payment of VAT on sales. The revealed amount equals 0.1 per cent of GDP, which, depending on the efficiency of the investigations, suggests that 1 to 2 per cent of GDP may be lost at the level of tax bases due to these types of VAT frauds. This size of this difference matches the statistical gap which evolved between the import-export balance on an accrual basis and the relevant financial statistics on a cash basis. There is usually a difference between the two statistics because of natural reasons as well, but due to the different data sources we may also assume that financial statistics on a cash basis that are built on data collection through questionnaires and data reporting by banks are less sensitive to these forms of VAT fraud. Based on the statistical deviation, between 2004 and 2006 evasion could be higher, then from 2007 the lost tax base may have declined by as much as half per cent of GDP. In the case of excise goods, illegal imports were motivated by the fact that the excise tax burden, further increased by VAT payable on this burden, was very high compared to that in some of the neighbouring countries. The resulting loss in VAT was reduced by the increased control of excise goods from 2006. According to various estimations, the controls added 0.1 per cent of GDP to the excise tax in 2007, simultaneously increasing VAT revenues as well.

EVASION OF INCOME TAXES AND CONTRIBUTIONS

We do not deal with the group of companies excluding small enterprises because, according to earlier analyses (Semjén and Tóth, 2004), tax evasion has declined among them, and was partly 'contracted out' in the form of employment at a low wage level. This group of employees turned into economically dependent workers (outsourcing, contracting out). This group is formally self-employed, but essentially they can be considered as forced or involuntary entrepreneurs. In the following, we examine the self-employed (private entrepreneurs, partners of companies) first, then employees.

Despite the fact that every seventh employed person is self-employed, these people contribute to the taxation only by 0.8 per cent of GDP, which is a disproportionately low figure compared to employees. However, the group of the self-employed is not homogeneous; it ranges from dependent workers to high-income entrepreneurs. If the share of low-income entrepreneurs is higher, it is also possible, in principle, that the contribution to GDP and average income of the self-employed is actually lower than those of the employees. By contrast, the comparison of the sectoral distribution of private entrepreneurs and employees justifies only a minor difference; in 2005, calculating whole-economy earnings with the weights of private entrepreneurs' sectoral distribution, the resulting earnings would be only 4 per cent lower than the average earnings. (Obviously, the group of employees does not provide an adequate basis for comparison either, as tax evasion is significant here as well.)

Based on the Hungarian personal income tax returns, private entrepreneurs' tax basis is below that of employees; in 2001 employees' total income was only 8 per cent higher than that of private entrepreneurs, while in 2005 it was already 85 per cent higher. Based on the returns, entrepreneurs' tax basis were calculated as 2 per cent of their total reported revenues, i.e. private entrepreneurs calculated a 98 per cent cost ratio on average in 2005, and 61 per cent of private enterprises were loss-makers or operated at break-even. Half of this group reported losses in 2007 as well, although almost without exception they also complied with the minimum tax requirement introduced from the second half of 2007, which is 2 per cent of the sales revenue which can be corrected with limited items. This measure will have a full-year effect on 2008.

Tax evasion is further increased by stating labour incomes as capital incomes, which is profitable because there is a substantial difference between the effective tax and contribution burdens on the two types of income. No data are available for us regarding the illegal forms of declaring labour incomes as entrepreneurial income (simulated contracts). For private entrepreneurs and small companies another form of rechannelling labour incomes is splitting the entrepreneur's income into labour and capital incomes. For example, private entrepreneurs determine their own labour income (entrepreneur's withdrawal), which is the basis for the social security contribution, by self-assessment, which practically allows for the legal avoidance of contribution payment. Based on the personal income tax returns, in the case of the private entrepreneurs that declare labour income

(180,000 people in 2005), for 77 per cent of them this income (which is the basis for the social security contribution) was below the minimum wage, and for 92 per cent of them below twice the minimum wage (75 per cent of the average wage). The amount of average labour income did not reach the amount of the minimum wage, which was only 36 per cent of employees' average salary. Therefore, from September 2006, a required minimum basis for contribution was introduced for entrepreneurs as well, amounting to the double of the minimum wage. (In 2007 the total additional revenue may have amounted to 0.2 per cent of GDP, but only a part of it was paid by the self-employed.)

Another possibility is comparison with the average of the EU, where the share of the self-employed within the employed exceeds that of Hungary only by a small extent. Assuming that not only the ratio of the number of Hungarian self-employed persons but also their actual contribution to GDP is close to that of the EU, the difference between their reported income in Hungary and in the EU (2.2 per cent of GDP in 2005) can be seen as a result of a higher Hungarian tax evasion.[5] As an EU average, we assumed a 30 per cent magnitude of tax evasion. Adding this revenue loss of 1.5 per cent of GDP to the Hungarian loss which exceeds the average by 2.2 percentage points, we estimated the lost revenue from self-employed as 3.7 per cent of GDP for 2005. As in the case of the major part of the tax base the total burden (tax and contributions on labour incomes) exceed 50 per cent, this loss may result from a 7.5 per cent evasion of the tax base. As a result of the measures taken in 2006 and 2007 (minimum tax and minimum base of contributions), this magnitude may gradually decline by 0.2 to 0.3 percentage point. Another reducing factor is the decline in the ratio of the self-employed, which may reduce their total income by a further 0.6 percentage point. Accordingly, tax evasion may decrease to 6.7 per cent of GDP.

These measures which affect all self-employed reflect new approach of the authorities abandoning the earlier approach of differentiation by professions or sectors. As we mentioned above, the group of the self-employed is not homogeneous at all. In the case of some professions income underreporting may even reach 80 per cent of total transactions; this is why individual professions used to be treated separately (for example, in the case of certain professions the option of simple flat-rate taxation was introduced replacing all normal taxes (including VAT), whereas in the case of other professions average figures regarding the presumed income were published by the tax authority).

---

[5] According to Eurostat, as an EU average the implicit tax rate of the self-employed is only two thirds of the implicit tax rate of companies, which is partly attributable to the lower tax burdens and partly to underreporting incomes and inflated costs. Estimates for income underreporting of the self-employed are available only for a few countries, e.g. England (35%, Pissarides and Weber, 1989), Finland (16-40%, Johansson, 2000) and Sweden (30%, Engström and Holmlund, 2006).

The best example of the new approach of the authorities is the introduction of the SET in 2003, which became an option for a wide range of entrepreneurs and companies, as it could be simply chosen on the basis of the amount of the sales revenue, without any restrictions for given professions or sectors. First, companies and private entrepreneurs with sales revenues below HUF 15 million were allowed to opt for the SET, then, from 2005, this limit was raised to HUF 25 million. Within the framework of the SET, enterprises used to pay 15 per cent of their sales revenues, which was increased to 25 per cent as of September 2006. This replaced entrepreneurs' personal income tax, the dividend tax and the VAT of entrepreneurs and the corporate profit tax in the case of companies. The basis of the social security contribution is the minimum wage.

The compromise (lower tax and contribution) made with the taxpayers who chose the SET is reasonable in a sense that the SET reduces the costs of tax administration and compliance, and may increase the willingness to pay tax. It is especially favourable for those taxpayers who reported inflated costs earlier.

However, due to the lack of restrictions in terms of professions or sectors, the SET means an actual saving of taxes for those taxpayers who have a low cost ratio in reality. Consequently, nearly 60 per cent of those who opted for the SET operated in the sectors of real estate activities and economic services, where the cost ratio is in fact lower. This tax saving is indicated by the fact that very few enterprises chose to leave the SET following the 10 percentage point increase in the SET rate in 2006. Another incentive is that the double basis of contributions introduced later has not become applicable to the SET, as due to the simplified accounting requirement there is no means of control. By virtue of its low tax and contribution burden and its simplicity the SET is especially advantageous for employees, although they can choose the SET only after a transitional period (first they have to become entrepreneurs).[6] It is a strong incentive for simulated contracts changing the employee status to a SET-paying entrepreneur's contract that the higher the total labour costs, the more advantageous the SET, partly due to the flat-rate replacing progressive taxation and partly due to the required 'fixed' minimum contribution replacing the social security contribution payable in proportion of labour income.

Overall, as a result of a compromise, the SET was able to attract some tax evaders to the legal economy, although it ensured unjustifiably low taxes for others, as there was no adequate control of entry. In other words, the price of simplicity was that in the case of some professions the elasticity of tax bases reflected in tax evasion increased.

An internationally widespread form of income underreporting is when companies report their employees with lower wages than their actual wages, for example as part-time employees or employees with minimum wage, and pay the difference – free of taxes and contributions – 'under the table'. Analysing 17 countries, Tonin (2006) came to the conclusion that there is a positive correlation between the ratio of minimum wage earners and the size of the hidden economy. According to foreign experience, companies respond to increases in the minimum wage by changing part-time employment (Ressler et al., 1996); one of the ways is to declare a shorter working time than the actual working hours. The role of part-time employment in tax evasion in Hungary can be illustrated by the fact that when the minimum wage was doubled in 2001–2002, the ratio of employees declaring less than the minimum wage increased from 16 per cent in 2000 to 26 per cent in 2002, while the working time survey did not show any rise in the number of people employed in part-time jobs. In 2000, 572,000 people declared an income in a range between the old and the new minimum wages, but 354,000 of them remained in the same range in spite of the increase in minimum wages, while the number of employees declaring minimum wages increased from 177,000 only to 225,000 despite the doubling of the minimum wage.

According to the personal income tax returns, 30 per cent and 25 per cent of taxpayers earned minimum wages or less in 2005 and 2006, respectively. However, these income distribution figures for the whole year cannot be compared with the earning statistics of the EU, based on which, in turn, it can be established that in 2005 8 per cent of full-time employees received wages proportional to the minimum wage in terms of working time. The question is whether the different hours of work indicated by the various data can cause a difference of this degree. Using the wage distribution of full-time workers of companies with more than 4 employees for 2005 and the labour survey data regarding part-time employment and the number of those who work only during a part of the year, we estimated a hypothetical annual wage distribution. This shows what the distribution of all employed taxpayers' annual labour income would look like, assuming that the monthly wage distribution of the employees of companies with more than 4 persons is not far from the monthly wage distribution of all employees. This assumption by itself would be distorting, because the actual

---

[6] For example, in the case of an annual net labour cost of HUF 4.8 million – i.e. a gross HUF 6 million income similar to the average income of those who pay SET – the SET results in a nearly 75% higher net income than employee status does.

Table 1

Estimated loss of tax base

(as a percentage of GDP)

	2005–2006	2006–2007
Lost VAT base	14.0	12.0
Underreported (grey) wages of those reporting minimum wage or less	2.0	1.4
Underreported (grey) wages of those reporting more than the minimum wage + undeclared (black) labour	n. a.	n. a.
Tax evasion of the self-employed	7.5	6.7

Source: own calculations.

income of enterprises employing less than 5 people may be lower than that of companies with more than 4 workers, on the other hand the phenomenon of underreported wage also exists among companies with more than 4 persons, and this alters the result in exactly the opposite direction (Krekó and P. Kiss, 2007).

According to our findings, in 2005 the number of employees whose wage really did not exceed the minimum wage could be 700,000-750,000. Consequently, it can be calculated that approximately 460,000 employees reported a lower than actual wage. As a result, in this group more than 2 per cent of GDP may have been lost from the total labour income. Assuming that our estimate is an adequate basis for comparison in 2006 as well, based on the personal income tax returns only 1.4 per cent of GDP may be underreported. However, for 2006 it can be seen that the minimum wage peak became somewhat flatter, tax evasion may have partly declined and reported income partly passed through from the range below the minimum wage to the range above the minimum wage.

We have not prepared an estimate for the wage underreporting of employees above the minimum wage, but used the correlation according to which it is the underreporting of domestic sales that allows for hiding income as well. Accordingly, deducting the hidden income of the self-employed from the hidden sales, we receive the hidden wage of employees. However, the categories of the self-employed and of the employees partially overlap, as those self-employed who, as members of companies are registered with their own firms also appear as employees.

Table 1 is a summary of our findings based on the personal income tax returns of 2005 and the estimated VAT lost up to 2006 (the 2005–2006 column) and the updates based on the personal income tax returns of 2006 and the estimated VAT lost up to 2007 (the 2006–2007 column). Here, it is the combined effect of the various forms of tax evasion that is presented; its further breakdown would only be illustrative (Krekó and P. Kiss, 2007).

Estimated on the basis of 1995–2006, VAT evasion could amount to 14 per cent. Considering its factors, we know that the statistical estimate for the underreported domestic sales is 12 per cent, thus 2 per cent remains for underreported import and inflated VAT refund. Excluding the VAT content of the 12 per cent, 10 per cent income underreporting is estimated. Total hidden income may be 11 per cent, because taxable income may be reduced by around 1 per cent by inflated costs which would actually constitute private (household) consumption. The self-employed and those employees who are registered at and below the minimum wage may hide an income of 9.2 per cent of GDP together, provided that the magnitude of the assumed overlap between them reaches 0.3 per cent of GDP. This means that 1.8 per cent of GDP remains for wage underreporting by other employees. This may partly be the result of hidden wages above the minimum wage, and partly may include undeclared (black) labour as well.

