MNB BULLETIN
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MAGYAR NEMZETI BANK

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Summary

DEAR READER,

The Magyar Nemzeti Bank attaches great importance to making central bank analyses on various current economic and financial trends of general interest available to the wider public. The May 2013 issue of the MNB Bulletin provides an overview of the dilemmas about nominal GDP targeting, the factors of unhedged foreign currency exposure in Hungary, the possible effects of the financial crisis on potential output, the impact of the European regulation on uncovered CDS positions and the ways in which real economic considerations can be reflected in the MNB's Monetary Policy Model. Furthermore, the Bulletin features a roundtable discussion with reputed economist Olivier Blanchard.

The motivation behind the article by Ágnes Csermely and Máté Barnabás Tóth is that the question of how central banks should set their monetary policies after the key policy rate has reached the zero lower bound has provoked heated debates during the current crisis. One idea that has recently received attention is 'nominal GDP targeting', which many people believe is worth considering as a monetary policy option irrespective of the crisis. The authors review the pros and cons of nominal GDP targeting. Although targeting a specific level of nominal GDP could, in principle, help monetary policy to stabilise the real economy more effectively after the interest rate has reached the zero lower bound, practical problems (e.g. frequent revisions of GDP data, uncertainty related to the measurement of potential output, etc.) raise questions about its applicability. For this reason, using nominal GDP targeting as a general policy strategy would not provide tangible benefits compared with the proven, flexible inflation targeting regimes.

Marianna Endrész, Győző Gyöngyösi and Péter Harasztosi analysed corporate micro data. According to the results, the size of unhedged foreign currency lending has become significant not just in the household sector, but in the corporate sector as well. The weight of foreign currency debtors without net foreign currency income was significant prior to the crisis. During the crisis – as a result of the exchange rate depreciation – the performance of foreign currency debtors was worse in relative terms. There was a greater increase in their probability of default and a stronger fall in their investment, while their access to the loan market also deteriorated more.

Péter Gábriel and Gergő Motyovszky consider the possible effects of the financial crisis on potential output. Following the outbreak of the crisis, the output of most economies declined considerably. The recovery is slow and fragile, and the trend of expansion to be followed by economies after the crisis subsides is uncertain. This study describes the channels through which the financial crisis may have affected potential output and outlines some possible scenarios in connection with longer-term developments in potential output.

The article by Dániel Horváth, Zsolt Kuti and Imre Ligeti examines the effects of the European regulation on naked CDS positions on market developments in Central and Eastern Europe. In particular, it focuses on the ban imposed by the European Union regulation on naked CDS positions and its effects on CDS market developments in CEE Member States. Although following the adoption of the regulation in March, an adjustment period of nearly seven months was available until it became effective, in the emerging European markets a considerable proportion of participants reacted to the changes only relatively late, in the first half of October. The concentrated closing of short CDS positions within a short period of time significantly reduced the CDS spreads of the countries in the region. The authors found that, as a result of the regulation itself, both the average regional and the Hungarian CDS spread shifted down by 50 basis points, with the resulting difference proving to be permanent. This shift makes the comparison of CDS spreads more difficult both in cross-sectional and in time series terms. At the same time, the dynamics of CDS spreads may provide good guidance regarding the shifts in individual countries' risk perception even after the regulation came into force on 1 November.

In their article, Balázs Krusper and Katalin Szilágyi seek to answer the question of how real economic considerations are reflected in the interest rate rule. First, the interest

rate rule ensures that monetary policy stabilises inflation over the appropriate horizon (generally approximately eight quarters), that is, it achieves medium-term price stability. Second, it takes into account the considerations of the real economy (both directly and indirectly), that is, it does not make excessive real economic sacrifices to achieve its primary objective. Monetary policy can attach more weight to real economy considerations if it broadens its horizon, that is, if it becomes forward-looking. This means that if monetary policy looks through short-term surges in inflation, then in the event of an adverse cost-push shock it need not aggravate the slowdown of the real economy to combat inflation. Moreover, this forward-looking rule which neutralises only second-round effects provides for a more favourable trade-off between the objectives of inflation and the stability of the real economy than a direct increase in the weight of real economy consideration in the interest rate rule.

Finally, the Bulletin contains a roundtable discussion with reputed economist and author of several books and studies, Olivier Blanchard. Mr. Blanchard's main research area is macroeconomics. In particular, he has dealt with a wide variety issues, including the role of monetary policy, the nature of speculative bubbles, questions related to labour markets and the determinants of unemployment, economic transition in former communist countries, economic downturns and external imbalances.