As an average of 2006–2007, the lost tax base of VAT may amount to 12 per cent, of which domestic sales may amount to 10.2 percentage points. Accordingly, after the deduction of VAT, the result is an underreported income of 8.5 per cent of GDP, and assuming a 1 per cent for inflated cost it allows for a 9.5 per cent hidden income. Of this, the tax evasion of employees registered at or below the minimum wage is supposed to have dropped to 1.4 per cent based on the personal income tax returns. Presuming a 6.7 per cent tax base avoidance of the self-employed and a 0.2 per cent overlap, the hidden income of these two groups may reach 7.9 per cent of GDP. Consequently, the remaining 1.6 per cent may be the result of hidden wage of other employees.

In 2005, wage underreporting may have affected approximately 12.5 per cent of employees' total wage income, followed by an estimated decline to 10 per cent in 2006. This is in line with the fact that in 2006 the number of those who submitted personal income tax returns increased by 2.4 per cent, which may partly be related to a decline in black labour. In addition to that, there was also a change in the composition of those who filed tax returns; the ratio of

Table 2

Estimated lost revenue

(as a percentage of GDP)

	2005–2006	2006–2007
VAT	2.3	2.0
Excise tax	0.4	0.3
Tax and contribution on labour incomes	5.0	4.2
Tax on capital incomes	0.2	0.2
Total	7.9	6.7

Source: own calculations.

those above the minimum wage rose noticeably, i.e. there may have been some whitening taking place in terms of wage level too. Estimates suggest that it occurred gradually during the year, reaching 2.5 per cent by the last quarter[7] (Eppich and Lőrincz, 2007).

Table 2 presents the lost revenue which can be estimated on the basis of the tax base evaded. While based on 2005–2006 the estimated lost revenue reached 7.9 per cent of GDP, based on 2006–2007 the loss may have declined to 6.7 per cent. Two thirds of the tax evasion (income taxes and contributions) is concentrated among the self-employed and a part of employees, while one third (VAT and excise tax) is shared between a more stable group of sellers and a variable one of buyers. With the exception of buyers, the groups of tax avoiders and taxpayers can be separated, i.e. a dual system can be outlined, where 90 per cent of the estimated tax evasion can be considered as transfers between these two groups.

TAX CHANGES – INTERNATIONAL EXPERIENCE

The theory of optimal taxation is based on the assumption that the various tax systems can be compared depending on the objective of the government, i.e. it can be examined as to which tax structure is the most favourable in terms of social welfare. This requires the estimation of how economic agents react to a given structure of taxes in the current equilibrium and in all other possible equilibria. Due to the lack of complete information, this complex response cannot be examined in practice; instead, using a solution which requires much less information, the analysis of the so-called marginal tax reform can be performed. This analysis may provide an answer as to the direction of changes in individual taxes in order to increase social welfare, but cannot provide any information on the extent and ranking of the measures. In addition to the analysis of taxes, transfers also need to be

analysed, since it is not worth separating the distribution and incentive effects of taxes and transfers.

It is an additional problem that the starting point of the analysis of the marginal tax reform would exactly be the current tax evasion behaviour, and the analysis would not be able to take into account the complex effect of the proposed changes on behaviour. If, let's say, the elasticity of individual tax bases related to tax evasion could be reduced, the question is how it would affect real elasticity. For example, by terminating simulated contracts, a part of the dependent staff could be driven back to employee status (their tax evasion elasticity would decline), although another part of them would not be able to enter the labour market (their real elasticity would increase) because of higher taxes.

The question is whether reducing high tax rates can be a solution. Neither theoretically, nor on the basis of empirical experience can it be stated that reducing the rates would in itself increase tax compliance, thus increasing the tax bases over the short run. Although numerous empirical analyses found a positive correlation between the tax burden and the grey economy (e.g. Schneider, 2005), experience suggests that the reduction of the tax burden itself does not reduce the size of the hidden economy, and only because of declining tax rates the attitude of tax payers does not change. Accordingly, if tax evasion has become a widespread practice, tax cuts do not provide sufficient incentives, not even if it was partly the high taxes that constituted the underlying reason for the evolution of tax evasion. In addition, the relationship between high taxes and tax evasion is endogenous, i.e. tax rates are high as a consequence of the widespread informal economy. Increase in the tax base and improvement in the tax compliance were experienced only in the case of such comprehensive reforms which, in addition to reducing the tax rates, also aimed at the reduction of the elasticity of the 'grey' tax bases, including, for example, the simplification of the tax system, eliminating elements that encourage and

---

[7] However, based on these estimates, the gradual process of whitening is discontinued in early 2007.

allow for tax evasion, enhancing tax audits and a significant improvement of administration (e.g. Russia 2001, Sweden 1991). Analysing Austria's tax reform in 1988, Schneider (1994) found that a tax cut did not result in a significant reduction of the grey economy, because the regulation did not change. In their New Zealand analysis, Giles et al. (1999) found some evidence that the grey economy responds to tax cuts to a lesser extent than to tax increases. All this calls the attention to the fact that it is better to carry out a comprehensive tax reform when the favourable budget balance and a cut of expenditure allow for a loss of tax revenues and a gradual improvement in tax compliance.

The question is whether it is possible to restructure the tax burden between the tax evaders and the taxpayers. The problem is that a taxpayer's reaction to a tax cut is less elastic than a tax evader's reaction to a tax increase. In other words, tax loss is certain, while revenue is uncertain. According to international experience, a shift towards better defined tax bases, a restructuring of the tax system and the focus of audit may be of decisive importance.

It is an observed trend that the ratio of informal employment is high in countries where the burden on capital income is lower than the burden on labour income, thereby directly encouraging the underreporting of labour. Violating the horizontal equity by allowing different tax burdens may damage the tax-compliance attitude. However, flat-rate tax systems often tried to impose equal tax burdens on labour and capital incomes without success, because the real difference between the burdens on entrepreneurs and employees can be identified in the differences of social security contributions and the definition of the tax base. These differences explain the diverse effects the flat-rate tax reforms of the last decade had on tax compliance and on the economy (Keen et al., 2006, Saavedra, 2007).

Is it a solution to decrease the difference between contributions payable by entrepreneurs and employees? This may be suggested by the trend that in those countries where the social insurance burdens of the self-employed are much lower than those of the employees, the ratio of the self-employed is higher, and the problem of tax evasion through small enterprises is more serious (OECD, 2004). Greece, Latvia and Lithuania can be mentioned as examples, where the self-employed pay a low, one-sum contribution. The situation is similar in Hungary as well; the self-employed pay their contributions on the basis of at least the minimum wage (SET-payers) or the double of the minimum wage, instead of

paying on the basis of their actual income. There is really no significant compliance problem in those countries where the contribution paid by the self-employed is roughly equal to that paid by the employees and employers (e.g. Australia, New Zealand, Denmark and Finland) (OECD, 2004). In Finland, the extension of contributions to personal capital incomes is implemented through the obligation to pay on the dividend as well.[8]

In practice, the alternatives to reducing the difference between the contribution burdens are focused audits and administrative measures. According to the OECD (2004), the problem of hidden income is less significant in those countries where instead of controlling the amount of labour, great emphasis is put on determining corporate income (e.g. Australia). In the fight against the illegal forms of reporting labour income as capital income an important role may be played by administrative measures, such as revealing simulated contracts and entrepreneurs that have one customer. In Norway, for example, where the taxation of labour income is different from that of capital income (dual income taxation), the splitting between labour and capital incomes for the self-employed and small enterprises is done in accordance with a specific and strict method. According to the Norwegian 'split' model, from the total income the capital income is defined as the yield of the capital invested in the enterprise according to a specific rate, while the remaining part is the labour income. Certainly, even the split model does not allow for exact separation, as it adds some kind of a risk correction factor to the risk-free rate of return. However, it can allow for professional and sectoral aspects to be taken into account instead of undifferentiated solutions (e.g. SET, minimum tax, etc.).

Decreasing the difference between contributions payable by entrepreneurs and employees can be also implemented by reducing the contributions of employees and increasing other taxes. The limit of the reduction of contributions is that it cannot affect those pension contributions to which a direct benefit is linked by individual. This has to be treated in a closed system, i.e. revenues should be consistent with expenditures over the longer term as well. By contrast, health-care, unemployment benefits or disability pension do not constitute a closed system by individuals, and according to international experience these can be covered from taxes too. Consequently, in this case it would be possible to carry out a regrouping between contributions and those taxes which impose taxes on hidden incomes or do not distort the tax burden between labour and capital incomes.

---

[8] Currently, health contribution has to be paid on certain capital incomes in Hungary as well, and the rate of contributions increased from 2007 onwards, but only up to an upper limit, to HUF 450 thousand in 2007.

One of the options of restructuring is the local business tax applied in developed countries, which imposes tax on labour and capital incomes at the same time. This is a tax on domestic added value, irrespective of its use (consumption, export). From this aspect, it is different from VAT, which imposes tax on imports instead of exports. The EU was also of the opinion that the IRAP applied in Italy does not constitute a duplication of VAT. It is also easier to collect than VAT, because it can be imposed on the basis of the corporate balance sheet and not on the basis of individual invoices. In Germany, this tax was introduced in the 1930s, but the tax base gradually narrowed in the 1980s. Starting from the 1950s it was adopted in several states of the USA; in some states it complemented, in other states it replaced the corporate tax. In its current form it has been applied in Hungary and Italy since 1998 and Japan since 2004. Subsequently, in Canada and France the tax reform committee proposed its introduction. With its low rate and broad tax base the local business tax results in significant revenues, because it is hard to avoid (consequently, it is less popular). In our case, a 3 per cent rate could even result in a revenue of 2.7 per cent of GDP, which could partly replace either health-care or unemployment contributions.

The other possibility of restructuring stems from imposing taxes on hidden incomes, although a much lower level of revenue regrouping can be expected of such a measure. The underlying reason is that due to the information asymmetry the authority cannot distinguish between those who hide their income and those who have low earnings. In order to avoid the negative labour market effects on the really low-wage group, there can be two ways of widening the tax base. One of them can be a low amount of fixed health-care contribution, which is not related to employment, but all insured adults are subject to it, with very few eligible for exemption (e.g. the unemployed, pensioners). The other possibility is a type of property tax. This can particularly increase the efficiency of the tax system and enhance the prevalence of the principle of horizontal equity, if income underreporting is a widespread and relatively easy exercise, while hiding property elements from the tax authority is costly, and the collection of property type taxes is simpler and feasible at a lower cost. For example, it is more difficult to hide real estates from the tax authority, although an efficient recording of real properties requires resources, and a property tax which is introduced without serious sanctions and which is easy to circumvent does not contribute to the reduction of tax evasion. For example, in the case of the tax on housing real estate, reporting the housing real estate as company property in order to avoid taxation must be prevented. Otherwise it is exactly those entrepreneurs who will have an opportunity to avoid paying the new tax who also have better opportunities in evading their income tax. In addition, the introduction of the property tax, if it can be deducted from the personal income tax, is possible through the widening of the tax base in a way that the burdens of current taxpayers will not or only hardly increase.

To summarise the lessons drawn from international experience, it needs to be emphasised that 'permanent tax reform', i.e. continuous changing of tax rules year by year generates an unforeseeable economic environment and has a negative impact on tax-compliance attitudes. Terminating the loopholes that result in significant revenue losses and administrative measures against tax evasion is not equal to tax reform. Measures that increase tax compliance over the short run and mitigate and technically prevent tax evasion over the short run do not necessarily result in a longer-term improvement in the tax-compliance attitude. Sweden in the 1980s and the example of Greece show that after learning the new tax rules and finding the loopholes, the level of tax evasion is restored, and tax amnesty even spoils tax-compliance attitude by being easily included in the expectations. However, a consistent and comprehensive package of measures (changing the tax structure, reasonable compromises and administrative rules) contributing a positive change in taxpayers' attitude (Sweden in the 1990s), may be successful. Increasing the role of local taxes (real estate tax, business tax) may contribute to the improvement of tax-compliance; in this case information is also more direct, and taxpayers can also perceive the benefit of the tax paid.

REFERENCES

BENEDEK, D. AND LELKES, O. (2007): "Estimating the Incidence of Income Tax Evasion in Hungary", paper for AIM-AP.

EC (2004): Undeclared work in an Enlarged Union.

ENGSTRÖM P. AND HOLMLUND, B. (2006): "Tax Evasion and Self-Employment in a High-Tax Country: Evidence from Sweden", *CESifo working paper* No. 1736.

EPPICH, GY. AND LŐRINCZ, SZ. (2007): "Három módszer a bérstatisztika fehéredés okozta torzítottságának becslésére" (Three methods to estimate the whitening-related distortion of the wage statistics), *MNB Occasional Papers* No. 66.

GILES, DAVID E. A., WERKNEH, GUGSA T. AND JOHNSON, BETTY J. (1999): "Asymmetric Responses of the Underground Economy to Tax Changes: Evidence From New Zealand Data", *University of Victoria Econometrics Working Paper* EWP 9911.

JOHANSSON, E (2000): "An Expenditure-Based Estimation of Self-Employment Income Underreporting in Finland", *Working Paper* 433, Swedish School of Economics and Business Administration, Helsinki.

JUHÁSZ, JUDIT (ET AL.) (2006): "Migráció és feketemunka Európában" (Migration and irregular work in Europe), MTA Földrajztudományi Kutatóintézet és Panta Rhei Társadalomkutató (Geographical Research Institute, Hungarian Academy of Sciences and Panta Rhei Sociological Research).

KEEN M., KIM, Y. AND VARSANO, R. (2006): "The 'Flat Tax(es)': Principles and Evidence", *IMF Working Paper* No. 06/218.

KREKÓ, J. AND P.KISS, G. (2007): "Adóelkerülés és a magyar adórendszer" (Tax evasion and the Hungarian tax system), *MNB Occasional Papers* No. 65.