The Editorial Board

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

During the current crisis, the question of how central banks should set their monetary policies after the key policy rate has reached the zero lower bound has provoked heated debates. One idea that has recently received attention is 'nominal GDP targeting', which many people believe is worth considering as a monetary policy option irrespective of the crisis. This article presents an overview of the pros and cons of nominal GDP targeting. Overall, targeting a specific level of nominal GDP could, in principle, help monetary policy to stabilise the real economy more effectively after the interest rate has reached the zero lower bound, but practical problems (e.g. frequent revisions of GDP data, uncertainty related to the measurement of potential output, etc.) raise questions about its applicability. For this reason, using nominal GDP targeting as a general policy strategy would not provide tangible benefits compared with the proven, flexible inflation targeting regimes.

INTRODUCTION

Virtually all efforts by economic policy-makers over the past four years to bring the global economy back to its previous growth path have failed. The euro area remains mired in recession, and unemployment has been stuck above pre-crisis levels even in countries registering positive growth. Meanwhile, economic policy seems to be running out of ammunition to stabilise the economy. In the first phase of the crisis, fiscal stimulus helped to halt the decline in demand, but today the focus has shifted to long-term fiscal sustainability both in the euro area and the United States. Leading central banks had reduced interest rates to levels close to the zero lower bound by 2009. As time progresses, the quantitative easing programmes subsequently introduced are losing their effectiveness, amidst increased concerns about the potential adverse side effects (e.g. asset price bubbles). It seems that the stimulatory fiscal policies pursued over the past few years have reached their limits, and therefore the question arises as to what alternative tools could be used to encourage economic agents to spend more and to reach a higher level of capacity utilisation. In this special context, nominal GDP

(nGDP) targeting,[1] a popular concept in academic circles in the 1980s, has been brought back to the table. Although a number of reputed theoretical economists argue in favour of this approach,[2] there are currently no central banks which pursue this monetary policy strategy. In a speech,[3] Mark Carney, current Governor of the Bank of Canada and incoming Governor of the Bank of England, said that adopting a nominal GDP level target would be an option to consider for central banks whose policy rates are stuck at the zero level bound and, as a result, the idea has become a topic of discussion in the daily press. In the following, we discuss whether nGDP targeting could support recovery from recession and whether it would be useful to consider replacing inflation targeting with nGDP targeting in central banking practice over the longer term.

THE THEORETICAL PROBLEM: HOW TO CREATE MONETARY STIMULUS IF POLICY IS CONSTRAINED BY THE ZERO LOWER BOUND?

One key problem facing monetary policy in several developed countries is that economic conditions would

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[1] A survey of the early literature on nominal GDP targeting is available in: HALL, ROBERT E. AND N. GREGORY MANKIW (1994), "Nominal Income targeting", in MANKIW, N. G. (ed.), *Monetary Policy,* NBER, pp. 71–94.

[2] Among others: Christina Romer, Paul Krugman, Michael Woodford.

[3] CARNEY, MARK (2012), *Guidance,* CFA Society Toronto, Toronto, Ontario, 11 December 2012, URL: http://www.bankofcanada.ca/wp-content/uploads/2012/12/remarks-111212.pdf.

require further monetary easing, but policy rates have already reached their effective zero lower bound and cannot decline further.[4] In turn, with inflation at low levels, this leads to excessively high real interest rates. In this environment, central banks attempt to achieve further easing by using an array of unconventional policy tools. The effectiveness of these tools, however, has declined over time. In addition to the tools employed so far, exerting a greater influence on longer-term interest rate expectations may be a new way of stimulating the economy. The idea is based on the concept that real economic decisions are not only influenced by short-term, but also by longer-term (real) interest rates, which are strongly dependent on expectations of the future path of the key policy rate. In principle, therefore, the economy could also be stimulated by influencing the expected future path of the key policy rate, in addition to actual reductions. However, when influencing expectations of the path of interest rates, it should also be taken into account that, generally, economic agents already have some idea of the central bank's usual behaviour. Based on past behaviour, therefore, participants may interpret communication about maintaining interest rates persistently low as reflecting a deterioration in the central bank's outlook for the real economy, and thus it does not necessarily have the desired stimulatory impact.

Consequently, for monetary policy to be able to significantly stimulate activity by influencing expectations of the future path of interest rates, it must convince economic agents that the low interest rate environment will be maintained for a while even *after* the recovery is well underway. This, however, is a time-inconsistent promise, as market participants can reasonably assume that, as the output gap closes, central banks will follow an interest rate policy which seems appropriate at the given time. Monetary easing by influencing expectations therefore requires that central banks credibly commit themselves to keeping interest rates low even after the economy has recovered.