LACKÓ, M. (2000): "Egy rázós szektor: a rejtett gazdaság és hatásai a poszt-szocialista országokban háztartási áramfelhasználásra épülő becslések alapján" (A shocking sector: The hidden economy and its impacts in the post-socialist countries based on estimations of the household electricity method).

OECD (2004): *Employment Outlook,* Chapter 5.

PISSARIDES, C. A. AND WEBER, G. (1989): "An Expenditure-Based Estimate of Britain's Black Economy", *Journal of Public Economics* (39:1) pp. 17-32.

RENOOY, P., IVARSSON, S., VAN DER WUNSTEN-GRITSAI, O. AND MEIJER, R. (2004): "Undeclared work in an enlarged Union", European Commission.

RESSLER, R. W., WATSON, J. K. AND MIXON, F. G. (1996): "Full wages, part-time employment and the minimum wage", *Applied Economics,* Volume 28, pp. 1415-1419.

SAAVEDRA, P. WITH CONTRIBUTIONS FROM MARCINCIN, A. AND VALACHY, J. (2007): Flat Income Tax Reforms, in: "Fiscal Policy and Economic Growth", GRAY, C., LANE, T. AND VAROUDAKIS, A. (ed.), World Bank.

SCHNEIDER, F. (1994): "Can the shadow economy be reduced through major tax reforms? An empirical investigation for Austria", supplement to *Public Finance* 49, pp. 137-152.

SCHNEIDER, F. (2005): "Shadow Economies of 145 Countries all over the World: Estimation Results over the Period 1999 to 2003".

SEMJÉN, A., SZÁNTÓ, Z. AND TÓTH, I. J. (2001): "Adócsalás és adóigazgatás – Mikroökonómiai modellek és empirikus elemzések a rejtett gazdaságról" (Tax evasion and tax administration – microeconomic models and empirical analyses of the hidden economy).

SEMJÉN, A. AND TÓTH, I. J. (2004): "Rejtett gazdaság és adózási magatartás, Magyar közepes és nagy cégek adózási magatartásának változása 1996–2001" (Hidden economy and taxpaying behaviour, changes in the taxpaying behaviour of medium-sized and large Hungarian companies, 1996–2001) MTA KTI (Institute of Economics, Hungarian Academy of Sciences).

SZABÓ, P. A. (2007): "A 2000–2001. évi minimálbér-emelés hatása a jövedelemeloszlásra" (The effect of the minimum wage increase in 2000 and 2001 on income distribution), *Közgazdasági Szemle,* May 2007 (pp. 397-414).

TONIN, M. (2006): "Minimum Wage and Tax Evasion: Theory and Evidence", manuscript Stockholm University.

Márton Nagy–Viktor E. Szabó: The Sub-prime Crisis and its Impact on the Hungarian Banking Sector

The last few years were characterised by high risk appetite and global spreading of a substantial amount of under-priced risks as a consequence of bank' securitisation activities. The turbulence triggered by the US mortgage market led to the re-pricing of risks, which in turn has resulted in significant losses for the financial sector, and temporary impairment of certain market segments. In addition to the direct losses suffered by US and European banks, these institutions also had to face increasing cost of funds and shrinking funding.

Even though the Hungarian banking sector had no direct exposure to the products involved in the US mortgage market, the global growth of risk premiums has caused increasing funding costs and shortening maturities of foreign funds. As an another negative development, there were disturbances in the Hungarian financial markets, in particular in the domestic government bond market,[1] and increases in the expected yield on Hungarian assets.

THE BEGINNING AND SPREAD OF THE US SUB-PRIME CRISIS

From the middle of the 1990s, sub-prime mortgage loans exhibited spectacular growth in the USA. Essentially, sub-prime[2] mortgage loans are loans provided to higher-risk borrowers at interest rates which are 200 to 300 basis points[3] higher than the interest rates of loans granted to 'prime' borrowers. A large portion of these debtors either had an unsatisfactory credit history or a history of payment problems. In addition, there is also an Alt-A category, which include otherwise relatively good borrowers, who either lack reliable proof of income or have a high debt-to-income ratio. At the beginning of 2007, according to IMF estimates sub-prime loans represented 15 per cent of the total mortgage loan portfolio in the USA, while Alt-A loans comprised another 5 per cent. According to estimations, the ratio of sub-prime and Alt-A category loans within the securitised mortgage loan portfolio was 14 per cent and 12 per cent, respectively (Chart 1).

The rapid expansion of sub-prime and Alt-A loans peaked between 2004 and 2006. A good indication of this expansion was the simultaneous growth in sub-prime and Alt-A loans, which together represented 40 per cent of the portfolio of new loans in 2006, as opposed to 10 per cent in 2003. During this period, even debtors with a blemished credit history were able to obtain loans as US real estate prices continued to increase. Both borrowers and lenders assumed that housing prices would continue to increase and that the capital gain from home price appreciation would be sufficient

Chart 1

Breakdown of securities backed by US home mortgage collateral
(January 2007)
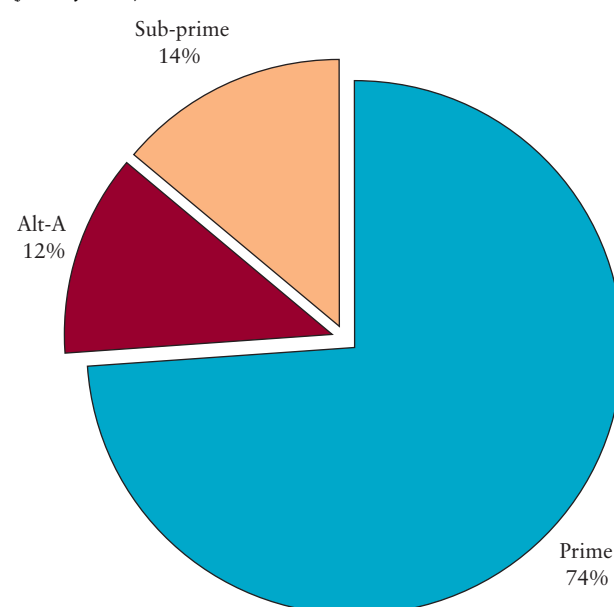
Source: IMF.

to pay back the loans of the home-owners. Due to the fact that, from the end of 2003 growing interest rates made it increasingly difficult for some sub-prime borrowers to obtain financing, lenders gradually started to relax their credit conditions. Thanks to the relaxed credit standards, an increasing number of borrowers were offered loans even though their equity was less than 10 per cent and they did not

---

[1] For details, see MNB Report on Financial Stability (April 2008) Box 2.1, visit: http://english.mnb.hu/Engine.aspx?page=mnben_stabil&ContentID=10898.

[2] For an explanation of the terms and abbreviations, please refer to the Glossary at the end of the document.

[3] In addition, certain incidental costs associated with these are higher than those of prime mortgage loans.

have sufficient proof of income, or enjoyed lending options with negative depreciation, or lower instalments in the initial incentive period. As a result, by 2006 the share of adjustable-rate mortgages (ARMs) ensuring lower initial interest payments typically for up to two years, had reached 50% in the sub-prime category.

The strong demand of investors for high-yield instruments also contributed to the dynamic expansion of sub-prime mortgage loans. Consequently, mortgage-backed securities were issued in growing quantities along with their re-packaged version, structured loan products called CDOs, which transferred the credit risks associated with sub-prime mortgages to investment groups with varying risk appetites. While base interest rates were at an all-time low, institutional investors typically became highly leveraged, i.e. the bank loans used to finance their investments exceeded the amount of their equity (hedge funds) or they issued short-term notes (conduits). Long-term investments were generally financed by rolling over very short-term funds. Due to low interest rate volatility and increasing asset prices, this strategy was beneficial.

Chart 2

Mortgage delinquencies in the USA
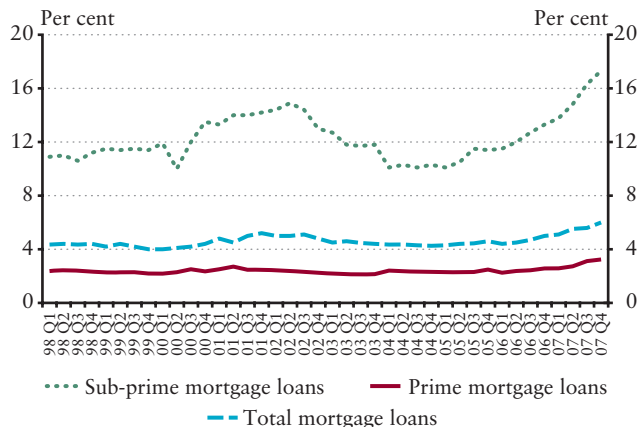
Source: Mortgage Bankers Association.[4]

The underlying problems in the sub-prime mortgage market and the issue of mispriced risks started to surface in 2006, when housing prices began to depreciate. The drastically decelerating growth of home prices combined with increasing interest rates resulted in payment difficulties. As a result, the ratio of delinquencies on sub-prime loans increased substantially, reaching 17.3 per cent by the last quarter of 2007 (Chart 2). This ratio exceeded the previous (2002) record, and featured a considerably steeper rate of growth than that of older vintages, while the loan portfolio drastically increased. The growing number of delinquencies on sub-prime mortgage loans is expected to peak this year as the re-pricing of these loans, which were originally offered with fixed teaser interest rates, continues.[5] In addition, the growing volume of delinquent loans has started to spread to the Alt-A category loans, and the same trend has been observed even for vehicle loans and credit cards.[6]

As the growth rate of defaults rose, prices of asset-backed securities (ABS) and structured credit products (CDO) associated with mortgage loans declined significantly, and as a result certain institutional investors suffered substantial losses. Investors stopped buying structured credit products to avoid further losses and increased risks, and thus they remained on the balance sheets of the issuing banks. The banks attempted to cover their credit exposures by purchasing credit derivatives (CDS), which set off a sharp increase in the prices of these derivatives (i.e. the cost of hedging). In order to reduce additional potential losses, banks cut back on the financing of leveraged clients. As a result, because of the increasing losses of leveraged entities (mainly conduits), issuance of short-term notes became impossible.

The abrupt contraction in short-term funds forced a number of investment funds to quickly liquidate their leveraged positions. As several funds followed the same investment strategy, they attempted to make similar deals at the same time, including a large part of their individual ABS and CDO portfolios. Since they did not essentially trade these instruments (they held them until they matured), their value was determined on the basis of financial models. Following their forced sales, these products showed up on the market, however, their sales price was extremely low due to the one-sided selling pressure, and investors had to mark down the value of these assets. This led to extreme price changes, and occasionally resulted in markets 'drying up'. As funding was scarce, the funds tried to open up financing opportunities on markets with no direct link to the mortgage market, spreading the wave of selling to other markets.

From the end of June, an increasing number of market players began reporting losses or bankruptcy. Although the turbulence primarily affected US banks and investment funds, some European financial institutions and funds also faced substantial

---

[4] Source: http://www.mortgagebankers.org/NewsandMedia/PressCenter/60619.htm.
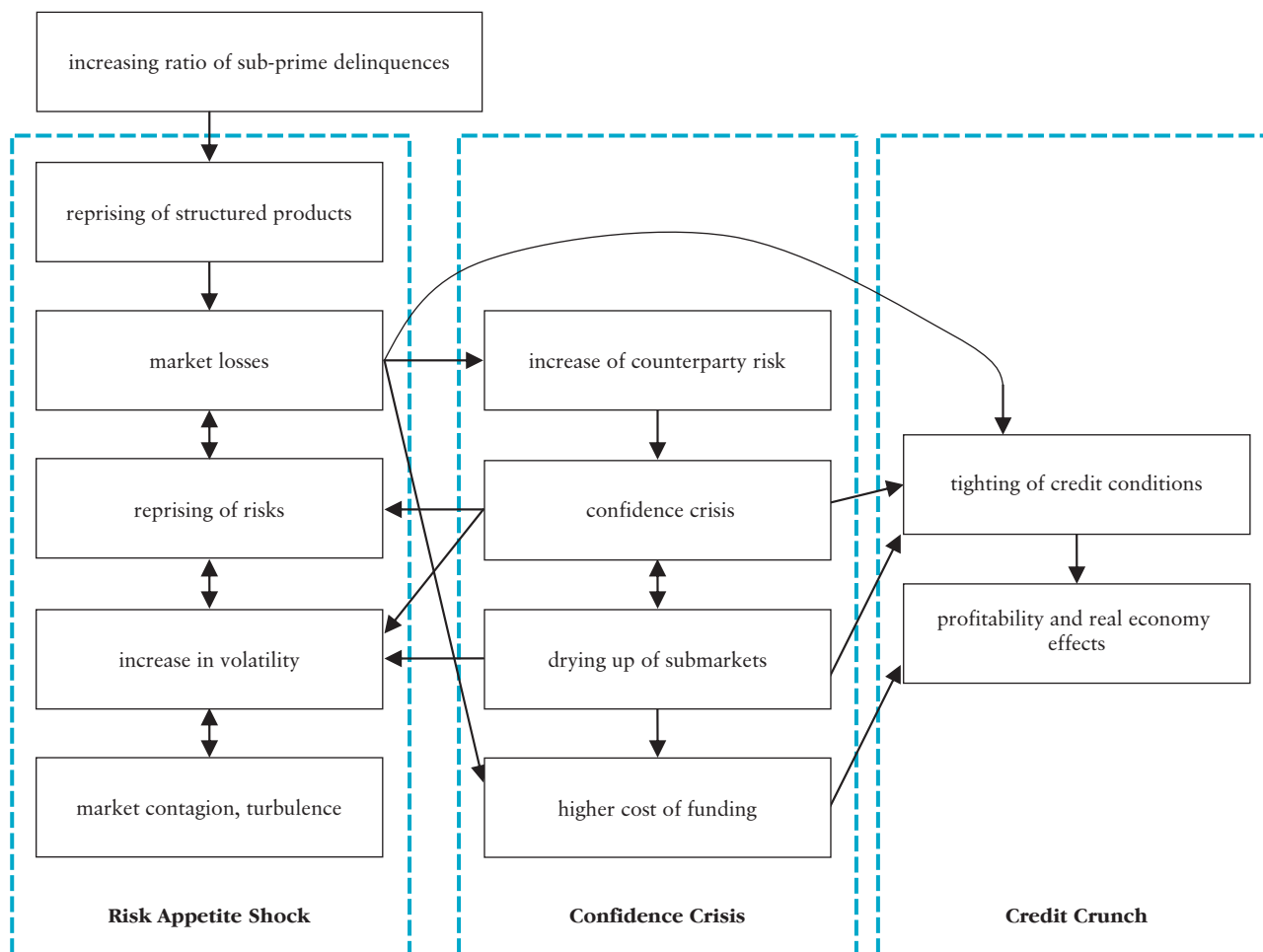
[5] A typical example of this is the so-called '2-28' loan, i.e. loans provided in 2006 with the first two years fixed at a lower, initial interest rate, which are scheduled to be readjusted this year to a higher rate for the remaining term of the loan.