Central banks have recently made several promises to keep interest rates low. Communication about maintaining a low interest rate environment for an extended period has been the most frequently used approach. Previously, some central banks published their own interest rate projections (e.g. Sveriges Riksbank, Norges Bank), so this did not

represent a significant departure from their traditional operations, whereas in other central banks indicating an interest rate path for a longer period constituted a new approach in their communication (e.g. Bank of Canada). After the nominal interest rate reached the zero lower bound, the Fed also began to make stronger references to the future path of interest rates, indicating that the interest rate level could be expected to be left unchanged for more than two years. These policy projections, however, have not always been efficient in reducing long-term interest rates, as central banks began to emphasise the conditionality of projections in their messages about the interest rate path: a low interest rate environment can only be sustained as long as it does not pose a threat to price stability.[5] ccordingly, market participants did not necessarily consider it a lasting commitment, but rather the best possible forecast based on information currently available, which may change if the economic outlook improves. This technique therefore proved insufficient to fully implement extra easing by influencing expectations.

Another possible of way of establishing the central bank commitment is to link interest rates to observable economic conditions, rather than to a certain period of time. From December 2012, the state-dependent commitment (or Evans Rule) has become the Fed's official policy rule. According to this rule, the federal funds rate will be kept low at least as long as the unemployment rate remains above 6.5 per cent, inflation between one and two years ahead is projected to be no more than a half percentage point above the 2 per cent longer-run goal and longer-term inflation expectations continue to be well anchored.[6] This sort of forward-looking communication may be more effective than the previous one, because it makes it clear that the central bank will leave interest rates low to help the recovery of the economy even if it should raise them based on its past behaviour.[7]

The logic of the proposal to link the future path of interest rates to developments in nominal GDP is similar to that of the Evans Rule. This is based on the observation that US nominal GDP grew at a relatively stable rate in the period prior to the crisis. Consequently, assuming that the potential output of the US economy has not been damaged in the crisis, a return to this path can be considered its

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[4] One reason is that holding zero interest bearing money is always an alternative for economic agents seeking to avoid negative interest rates, and therefore a negative interest rate would not be effective.

[5] This is illustrated by the words of the Governor of the Bank of Canada: 'This guidance is never a promise, however. Actual policy will always respond to the economic and financial outlook as it evolves'. Speech by Mark Carney on 12 December 2012: http://www.bankofcanada.ca/2012/12/press-releases/central-bank-policy-guidance/.

[6] Federal Reserve Press Release, 12 December 2012. URL: http://federalreserve.gov/newsevents/press/monetary/20121212a.htm.

[7] Originally, Evans proposed a threshold of 3 per cent for the inflation rate and one of 7 per cent for the unemployment rate; however, the decision-making body accepted a lower tolerance for inflation.

Chart 1
US nominal GDP

(log scale)

normal state. Then, the central bank should commit to maintaining stimulatory monetary policy until the economy reaches the nominal path of the period characterising the period before the crisis (Chart 1). So, in an implicit way this approach also assumes that loose monetary conditions are maintained even if inflationary pressures appear in the economy.

However, there are doubts as to whether this new approach to monetary easing can be effective.[8] The Evans Rule and the strategy of targeting a specific level of GDP can only succeed if the central bank is able to encourage households and companies to spend more today by moderating future interest rate expectations, while inflation expectations remain well anchored over the longer term. Sceptics believe the behaviour of banks and real economic agents is dominated by uncertainty about the outlook for growth and the reduction in debt to an extent that further marginal easing of monetary conditions would not bring any tangible benefits, while central banks' anti-inflation credibility is put at risk by tolerating, if only temporarily, higher inflation. Moreover, as we will discuss in more detail below, if the production capacity of the economy has been damaged during the crisis, then monetary easing over an extended period will generate extra inflation and will not help provide a boost to growth.

MONETARY REGIME CHANGE? INFLATION VS. NOMINAL GDP TARGETING

Although the debate today focuses on the search for a temporary solution which could be applied in a situation where the key policy rate is at its zero lower bound, the question has also been raised as to whether nominal GDP targeting could provide a suitable policy framework over the long term. Jeff Frankel[9] actually argues that – due to the credibility risks – full transition could be a practical solution. The reason is that if nominal GDP level targeting is introduced as a longer-term monetary regime change rather than a temporary solution, it need not be made explicit when the central bank faces cost-push shocks, but it is willing to tolerate higher inflation temporarily in order to avoid excessive output losses. However, the experience of countries operating a flexible inflation targeting regime shows that a similar response is possible even within the current monetary policy framework in such a manner that long-term inflation expectations remain well anchored.

One argument supporting nominal GDP *level* targeting is that within this framework 'real economy' aspects may come to the forefront more strongly than in the current policy regimes. However, this interpretation is only valid if the actual value of nominal GDP is below its long-run trend.

Nominal GDP level targeting can be thought of as a monetary policy rule where the central bank responds with an equal weight to deviations in output and prices (or, more precisely, the GDP deflator) from their ideal level.[10] However, the departure from the logic of inflation targeting is mainly due to history-dependence, rather than to stronger considerations to real economic aspects. Inflation targeting focuses on changes in the general price level (i.e. inflation), and therefore if inflation rises temporarily above the target, the central bank still seeks to ensure a 2 per cent increase in prices over the medium term *(bygones are bygones)*. By contrast, in targeting the level of nGDP, if the price level and/or output increase policy is set to create a contraction in order to return to the targeted nominal path. Such a 'history-dependent' rule of behaviour could be more

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[8] See, for example, http://www.economist.com/blogs/freeexchange/2011/11/case-against-case-nominal-gdp-target.

[9] Jeff Frankel (2012), "Central Banks Can Phase in Nominal GDP Targets without Losing the Inflation Anchor", *Jeff Frankels Weblog,* December 25, URL: http://content.ksg.harvard.edu/blog/jeff_frankels_weblog/2012/12/25/central-banks-can-phase-in-nominal-gdp-targets-without-losing-the-inflation-anchor/.

[10] Although this option is not in the focus of today's discussions, the monetary policy rule responding to *changes* in nGDP was also raised in the economic debates of the 1980s. Targeting the level and changes in nGDP are treated as synonyms in the press, while there are significant differences between the two strategies. There is no history-dependence in the latter, and therefore its ability to influence expectations is reduced (i.e. its quality which was instrumental in raising the idea of nGDP targeting at all). Moreover, in the case of recovery from a very low demand environment, when the growth rate of the economy temporarily exceeds potential growth targeting the change in nGDP may unnecessarily slow the expansion of the real economy.

efficient in influencing future expectations. However, it has its price, as for example the rule does not allow for the central bank to disregard certain one-off price shocks that divert nominal GDP from its target level, and must offset them even at the price of generating deflation.

Nominal GDP targeting therefore does not imply systematically looser or tighter monetary policy compared with inflation targeting. In the case of a demand shock, when growth and inflation change in the same direction, a central bank employing an nGDP regime adjusts interest rates by more; when there is excess demand it tightens more, and it eases policy more when there is weak demand, as is currently the case. In the case of shocks affecting output and inflation in opposite directions, the path of nominal GDP is more stable than that of inflation. However, it cannot be inferred from this that nGDP targeting places more weight on the real economy, as the actions of inflation targeting central banks are also influenced by real economic considerations. This may manifest itself in the fact that, for example, the central bank does not respond to current inflation, but to the medium-term inflation outlook, or directly takes into account the cyclical position of the economy.

Furthermore, nGDP level targeting necessarily runs into problems related to the measurement of potential output and its growth rate.[11] As the desired path of nominal GDP is the sum of potential output and a targeted price level, a central bank pursuing a GDP target (or the government defining the central bank's mandate) needs to have a clear picture of a variable which it cannot directly influence let alone observe and which can only be estimated with a significant degree of uncertainty (Chart 2).

Although potential output is a key variable even in current central bank practice, inflation targeting central banks do not have a numerical target for it and, consequently, potential mismeasurement may lead to distortion only indirectly, through the estimated impact on inflation. In the case of nGDP targeting, however, the measurement/observation problem directly affects the target variable. Moreover, growth is a much more politicised issue than inflation, and therefore the central bank may be under pressure to calculate a higher-than-realistic rate of potential output/growth. However, a central bank is unable to materially influence potential output,[12] while medium-term