[6] This document is not intended to discuss the impact of the sub-prime crisis on the economy of the USA.

Chart 3

The spread of sub-prime crisis

```
┌─────────────────────────────────────────┐
│   increasing ratio of sub-prime delinquences │
└─────────────────────────────────────────┘

  Risk Appetite Shock        Confidence Crisis        Credit Crunch

  reprising of structured
  products

  market losses          increase of counterparty risk

  reprising of risks     confidence crisis       tighting of credit conditions

  increase in volatility drying up of submarkets  profitability and real economy
                                                   effects

  market contagion,      higher cost of funding
  turbulence
```

Forrás: Mortgage Bankers Association.

losses, and as a result, risk appetite weakened. Due to the combined effect of the selling wave set off by the sub-prime crisis and investors' desire to minimise their risk exposure, pressures to sell higher-risk instruments and the demand for risk-free and highly liquid instruments skyrocketed.

The sub-prime crisis and money market turbulence affected banks through several channels. In addition to the direct exposure of banks (mortgage loans), their investment portfolio included mortgage-backed securities as well. Legally independent special entities, which were founded by banks to underwrite their leveraged positions (e.g. conduit, SPV or SIV) amplified their exposure. Even though the founding banks generally played a major role in their financing, the related exposure was off-balance sheet, and was not included in the books. Additional risk was posed by the loans which banks extended to the related, opaquely operating hedge funds. Due to the multi-layered potential exposure, it was impossible to assess the actual exposure of specific banks. Last August and subsequently in November

this uncertainty led to a crisis in confidence among banks, as well as the drying up of commercial securities markets used by banks to raise funds, and this in turn was followed by the drying up of dollar and euro inter-bank markets.

After hitting banks and investment funds, the crisis spread to US financial guarantors. Financial guarantors were originally established to insure local government bonds, but over recent years they extended their activities to the insurance of asset-backed securities and structured credit products. Covered by the insurance of financial guarantors with a generally higher credit rating (usually the top rating, AAA), low-rated issuers were able to issue securities with the lower interest rates connected to higher rating categories. However, as the number of defaults increased credit insurers were crippled by ever-growing payment obligations and consequently, they faced the threat of downgrade. In addition, the downgrading of credit insurers instantly deteriorates the rating of all securities insured by them, causing additional losses to the owners of the insured securities.

Chart 4

Changes in the risk premiums of euro debts of different credit ratings
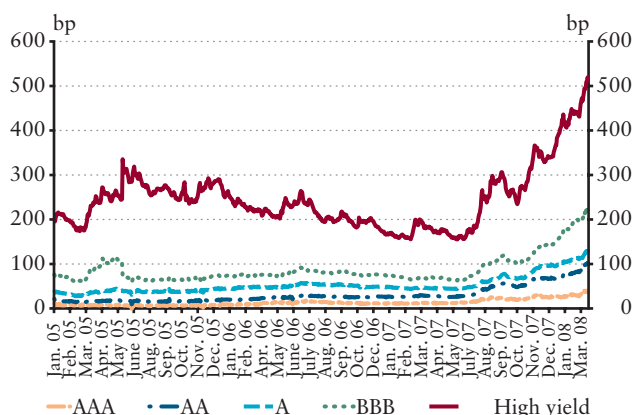
Source: J. P. Morgan.

Through a general, sharp decline in risk appetite, the sub-prime crisis led to the re-pricing of risk on other credit markets as well. The risk premiums of corporate bonds with lower (speculative) credit ratings increased drastically, and to a lesser degree, the increasing risk premiums affected higher-rated corporate loans as well (Chart 4). In addition to increasing risk premiums, there were other signs indicating troubles on the credit market, such as a rising number of leveraged corporate buyouts executed by private equity funds, and cancellations of scheduled corporate bond issues. As a result of concerns about the potential spread of credit market troubles and the expected decline in mergers and acquisitions, the stock market finally tumbled, and the primary victims of the deterioration were stocks in the financial sector.

Since it is still difficult to determine the actual extent of the losses, a significant part of the uncertainty is attached to the financial sector regarding the further development of the sub-prime crisis and its potential dispersion. According to the IMF, the major credit rating institutions and investment banks, the expected losses could be anywhere between USD 300 and 1000 billion.[7] At the beginning of March, banks in developed countries and financial guarantors reported USD 180 billion and USD 50 billion losses and write-downs in total. The impact on banks is particularly disturbing, because the losses caused by the sub-prime crisis could hinder their lending activity. While US and European banks are continuously tightening their lending terms in respect of their corporate and retail clients, they also strive to transfer the rising cost of funds to these clients. Decelerating lending weakens both consumption and investments, which in turn

has a negative impact on economic growth ('financial accelerator' effect). In extreme cases, the credit crunch may lead to recession.

THE SCOPE OF EUROPEAN AND HUNGARIAN DIRECT EXPOSURE

The security-based exposure of the countries in the euro area to the US mortgage market roughly amounts to a total of EUR 200 billion (Table 1), comprising less than 2 per cent of long-term security investments. It is important to note, however, that only a fraction of the above EUR 200 billion is linked to the sub-prime market. Of the total exposure, EUR 117 billion represents securities issued by mortgage companies sponsored by the federal government, with no sub-prime exposure whatsoever. On the other hand, some of the exposures behind the securities issued by private corporations, which amounts to a total of EUR 83 billion, have no relation to the sub-prime market either. Another important factor to underline is that, based on current information, the parent banks of the largest Hungarian banks typically have marginal direct exposures to the sub-prime market. According to securities statistics, Hungarian banks do not have instruments backed by foreign mortgages, and the total volume of the portfolios in the bank's custody, particularly the investment fund portfolio, is negligible.

In the near future, the contagion effects of the sub-prime crisis on other markets may have a negative impact primarily on the profitability of investment banks and complex banking groups with a strong investment business. Such effects may be channelled through the declining volume of leveraged buyouts and speculative corporate bond issues, the substantial deterioration in trading profits, and potential credit losses from defaulting hedge funds. In this context, the impact on the foreign banking groups dominating the domestic banking sector will be somewhat mitigated by the fact that the most significant contributor to their business activities and increased profitability of recent years was income from traditional financial intermediary activities (e.g. retail banking), which is largely attributable to their significant expansion in lending in the regions of Central and Eastern Europe.

From a broader perspective, it is important to assess how the solvency situation of large US and European banks may impact the stability of the European parent banks of Hungarian banks. Up to now, the capital adequacy of some US and European banks has deteriorated significantly, which is reflected in decreasing stock prices. Capital was mainly

---

[7] For details, see IMF Global Financial Stability Report (April 2008), visit: http://www.imf.org/external/pubs/ft/gfsr/2008/01/index.htm.

Table 1

Exposure of the euro area to the US mortgage market[8]

	Total exposure (EUR billion)[9]	Of which: securities issued by private corporations (EUR billion)
Austria	2.3	0.2
Belgium	46.2	13.3
Finland	0.5	0.1
France	10.8	6.5
Germany	28.2	16.8
Greece	0.15	0.0
Ireland	25.6	7.9
Italy	4.4	1.2
Luxembourg	45.3	16.8
Netherlands	34.2	20.3
Portugal	0.8	0.1
Slovenia	0.2	0.0
Spain	1.3	0.1
Euro area	*200*	*83.2*

Source: US Treasury.

raised by sovereign funds. Another risk may be that only a part of expected losses has been reported up to now. The increasing market role of non-transparent financial institutions (hedge funds, private equity funds) and financial innovations (credit risk transfer, CRT, products) deteriorates the transparency of financial markets and impedes risk pricing, and consequently, inhibits the adequate assessment of direct and indirect credit market exposures to the sub-prime crisis and the distribution of losses in the financial sector. Another difficulty is posed by the financial institutions themselves: many of them tend to conceal their losses for business considerations, and thus the actual extent of losses is not revealed until the institution is on the verge of insolvency. As a consequence, European supervisory authorities are exerting pressure on financial players to report their exposures related to the US sub-prime mortgage market as early and as precisely, as possible.

TURBULENCE ON THE FOREIGN INTERBANK MONEY MARKETS AND ITS IMPACT

The temporary disorder experienced so far on the European and US money markets did not have a significant effect on the forint money markets. The FX swap market is the most important factor in the forint liquidity of non-resident players, and the forint interbank market, and its turnover did not reflect any changes. International news did not have a major influence on overnight forint yields, and nor were central bank secured loans taken.

All in all, reports of market players are consistent with the scenario described above based on the aggregate market indices. According to some bank dealers, the lack of confidence observed between the parent banks may have appeared on the domestic market as well. However, the reports of other dealers indicate that this opinion is neither shared throughout the banking sector, nor reflected in the actual market deals.

The crisis of confidence which appeared on the non-resident interbank markets should not pose a threat in the future to domestic banks, unless potential problems related to confidence between the parent banks also extend to the subsidiary banks. Only a prolonged confidence crisis would have a notable impact, triggered by further negative news involving some of the major market players. This may manifest itself in decreasing interbank limits and higher premiums for loans of banks that are deemed higher-risk institutions. As a consequence, it is extremely important to continuously monitor the domestic interbank markets and payment systems in order to identify any potential contagion

---

[8] Visit: www.ustreas.gov/tic/shl2006r.pdf.

[9] The total mortgage market exposure consists of two main parts: securities issued by agents sponsored by the federal government (i.e. Fannie Mae or Freddie Mac), and securities issued by private corporations.

from the troubled European markets, a task that the central bank of Hungary is obviously performing on a daily basis.

LONG-TERM FUNDING RISK OF DOMESTIC BANKS

A prolonged increase in market liquidity risks may impact domestic banks primarily through the pricing of and access to non-resident interbank and capital market funding. Shrinking liquidity primarily affects domestic banks through the increasing cost of funds. Short-term non-resident interbank interest rates and, to a certain extent, the higher, above pre-crisis values of banks' CDS premiums indicate that in the event of a prolonged contraction of liquidity, the cost of non-resident funds are expected to increase.

It is important to note, however, that a significant difference may be observed on developed markets regarding the price of non-resident funds. The 3-month TED spread increased, and at this point it exceeds the level recorded in August by some 50 to 60 basis points. This is largely due to the fact that, by means of the successful, temporary expansion of monetary policy instruments, central banks have managed to significantly alleviate the confidence crisis. In the meantime, CDS premiums, used for assessing the price of long-term funds, have shown a further increase (Chart 5). Since July, 2007, CDS premiums have increased by 250 to 260 basis points, which may be explained by two primary factors. On the one hand, credit risks have increased; and on the other hand, there is less confidence in the risk rating of credit derivatives of credit rating agencies.

Chart 5

#### Costs of short-term and long-term foreign funding
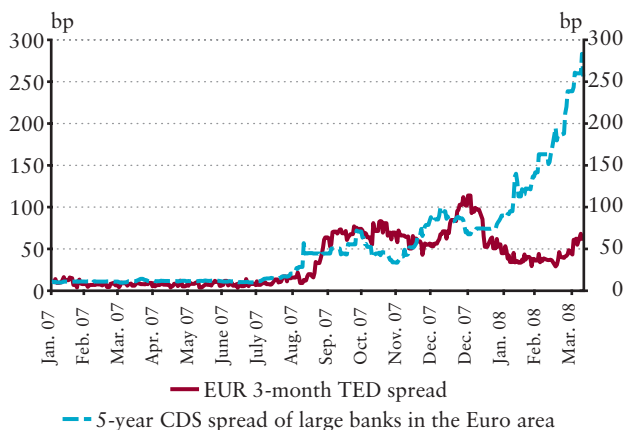
Source: Datastream.

The banking sector of the euro area promptly responded to a potential divergence of short-term and long-term fund costs, i.e. differences in costs over various time horizons.

Concerned about permanently high prices of long-term funds, the banks increased the frequency of short-term security issues, and held back on the issue of long-term securities (Chart 6).

Chart 6

12-month changes in short-term and long-term funds
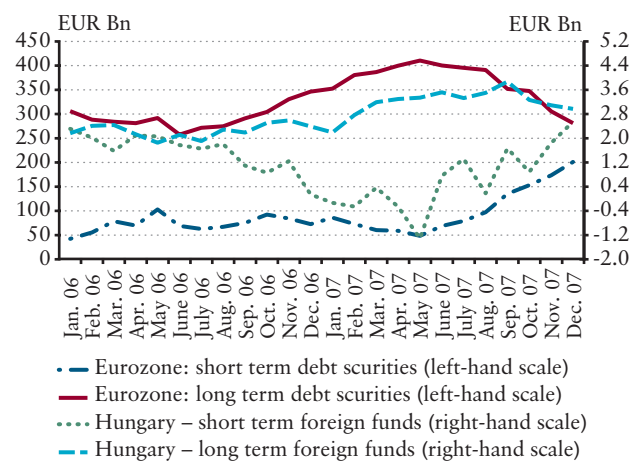
Sources: ECB, MNB.

Due to the high proportion of non-resident funding in general, and that of parent bank funding in particular, pressure to shorten the average maturity of funds has become typical in Hungary. By the end of 2007, domestic banks had a worse funding structure (increasing ratio of short-term, non-resident funds) and increased funding costs.

It is important to note, however, that the abundant liquidity which characterised the past few years on a global scale is expected to drop substantially over the long run, which may adversely impact the domestic banking sector through increasing funding costs and shrinking access to non-resident funds. Shrinking access to non-resident funds may inhibit loan originations, and pose increasing funding liquidity risks. Funding liquidity risks may be mitigated by the fact that nearly one-half of the banking sector's non-resident funding is provided by non-resident parent banks. On the other hand, subsidiary banks may face increased liquidity risks if parent banks reduce the average maturity of the funding they provide to their subsidiaries.

RISK OF A CREDIT CRUNCH

In extreme cases, the sub-prime crisis related losses and increasing funding costs of banks may lead to a credit crunch. A credit crunch occurs when the willingness of banks to take risks sharply declines to such an extent that they drastically reduce their lending business, and despite increasing prices they are not willing to expand their loan portfolio, i.e. the

credit supply curve becomes vertical. This setback in the availability of loans can lead to an economic recession. The sub-prime crisis may primarily result in a credit crunch in countries where sophisticated financial markets are in place, and capital markets play a major role in the financial structure. With an eye to the underdeveloped local bond markets, lack of loan securitisations, and the dominance of bank loans, this channel has low relevance in Hungary. A more likely channel for potential credit crunch contagion could be the increasing risk avoidance and stricter lending terms of parent banks, which may result in reduced credit limits for subsidiaries.

Influenced by the sub-prime crisis, banks on developed markets have introduced drastically tighter lending terms regarding non-price related factors (Chart 7). The most significant restrictions have affected the mortgage market in the USA.

Chart 7

Changes in credit standards according to Senior Loan Officer Surveys by the Fed and the ECB
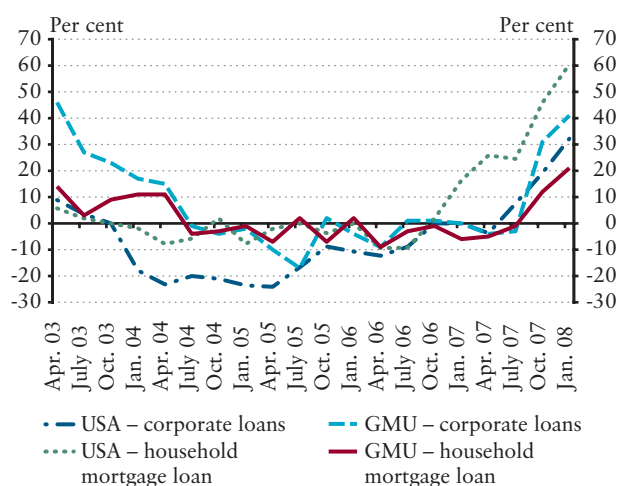

Sources: Fed, ECB.

Restricted lending may spread to the domestic banking sector if the subsidiaries of non-resident parent banks reduce their credit limits. Thus far we have not experienced this; on the contrary, commercial banks have introduced even more relaxed terms for housing loans after the austerity measures from last year, and this more lenient practice is expected to continue in the first half of 2008. As far as consumer loans are concerned, banks continue to ease their credit standards (Chart 8). Apart from Hungary, Poland and Lithuania have similar statistics in the region. In both countries of the region, lending terms were tightened for housing loans, and did not change notably in respect of consumer loans. In neighbouring countries banks justified the more stringent terms for housing loans by the deteriorating capital

Chart 8

Changes in credit standards in Hungary
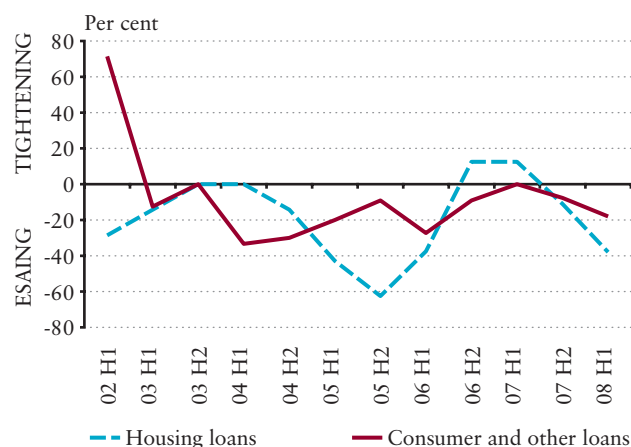
Source: MNB.

adequacy, which followed the accelerated growth in the volume of the loan portfolio.

Apart from non-price factors, it is also important to observe factors affecting prices. The banking sector may react to the increased cost of funds by reducing margins on the one hand, and by raising interest payments for (existing and new) clients on the other. The primary consequence of higher interest payments for existing clients may be a deterioration of the portfolio quality, and the increased instalments may reduce the disposable portion of available income. Transferring costs to new customers may have an adverse effect on credit demand and consequently, on consumption. Currently, the transfer of costs to new customers is not a typical practice

Chart 9

Increase of freshly announced lending rates above the 3-month risk free interest rates in 2007
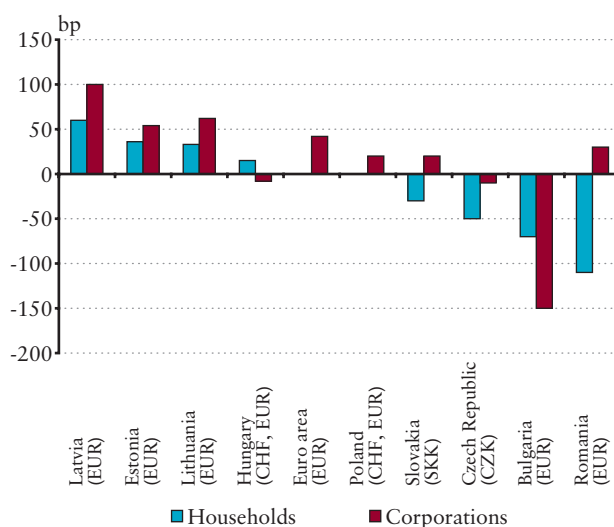
Sources: National central banks.

either in the region as a whole, nor in the euro area. The only exception so far are the Baltic countries, where lending rates on both the corporate and household markets increased considerably, exceeding the 3-month reference interest rates (Chart 9).

The increased cost of foreign funds and shrinking (FX) liquidity may influence individual countries differently. The impact may depend on a number of factors, including the liquidity situation of parent banks, the tightness of the position of subsidiary banks based on their loan-to-deposit ratio, the profitability prospects of the banking sector in the specific host country, and changes in the macroeconomic environment. These last few factors may be significant because they strongly influence liquidity allocation within banking groups. It is unfavourable that the loan-to-deposit ratio of the Hungarian banking sector is high compared to international standards (Chart 10), the profitability of the banking sector is on the decline, and macroeconomic activity is low.

Chart 10

Loan-to-deposit ratio in international comparison (2007)
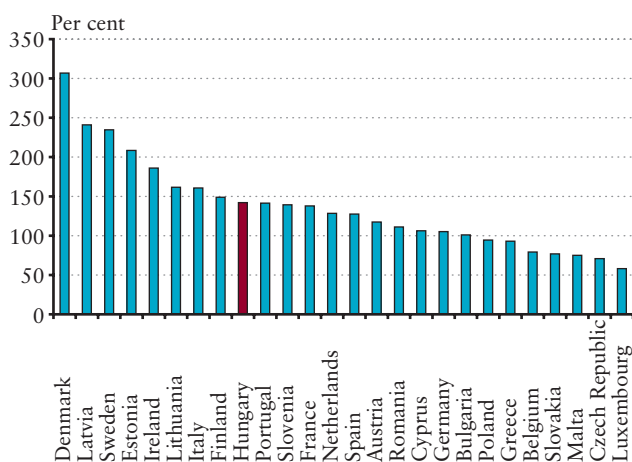
Source: ECB.

IS TURBULENCE SIMILAR TO THE US SUB-PRIME CRISIS LIKELY TO DEVELOP IN HUNGARY?

Risk competition is intensifying in the practice of domestic banks. Risk competition is usually reflected by extremely lax credit standards and a new range of increasingly risky credit products. Obviously, these two processes are interrelated. While they keep loosening their credit standards, banks attempt to generate considerable customer demand by introducing new, high-risk products. A typical example for this is the appearance of JPY-based credit products on the market. On the other hand, the appearance of new products,

e.g. JPY-based loans, encourages competitors to offer similar products on the market. At the same time, this trend also encourages banks to make an effort to retain the competitive nature of other credit products, primarily CHF-based loans, and in order to reach this goal they are increasing LTV ratios from a prudent level, i.e. reducing equity and increasing the maximum period of maturity.

Having said that, a number of factors work against the development of a similar crisis. Although the proportion of loans with an LTV ratio over 70 per cent is dramatically increasing within mortgage loans, the average LTV of the loan portfolio is 50 per cent. In addition, in contrast to the practices seen in the US sub-prime segment, black-listed debtors are unable to obtain loans from banks in Hungary (if they do obtain loans through financial companies financed by some banks, they are relatively small in number and low in value). In addition, there is no sign of a real estate bubble. Finally, even though the debt service coverage ratio is slightly higher than the EU average, the proportion of the mortgage loan portfolio relative to the GDP is 10 per cent and considered low, and this, again, works against the development of a similar crisis.

GLOSSARY

ALT-A: With regard to risk the ALT-A category is located between the prime and sub-prime market on the US mortgage market. The candidates for ALT-A lending are considered relatively good borrowers, but either lack reliable proof of income or their debt-to-income ratio tends to be high.

Asset-backed securities (ABS): Securities backed by portfolios of homogeneous debt groups (mortgage or motor vehicle loans, credit cards, student loans, etc.). These securities are issued by institutions established exclusively for this purpose (SPV). One of the most important types of ABS is MBS, a security with an underlying mortgage loan collateral (mortgage-backed security). Changes in the prices of the ABS market are indicated by the ABX index, a synthetic, asset-backed credit derivative index.

Collateralised debt obligations (CDO): Special securities backed by bonds, loans or other assets as collateral. Investors purchasing the CDO assume the risk of the loan or bond portfolio concerned. The CDO is issued by an entity established solely for this purpose (special purpose vehicle, SPV), which acquires the securities used as collateral. Based on the different risk levels and maturities the issuer of the CDO chops the credit and/or bond portfolio into pieces (tranches). There are three risk categories reflected by three tranches: senior tranches (AAA rating), mezzanine tranches (from AA to BB ratings), and equity tranches (unrated). If the

securities are backed by loans or bonds only, they are called collateralised loan obligations or CLO, and collateralised bond obligations or CBO, respectively.

Credit crunch: A period of recession in a debt-based monetary system, when decelerating growth in debt creates a liquidity shortage in the economy. It is often caused by lax, inadequate lending policies, which generate losses for the lending institutions and for investors trading in debt-type instruments. Obtaining credit may become difficult or more expensive for these institutions, which further increases their accumulated losses.

Credit default swap, CDS: A derivative instrument to transfer credit risk, where the buyer of the credit protection pays a swap spread to the seller of the protection, who, in turn, will guarantee the payment of the borrower's debt.

Credit Risk Transfer Markets, CRT markets: A market for those products, which are used for transferring the default or bankruptcy risk of a client to another party. Credit risks may be passed on through the physical transfer of instruments (securitisation), or through a synthetic transfer (credit derivatives). By means of securitisation the credit risk attached to a specific instrument portfolio is transferred to the investor through tradable securities (e.g. ABS). Risk transfer is performed in at least two different investment grade tranches. Credit derivatives are bilateral financial contracts (e.g. CDS), which are used for separating the credit risk of financial products from other risks, and for transferring the risk to another party without transferring the actual ownership of the underlying instrument.

FX swap: A short-term lending rate derivative traded on the interbank market. It consists of a spot and a forward FX deal made simultaneously in exactly the same foreign currency amount. The position taken by the forward transaction is the opposite of that of the spot transaction. Excess liquidity in one foreign currency is swapped to another currency, where liquidity can be made better use of. The forward interest rate is fixed at the time of the deal, while the floating rate is the O/N rate, which is realised on the spot deal on a daily basis.

Hedge funds: As opposed to traditional investment funds these funds are private, closed, speculative-purpose investment funds, which require a high initial minimum investment amount. For this reason, the entities investing in hedge funds are usually sophisticated, large institutional investors, private pension funds, investment companies or extremely wealthy private individuals. Due to their closed nature they are exempt from several capital market regulations and reporting responsibilities. Their position

taking is not restricted by any regulation, and they are characterised by high leveraging, short positions, and the free use of derivatives.

High-yield bond/Junk bond: A short name for non-investment grade corporate bonds, which, in return of their higher than average risk, pay higher yields than the traditional corporate bonds.

Leveraged buyout, LBO: A form of corporate financing where the acquisition of a company's majority ownership is financed through debts (loans or bonds). Frequently, the assets of the company being acquired are used as collateral under the responsibility of the company performing the buyout. Since in leveraged buyouts the debt-equity ratio is usually 90 per cent, respectively, if bonds are used for a part of the financing the issued papers are usually speculative bonds (junk bonds).

LTV: Loan to Value = loan amount / collateral value.

Prime lending: Selling credit products to clients with excellent credit rating and/or clean credit history.

Private equity fund: Funds invested in companies and/or complete business sectors with the purpose of obtaining influential ownership. The influential ownership obtained this way allows the owners to restructure the capital, management and organisational structure of the target company.

Special Purpose Vehicle, SPV: A legal entity established by the securitisation issuer specifically for the purpose of managing the transaction, which is independent of the securitisation issuer both in respect of bankruptcy and tax law. During the securitisation process, the financial service provider pools and packages some of its assets under the SPV, which then uses the assets as collateral to issue bonds or other securities.

Structured Investment Vehicle, SIV: Funds established for the purposes of credit arbitrage, taking advantage of the difference between short and mid-term lending rates and the yields of structured financing products. Their typical investments include ABS securities and certain bonds issued by financial corporations.

Sub-prime lending: These clients typically have below average credit ratings because, being unable to prove regular and timely loan payments, their credit history is compromised (in the USA such clients are typically low income or elderly individuals, or new immigrants).

Judit Páles–Lóránt Varga: Trends in the liquidity of Hungarian financial markets – What does the MNB's new liquidity index show?

The Magyar Nemzeti Bank measures the trends in the liquidity of Hungarian financial markets by means of a liquidity index and a related set of liquidity sub-indices. These liquidity indices relate to the four most important domestic financial markets (the EUR/HUF spot foreign exchange market, the USD/HUF FX swap market, the secondary market of Hungarian government bonds and the interbank unsecured money market), and are based on indicators that quantify the different dimensions of market liquidity (bid-ask spread, return-to-volume ratio, average size of transactions, number of transactions). The timeliness of this topic is supported by the fact that, in relation to the impact of the US sub-prime crisis, analysts and experts have started to focus their attention on the development of financial market liquidity again. Until mid-2006, the liquidity of Hungary's domestic financial markets increased steadily, but in 2007 the trend-like growth in liquidity ceased. Looking at the last period of more than a half year, the liquidity of Hungarian financial markets fell suddenly several times during the turbulent periods. The magnitude of the decline was particularly considerable in the period of the government bond market liquidity problems in early March 2008. In these periods, the decline in liquidity was mainly attributable to a decline in market tightness, i.e. to an increase in the costs of trading, while market turnover usually did not decline significantly.

INTRODUCTION

Monitoring the liquidity of financial markets and changes in liquidity is an important task for the central bank and market participants as well. An internationally widespread, simplified, but expressive form of this is the calculation of some sort of market liquidity index. The issue of market liquidity is important for central banks in terms of the efficient implementation of monetary policy operations, the reliability of the information content of money market price data, as well as the stability of financial markets and institutions.

First, the efficiency of central banks' monetary policy operations is improved if they are aimed at liquid money market segments, because a drastic decline in the liquidity of interbank money markets may constrain the suitable operation of monetary policy instruments and the appropriate redistribution of the available liquid assets among banks. *Second,* in the event of liquidity problems, the reliability of the exchange rate, interest rate and inflation expectations derived from the prices of financial assets deteriorates, as the price fluctuations resulting from low liquidity may contain significant distortions, and in extreme cases price information may completely disappear from the market. *Third,* in the event of a significant fall in market liquidity, financial markets' and institutions' capacity to withstand economic shocks may decrease, and the effect of economic shocks on asset prices may strengthen. A drop in liquidity may be a sign of financial stability problems and reduced confidence in market operation.

THE CONCEPT, DIMENSIONS AND MEASURING OF MARKET LIQUIDITY

The indicators discussed in this article quantify the trends in *market liquidity*. This is important to be stressed because economic and financial literature uses the term 'liquidity' to describe several, basically different concepts (see, for example, Balás and Móré, 2007; BIS, 1999 and Fleming, 2003). In examining market liquidity, we measure if large-volume transactions can be carried out in the given financial market within a short time and without a significant change in market prices (BIS, 1999 and Csávás and Erhart, 2005). Accordingly, the market liquidity of financial markets is determined by how easily and at what costs it is possible to trade in a given asset. Of other meanings of liquidity, we only mention the concept of *asset liquidity* briefly, which means the quantity of the various financial assets in the economy. Distinguishing this from market liquidity is also important, because they may show contrasting developments. It is possible, for example, that the participants of a market possess a considerable quantity of a financial asset, i.e. they are liquid in that one, while the market of the given asset still does not work properly for some reason, so the market itself is not liquid.

The concept of market liquidity includes several characteristics of a given market, and thus the level of market liquidity can only be determined by examining several dimensions together. Three basic dimensions of market liquidity are distinguished in international literature (Kyle,

1985 and Fleming, 2003): the tightness, depth and resiliency of financial markets.

Tightness of the market means the cost of performing a transaction within a short period of time and the cost of the liquidation of a position. For the measuring of tightness, international literature usually recommends the bid-ask spread,[1] i.e. the difference between the (best) bid and ask prices. In the case of a narrow bid-ask spread, the price at which individual transactions can be carried out is only a little bit different from the average market price, i.e. the transaction cost is low, so the given market may be considered as liquid. Under normal circumstances, the bid-ask spread is determined by structural factors, such as the outstanding amount of the given financial asset, the frequency and size of new issuances, the frequency and magnitude of trading as well as market concentration. In the case of an illiquid market, market makers increase the spread in order to compensate for the liquidity risk; this is partly attributable to the adverse selection stemming from the information asymmetry valid in the given market and partly to the inventory costs (Amihud, 2002). The relative bid-ask spread, which is the ratio of the bid-ask spread and the average price, is also often used as an indicator of tightness.

Depth is the minimum order flow required to change prices a given and considerable amount. In other words, when examining the depth of the market we measure the size of the largest order flow that can be carried out without changing the market price. A frequently used indicator of depth is the total volume belonging to the best or to all bids in the order book. If in a given market, order book or transaction level data are not available, this dimension is often measured with the average size of transactions or simply with daily turnover. The larger the turnover or average transaction size, the more probable it is that a larger transaction can be performed in a short time without a significant shift in market prices.

When measuring *resiliency,* we examine the speed at which prices return to the new equilibrium level following shifts resulting from information shocks that affect liquidity. On the one hand, the new equilibrium level may mean the value defined by fundamentals, on the other hand it may mean the price belonging to the balance between bids and offers for sale. Due to the difficulties of determining the new equilibrium price, the extent of resiliency is often measured by the price impact indicators. Price impact indicators basically express the extent of the price change caused by a given size of order flow. Prices probably reach their (new) equilibrium level more slowly, if prices change to a greater extent as a result of a transaction of a given size. However, in these price impact indicators the depth of the market is also reflected in addition to resiliency. For the calculation of the price change resulting from order flows, intraday transaction and quotation data are often used. These indicators are more precise equivalents of the parameters of theoretical models which can be found in the relevant literature, but in most markets microstructural data are not available, thus the return-to-volume ratio is used for approximation. In addition, the bid-ask spread relative to the average transaction size ratio is often used in international literature as an indicator of resiliency.

INTERNATIONAL EXAMPLES FOR THE USE OF FINANCIAL MARKET LIQUIDITY INDICATORS

Amongst the major central banks, both the Bank of England (BoE) and the European Central Bank (ECB) calculate financial market liquidity indicators, which serve as good examples for compiling a Hungarian liquidity index. At the same time, it is important to emphasise that the level of development of individual financial markets significantly determines the range of successfully applicable indicators. Therefore, the international examples presented here only offer a starting point for us, and not solutions that can be copied without any modifications.

The *financial market liquidity indicator* published in the April 2007 Financial Stability Report of the BoE (Bank of England, 2007a) takes into account the aforementioned dimensions of liquidity (tightness, depth and resiliency), as well as liquidity premia in certain market segments. Of the market segments it focuses on those where major banks play a more important role, i.e. the gilt market, major foreign exchange markets, the stock market as well as the market of equity options, corporate bonds and interest rate swaps (Table 1).

---

[1] Spreads calculated from effective and indicative quotations are also used in the relevant literature for measuring tightness: the effective spread is calculated from the firm quotations, and thus it is usually lower than the spread calculated from market makers' indicative, not firm quotations.

Table 1

Liquidity measures used by the Bank of England

Dimensions	Type of measure	Measures
Tightness	Bid-ask spreads	Gilt repo
		Exchange rates (USD/JPY, USD/EUR, USD/GBP)
		Average of individual stocks (FTSE-100)
Depth & Resiliency	Return-to-volume ratio	Gilt market
		Average of individual stocks (FTSE-100)
		Equity options (S&P 500 options as a proxy)
Liquidity premium	Liquidity premia	Corporate bonds (investment grade and high yield)
		Libor spread (three-month dollar, euro and sterling)

Source: Bank of England (2007a).

For the measurement of *tightness,* the BoE opted for the difference between the prices at which a financial instrument can be bought and sold (bid-ask spread), in the case of the gilt repo market, major exchange rates (EUR/USD, USD/JPY and USD/GBP) and the market of stocks included in the London FTSE-100 index. As a proxy measure for *depth and resiliency,* the BoE uses the return-to-volume ratio in the case of the gilt market, the FTSE-100 index and the S&P 500 options. This shows the relationship of the absolute return on a financial instrument to its turnover.

In addition to the above features, taking account of *liquidity premia* is justified by the theoretical hypothesis which suggests that markets price a higher liquidity premium for financial instruments that can be characterised by greater market liquidity risk. For corporate bonds, the BoE estimated the liquidity premium using the difference between the premium of investment grade and speculative (high yield) corporate bonds compared to government bonds and an estimated credit spread, and for interest rate swaps the spread of the 3-month (dollar, euro and sterling) Libor over government bond yields.

The BoE concentrated the information content of the aforementioned market liquidity measures in a financial market liquidity indicator with the unweighted mean of the measures, normalised on the period 1999-2004. It then took the exponentially weighted average of historical values of the liquidity indicator. The essence of this method is that an exponentially declining weight belongs to past values.

In June 2007, the ECB prepared and published a *financial market liquidity indicator* similar to the Bank of England's liquidity indicator, although the set of measures taken into account shows a somewhat different picture. Three basic differences can be observed between the two indices, which mainly originate from the differences in significance and importance of individual money market segments of the two economies (Table 2). *On the one hand,* the ECB approximates the changes in bid-ask spreads with the spread of the one- and three-month swap rates instead of gilt repo. *On the other hand,* for corporate bonds the ECB takes into account only high-yield bonds. *Finally,* it estimates the liquidity premium with the euro area spreads between interbank deposit and repo interest rates, instead of Libor spreads.

Table 2

Liquidity indicators used by the European Central Bank

Dimensions	Type of measure	Measures
Tightness	Bid-ask spreads	EONIA one month and 3-month swap rates
		Exchange rates (EUR/USD, EUR/JPY, EUR/GBP)
		Average of individual stocks (Dow Jones EURO STOXX 50 index)
Depth & Resiliency	Return-to-volume ratio	Euro bond markets
		Average of individual stocks (Dow Jones EURO STOXX 50 index)
		Equity options market
Liquidity premium	Liquidity premia	Euro area corporate bonds (high-yield)
		Euro area spreads between interbank deposit and repo interest rates

Source: European Central Bank (2007a).

Based on the *market liquidity indicator of the BoE,* financial markets have been characterised by expressly high liquidity since mid-2003, which can partly be explained by structural factors, such as the appearance of new investors with a greater risk tolerance, the increasing role of hedge funds and the emergence of innovative financial products. At the same time, market liquidity fell sharply in market stress periods, and this is what also happened as a result of the sub-prime crisis in 2007. In the past, especially from June 2003 onwards, the liquidity indicator of the ECB moved closely together with the liquidity index of the BoE. This indicates that in the past years global factors have played a decisive role in the trends in the liquidity of financial markets important for both euro area and UK banks.[2]

CALCULATION OF THE INDEX MEASURING THE LIQUIDITY OF HUNGARIAN FINANCIAL MARKETS

The index measuring the liquidity of the Hungarian financial markets is based on quantitative and price data from the four most important domestic financial markets. In compiling the liquidity index we concentrated on those market segments that, due to their size, carry substantial risk to the domestic banking sector, i.e. on the ones where a decline in liquidity would have a negative effect on domestic banks as players using the markets. Based on these criteria, the liquidity index calculated by the MNB concerns four domestic financial markets: the EUR/HUF foreign exchange market, the USD/HUF FX swap market, the secondary market of Hungarian government bonds and the interbank unsecured money market. As the operation, function and importance of these markets are described in detail by Csávás, Kóczán and Varga (2006), these issues are not discussed here.

In respect of EUR/HUF foreign exchange market transactions, we took account of the most important spot transactions of the highest volumes; consequently, the liquidity indices do not contain data for foreign exchange forward transactions and other derivative foreign exchange transactions. Market participants conclude deals with various maturities in the USD/HUF FX swap market and the interbank money market, thus the maturities of key importance in terms of the markets' function and operation had to be selected. Although in both markets transactions with a maturity of one day play the role of the most important maturity, in the interbank unsecured money

market the majority of transactions are *overnight* ones (starting on the day the deal is done and expiring on the next working day), while in the USD/HUF FX swap market most of the transactions are more likely to be carried out at a *tomnext* maturity (starting on the working day following the day the deal is done and expiring on the next working day after the starting working day). Of the secondary market transactions carried out with government bonds, the liquidity indicator covers the *outright* spot transactions.

Considering that market liquidity is a complex concept consisting of several dimensions, in the liquidity index we intended to take into account as many regularly calculable liquidity indicators as possible. However, as opposed to the practice of the BoE and the ECB, we wished to capture all dimensions of liquidity in the case of all the selected markets and, moreover, with similar indicators for each market. Therefore, of the indicators used by Fleming (2003), we selected the ones that can be computed for all the four markets and cover all the three dimensions of liquidity presented above (tightness, depth and resiliency).
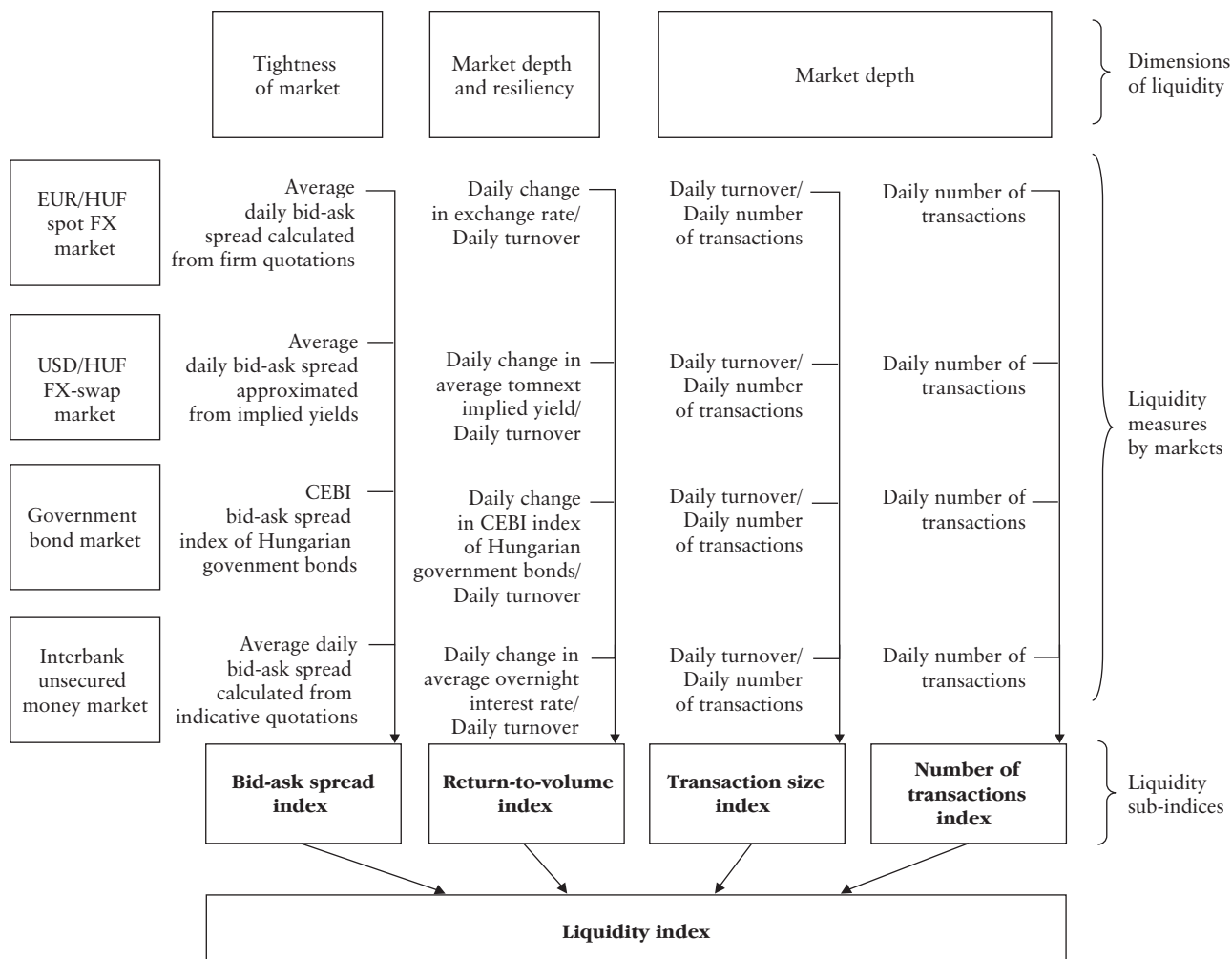
As we have seen, the liquidity indices of the ECB and of the BoE are based on two major indicators: the bid-ask spread, which quantifies tightness, and the return-to-volume ratio, which captures both depth and resiliency.[3] These indicators are also included in the liquidity index we have constructed. However, if only these two kinds of indicators were taken into account, that would, *on the one hand,* carry the risk that the liquidity index overweighs the effect of volatility, as volatility strongly affects both aforementioned indicators. Higher volatility, in turn, does not necessarily reflect lower liquidity (see Csávás and Erhart, 2005). *On the other hand,* depth can be considered as one of the most important liquidity dimensions; therefore, we felt it necessary in any case to have an indicator individually quantifying depth in the aggregate liquidity index. However, one of the often used indicators of depth, the quoted volume (the total volume belonging to the best or to all bids in the order book), is not regularly available in the domestic markets. Moreover, depth – contrary to tightness – can be less precisely covered with one indicator. Consequently, it is worth taking into account more indicators concerning this liquidity dimension. In line with this consideration – also using the approximation recommended in the relevant literature – the average transaction size and the number of transactions were also included in the aggregate liquidity index (Chart 1).

---

[2] For recent developments in the indices see Bank of England (2007b) and European Central Bank (2007b).

[3] We refrained from taking account of the third indicator, which reflects the liquidity premium, used by the BoE and the ECB, as it is only meaningful in the bond market, and thus it does not meet our criteria of computing indicators with the same contents for each market.

Chart 1

Structure of the liquidity index compiled by the MNB

	Tightness of market	Market depth and resiliency	Market depth		Dimensions of liquidity
EUR/HUF spot FX market	Average daily bid-ask spread calculated from firm quotations	Daily change in exchange rate/ Daily turnover	Daily turnover/ Daily number of transactions	Daily number of transactions	
USD/HUF FX-swap market	Average daily bid-ask spread approximated from implied yields	Daily change in average tomnext implied yield/ Daily turnover	Daily turnover/ Daily number of transactions	Daily number of transactions	Liquidity measures by markets
Government bond market	CEBI bid-ask spread index of Hungarian govenment bonds	Daily change in CEBI index of Hungarian government bonds/ Daily turnover	Daily turnover/ Daily number of transactions	Daily number of transactions	
Interbank unsecured money market	Average daily bid-ask spread calculated from indicative quotations	Daily change in average overnight interest rate/ Daily turnover	Daily turnover/ Daily number of transactions	Daily number of transactions	
	Bid-ask spread index	**Return-to-volume index**	**Transaction size index**	**Number of transactions index**	Liquidity sub-indices
		Liquidity index			

With regard to the EUR/HUF spot foreign exchange market, in the Reuters electronic dealing system *(Reuters D3000)* bid-ask spreads originating from actually firm quotations, from which daily averages can be calculated, are available. In the government bond market, the bid-ask spread, originating indirectly from government bond market brokers, calculated from the CEBI bid-ask spread index[4] for Hungarian government bonds is available to us. However, in respect of the FX swap market and the interbank unsecured money market there are no such spreads originating from actual firm quotations. In the case of the FX swaps, a daily average bid-ask spread can be estimated from the implied yields of actual transactions, as a difference between the quotations of loan and deposit side transactions made by domestic banks with non-residents. With regard to the interbank unsecured money market, a bid-ask spread can be calculated from indicative quotations from Reuters.

Return-to-volume indicators, as we have seen, try to quantify the magnitude of price change caused by a transaction of a given size. Determining it exactly would require transaction data of such depth that are not available for most of the above markets. Consequently, for all the four markets we also applied the approach widespread in the relevant literature: the absolute value of the daily change in an indicator expressing the price developments in the given market is compared to the daily turnover of the market. In the case of the foreign exchange market, price developments in the market are captured through the change in the average daily EUR/HUF exchange rate weighted by the transactions. Price developments in the FX swap market are captured with the daily change in the average implied tomnext forint yield weighted by the transactions, whereas price developments are grasped with the daily change in the value of the CEBI index for Hungarian government bonds in the case of the

---

[4] The CEBI (Central European Bond Indices) indices containing government bonds denominated in Central European (Czech, Hungarian, Polish and Slovakian) domestic currencies and traded in local markets are calculated and published by Dresdner Kleinwort Wasserstein (DrKW), a London based investment bank.

government bond market, and with the change in the average daily overnight rate weighted by the transactions in the case of the interbank unsecured money market.

For all markets, the total value of the individual markets' daily turnover and the number of transactions are estimated on the basis of the same source by the MNB. In the case of the EUR/HUF spot foreign exchange market and the USD/HUF tomnext FX swap market, domestic credit institutions report all their transactions to the MNB on a daily basis, and adequate aggregation of these data allows for daily turnover and the number of transactions to be determined. Accordingly, the data estimated this way contain all transactions in which at least one of the participants is a domestic credit institution. However, transactions between non-residents (concluded for example in London) are not included. The number of transactions and the daily turnover of the overnight interbank unsecured money market are also estimated on the basis of data reported by the domestic credit institutions. However, these contain only those transactions that were concluded by two domestic credit institutions.[5] The number and turnover of transactions concluded in the secondary market of government bonds are estimated on the basis of securities account transfer data from the Central Clearing House and Depository Ltd. (KELER). They contain all transactions between market players that have a securities account with KELER or, if they do not have one, between market participants which have different custodians. Accordingly, they also contain the turnover between non-residents with different custodians.

Each of the four indicators concerning the four most important domestic financial markets that can be seen on Chart 1 was calculated in a way that an increase in the value of the indicator reflects an increase in liquidity (for example, the value of the bid-ask spread indicator increases if the bid-ask spread declines, i.e. the given market becomes more liquid and tighter). In order to be able to add up the calculated 16 time series somehow, they have to be reduced to a common denominator. Because of the different units of measurement and magnitudes, the simplest way is to normalise each time series, i.e. to calculate the difference of the values for individual days of the given time series from the average of the whole time series, then divide it with the standard deviation of the whole time series. The time series normalised this way have no unit of measurement, and are first aggregated

according to liquidity dimensions, and not according to markets, by the unweighted averaging of the individual time series.[6] Finally, the liquidity index is the result of aggregating these four major sub-indices, also by way of unweighted averaging (Chart 1). The advantage of this method is that using the aggregate indicator we can present the general trend of the liquidity of domestic financial markets clearly and in an easily understandable manner. The comparison of sub-indices reveals the relationship between the shifts in liquidity taking place in certain periods and the change in individual liquidity dimensions, while the 16 initial time series of liquidity measures also allow us to observe the different trends shown in the development of liquidity of the various market segments as well.

Accordingly, the liquidity index is a result of unweighted averaging of normalised time series. Consequently, the long-term average of the index is zero. An increase in the value of the index marks a rise in the liquidity of financial markets, and if its value is higher than zero, we can say that financial markets at that moment are more liquid than the average liquidity of the whole period under review.

TRENDS IN THE LIQUIDITY OF HUNGARIAN FINANCIAL MARKETS

Until mid-2006, the liquidity of domestic financial markets increased steadily, but later the trend-like growth in liquidity ceased. From mid-2005 to 2006 Q2, the liquidity index reflected an unmistakably upward trend (Chart 2). During this period, the increase in the liquidity of domestic financial markets was ensured by the globally observable high risk tolerance and abundant liquidity, and the related increasing activity of foreign investors and hedge funds on the one hand, and also by the steady increase in the assets managed by domestic institutional investors as well as Hungarian credit institutions' and corporations' enhanced financial market activity, on the other hand. This increased liquidity was mainly reflected in narrowing bid-ask spreads and a rise in average transaction size, i.e. markets became both tighter and deeper. Starting from 2006 Q2, the liquidity index usually fluctuated above its long-term average, although during turbulent market periods (and during year-end periods when liquidity is seasonally low) it often reflected sudden and significant falls in market liquidity.

---

[5] This does not result in any significant distortion, since, according to our estimates, the share of non-residents is negligible in this market.

[6] Normalisation and unweighted averaging are in conformity with the practice of the BoE and the ECB. Similarly to these two major central banks, we also opted for the method of unweighted averaging because there is no viable quantifiable indicator that could express the importance of the selected markets relative to one another from the aspect of market liquidity. We cannot say, for example, that the market with the highest turnover is surely the most significant one in terms of the liquidity of domestic financial markets. The liquidity indicator weighted with the banking sector's exposure regarding the given market may be suitable for a special analysis of market liquidity, which emphasises credit institutions' stability, but due to the weights which change as time goes by, even in this case it would be difficult to interpret precisely the shifts of the index (it would be hard to separate the effects of exposures and the changes in market liquidity). Accordingly, while out of the liquidity dimensions depth was deliberately taken into account with a greater weight, we made no distinction between the selected four financial markets according to their importance.

Chart 2

Liquidity index
(exponentially weighted moving average)
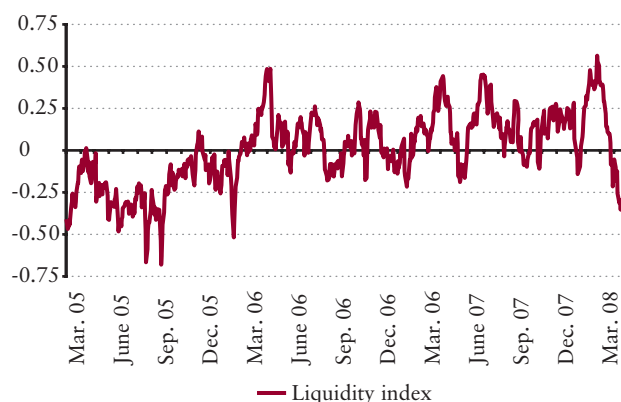
Note: Rise in the liquidity index denotes an increase in the liquidity of financial markets.
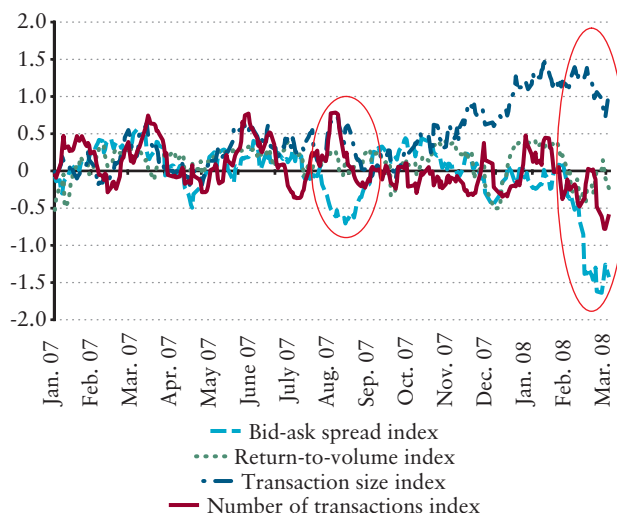
Sources: MNB, KELER, Reuters, DrKW.

The liquidity of domestic financial markets fell below its long-term average both at the time of the outbreak of the US sub-prime crisis in August-September 2007, and in the period of domestic and international government bond market liquidity problems in early March 2008 (Chart 2). However, in connection with the decline in liquidity related to the sub-prime crisis it is worth underlining that its magnitude was far below the fall in market liquidity observed in more developed financial markets. The liquidity indices of both the BoE and the ECB show a fall of unprecedented degree and speed in the period of August-September 2007, while the drop in the MNB's liquidity index in the same period was not outstanding compared to its earlier fluctuations.[7] In early March 2008, in turn, the value of the liquidity index declined significantly within a short time. Nevertheless, market liquidity did not drop to the level of the historical minimum observed in mid-2005; the underlying reason for this is that right before the occurrence of the government bond market liquidity problems the liquidity of domestic financial markets was at an all-time high.

One common feature of the turbulent periods of the recent period of more than one-half year is that the fall in the liquidity of the Hungarian financial markets was primarily reflected in a decrease in tightness, i.e. in the rise in the costs of trading, while the depth of the market, i.e. the market turnover, did not change significantly. The time series of liquidity sub-indices reveal that a shared characteristic of the fall in liquidity in August-September 2007 and in early March 2008 was that in both cases the bid-ask spread index reached

Chart 3

Liquidity sub-indices
(exponentially weighted moving average)

Note: Similarly to the liquidity index, increase in liquidity sub-indices suggests an increase in the given dimension of liquidity.
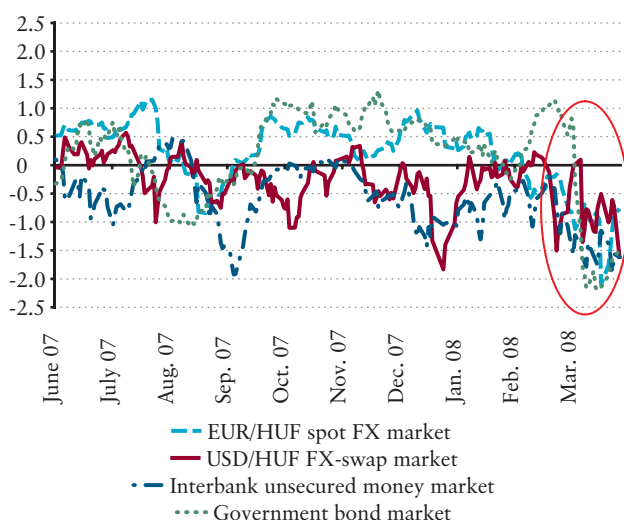
Sources: MNB, KELER, Reuters, DrKW.

historically low levels (Chart 3). This indicates a considerable widening of the bid-ask spreads in the Hungarian financial markets, i.e. a significant easing in the tightness of the market. However, in August-September 2007 the easing of tightness was still partly offset by the deepening of the market, because during this period both average transaction size and the number of transactions rose. In early March 2008, in addition to tightness, there was an unfavourable tendency in the number of transactions as well, i.e. market turbulence affected several dimensions of liquidity. An exception was the average size of transactions, which did not decline notably even then from its historically high level reached in the previous months. Overall, the turnover of domestic financial markets did not fall considerably in early March 2008 either.

At the time of the government bond market liquidity problems in early March 2008[8] market tightness worsened by an unprecedented extent, and the significant fall in liquidity was no longer limited to the government bond market either. After November 2007, (apart from its typical seasonal fall at the end of December) the liquidity index started to follow a clearly upward trend again. Based on the liquidity sub-indices, the underlying reason for this is undoubtedly the dynamic increase in the average transaction size observed in domestic financial markets (Chart 3). The rise in the liquidity

---

[7] For the developments in the liquidity indices of the BoE and the ECB see Bank of England (2007b) and European Central Bank (2007b).

[8] The domestic and international government bond market liquidity problems in early March 2008 are discussed in detail in the April 2008 issue of the Report on Financial Stability.

Chart 4

Bid-ask spread indices of the major domestic financial markets

(exponentially weighted moving averages)

Note: A rise in the indices shown reflects a narrowing of the bid-ask spreads, i.e. an increase in the tightness and liquidity of the market.

Source: MNB, KELER, Reuters, DrKW.

index came to a halt in early March 2008, when the effect of the government bond market liquidity problems appeared mainly in the unprecedented widening of the bid-ask spreads. Although to a lesser extent, due to the general market sentiment as well as the expectations and complex positions of market participants, this development emerged not only in the government bond market but also on the other major domestic financial markets (Chart 4).

CONCLUSIONS

The concept of market liquidity includes several features of a given market, including the tightness, depth and resiliency of the market. A liquidity index should contain indicators that are able to quantify all these factors. Based on a review of international central bank practices and taking into account the peculiarities of domestic financial markets, the liquidity index of the Hungarian financial markets concentrates on four major markets: the EUR/HUF spot foreign exchange market, the USD/HUF overnight FX swap market, the overnight interbank unsecured money market and the secondary market of Hungarian government bonds. After adequate normalisation, the time series of the indicators which capture the various dimensions of liquidity (bid-ask spread, return-to-volume ratio, average transaction size, number of transactions) can be condensed into one single liquidity index, but an independent analysis of the specific time series or sub-indices related to individual liquidity

dimensions may also provide useful information when different trends can be observed across market segments, or the various dimensions of liquidity change in opposing directions. The current time series of the liquidity index and the analysis of the factors underlying the changes in market liquidity will be regularly presented in the future in the market liquidity chapter of the MNB's Report on Financial Stability.

Overall, based on the indices, the liquidity of domestic financial markets followed an increasing trend in the past years, but in the turbulent periods (especially at the time of domestic and international government bond market liquidity problems in early March 2008) rapid and considerable declines in markets' liquidity could be observed. Most of these market turbulences mainly entailed a fall in the tightness of domestic financial markets, i.e. an increase in the costs of trading, while the depth and turnover of markets did not decrease significantly.

REFERENCES

AMIHUD, Y. (2002): "Illiquidity and stock returns: cross-section and time-series effects", *Journal of Financial Markets,* Vol. 5. pp. 31-56.

BANK OF ENGLAND (2007a): "Financial Stability Report", April 2007.

BANK OF ENGLAND (2007b): "Financial Stability Report", October 2007.

BALÁS, TAMÁS AND MÓRÉ, CSABA (2007): "Likviditási kockázat a magyar bankrendszerben" (Liquidity risk in the Hungarian banking sector), *MNB Occasional Papers* No. 69.

BIS (1999): "Market Liquidity: Research Findings and Selected Policy Implications", *Committee on the Global Financial System Publications* No. 11 May 1999.

CSÁVÁS, CSABA AND ERHART, SZILÁRD (2005): "Likvidek-e a magyar pénzügyi piacok? A deviza- és állampapír-piaci likviditás elméletben és gyakorlatban" (Are Hungarian financial markets liquid enough? The theory and practice of FX and government securities market liquidity), *MNB Occasional Papers* No. 44.

CSÁVÁS, CSABA, KÓCZÁN, GERGELY AND VARGA, LÓRÁNT (2006): "A főbb hazai pénzügyi piacok meghatározó szereplői és jellemző kereskedési stratégiái" (Main participants of the domestic financial markets and their typical trading strategies), *MNB Occasional Papers* No. 54.

EUROPEAN CENTRAL BANK (2007a): *"Financial Stability Review",* June 2007.

EUROPEAN CENTRAL BANK (2007b): *"Financial Stability Review",* December 2007.

FLEMING, M. J. (2003): "Measuring Treasury Market Liquidity", *FRBNY Economic Policy Review,* September 2003.

KYLE, A. (1985): "Continuous auctions and insider trading", *Econometrica* 53, pp. 1315-1335.

Appendix

MNB BULLETIN ARTICLES (2006–2007)

Volume 2, issue 2 (November 2007)

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

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

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

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

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

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

Volume 2, issue 1 (June 2007)

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

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

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

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

Volume 1, issue 2 (December 2006)

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

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

GEREBEN, ÁRON AND NORBERT KISS M. (2006): A brief overview of the characteristics of interbank forint/euro trading

JAKAB M., ZOLTÁN (2006): Consequences of global imbalance corrections for Hungary

REZESSY, ANDRÁS (2006): Considerations for setting the medium-term inflation target

DR. SZÉPLAKI, VALÉRIA (2006): Reform of the Hungarian corporate insolvency regulation and its financial stability aspects

Volume 1, issue 1 (June 2006)

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: Macroeconomic Effects of Fiscal Adjustments in Hungary

MNB OCCASIONAL PAPERS 2007–2008 (English language issues)

MNB Occasional Papers include empirical (applied) researches of central bank areas, summarize theories on different themes and present international results, in addition they introduce analyses assisting the better understanding of central bank decisions.

Occasional Papers 59. HORNOK, CECÍLIA–ZOLTÁN M. JAKAB–MÁTÉ BARNABÁS TÓTH (2007): Adjustment of global imbalances: Illustrative scenarios for Hungary

Occasional Papers 60. BENK, SZILÁRD–ZOLTÁN M. JAKAB–MIHÁLY ANDRÁS KOVÁCS–BALÁZS PÁRKÁNYI–ZOLTÁN REPPA–GÁBOR VADAS (2007): The Hungarian Quarterly Projection Model (NEM)

Occasional Papers 61. P. KISS, GÁBOR (2007): Pain or Gain? Short-term Budgetary Effects of Surprise Inflation – the Case of Hungary

Occasional Papers 62. KOPITS, GEORGE (2007): Fiscal Responsibility Framework: International Experience and Implications for Hungary

Occasional Papers 66. EPPICH, GYŐZŐ–SZABOLCS LŐRINCZ (2007): Three methods to estimate the whitening-related distortion of the wage statistics

Occasional Papers 67. ZSÁMBOKI, BALÁZS: Basel II and financial stability (2007): An investigation of sensitivity and cyclicality of capital requirements based on QIS 5

Occasional Papers 68. VADAS, GÁBOR (2007): Wealth Portfolio of Hungarian Households – Urban legends and Facts

Occasional Papers 70. HOLLÓ, DÁNIEL–MÓNIKA PAPP (2007): Assessing household credit risk: evidence from a household survey

Occasional Papers 73. REPPA, ZOLTÁN (2008): Estimating yield curves from swap, BUBOR and FRA data (forthcoming)

MNB WORKING PAPERS 2007–2008

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

WP 2007/1. MOLNÁR, JÓZSEF–MÁRTON NAGY–CSILLA HORVÁTH: A Structural Empirical Analysis of Retail Banking Competition: the Case of Hungary

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

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

WP 2007/4. JIN-CHUAN DUAN–ANDRÁS FÜLÖP: How Frequently Does the Stock Price Jump? – An Analysis of High-Frequency Data with Microstructure Noises

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

WP 2007/6. ERHART, SZILÁRD–JOSE-LUIS VASQUEZ-PAZ: Optimal monetary policy committee size: Theory and cross country evidence

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

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

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