Chart 2
Estimating US potential GDP with various methods
(log scale)
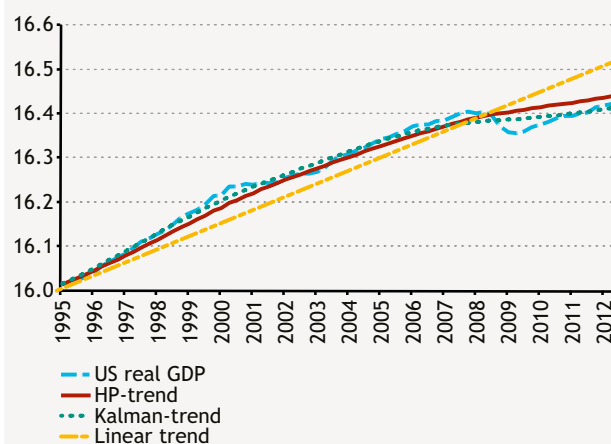
Note: HP trend: trend derived using a univariate Hodrick-Prescott filter (lambda: 1600). Kalman trend: the trend derived based on a multivariate state-space model, using a Kalman filter. The state-space model contains a price and wage Phillips curve and an Okun's law relationship.

developments in inflation are fundamentally dependent on monetary policy. Under both nGDP and inflation targeting, a central bank seeking to achieve a higher potential output than determined by the supply side of the economy can only generate higher inflation, without any significant influence on long-term growth.

A second practical problem stems from the measurement of nominal GDP. While indicators of inflation are available on a monthly basis, data on nominal GDP are released only quarterly, typically with a delay of several months. In contrast to inflation indicators, GDP is revised frequently, i.e. the entire time series may change as more accurate information is received. While many academic authors identify the GDP deflator with inflation or, sometimes, core inflation, co-movement between the two time series can be demonstrated only over the longer term. The reason is that inflation is the price index of household purchased consumption, while the GDP deflator is the price index of overall GDP, and because consumption accounts for roughly about a half of GDP, a number of factors may divert movements in the two indicators. Backward revisions to GDP may overwrite the starting position of the economy again and again and, consequently, the path of interest rates required to return to the targeted path.

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[11] The measurement problem is discussed in more detail in Péter Gábriel and Gergő Motyovszki (2013), "Possible impacts of the financial crisis on potential output", *MNB Bulletin,* May 2013.

[12] Exceptions from this may be episodes of persistent unemployment leading to a loss of skill due to cyclical reasons, which in turn raises the level of structural unemployment and reduces potential output. In such cases, cyclical stabilisation by monetary policy may help reduce the damage to the supply side of the economy in a persistently low demand environment. For more details on this issue, see: Pissarides, Christopher A. (1992), Loss of Skill During Unemployment and the Persistence of Employment Shocks, *The Quarterly Journal of Economics,* 107 (4), pp. 1371–1391.

CONCLUSION

In summary, there is an approach to monetary easing where the central bank seeks to provide further stimulus to the economy by softening up its future anti-inflation commitment temporarily. This is a risky strategy, as it poses the threat that inflation expectations will not be well anchored, but if there is a significant margin of spare capacity in the economy, interest rates are close to the zero lower bound and unconventional policy tools are becoming less effective, the central bank may feel that it is worth running this risk. So far, the example of the Fed has been the only one of explicitly pursuing a similar strategy. However, the Fed has opted for a state-dependent commitment (Evans Rule) rather than setting an explicit target path for nominal GDP.

If we think of nominal GDP targeting not only as a temporary approach that can be used after interest rates have reached the zero lower bound, but also as a long-term monetary policy framework, it is important to note that it may lead to more rigid and more unfavourable real economic outcomes in the case of certain shocks compared with the current practice of inflation targeting. Defining the actual and targeted level of GDP is made more difficult by serious data revision and measurement problems, which would hinder the reliable operation of the system.

As Mark Carney mentioned in his often quoted speech, as long as conventional monetary policy tools are available, full transition to nominal GDP targeting would not bring tangible benefits. In the exceptional case when the central bank policy rate has reached its zero lower bound, setting a target path for nominal GDP may help stimulate the economy. 'Of course, the benefits of such a regime change would have to be weighed carefully against the effectiveness of other unconventional monetary policy measures under the proven, flexible inflation-targeting framework.'

Marianna Endrész, Győző Gyöngyösi and Péter Harasztosi: Corporate sector currency mismatch in Hungary[1]

Our analysis of micro data shows that the size of unhedged foreign currency lending has become significant not just in the household sector, but in the corporate sector as well. The weight of foreign currency debtors without net foreign currency income was significant prior to the crisis. During the crisis – as a result of the exchange rate depreciation – the performance of foreign currency debtors was worse in relative terms. There was a greater increase in their probability of default and a stronger fall in their investment, while their access to the loan market also deteriorated more.

INTRODUCTION

The financial crises of the 1990s, coupled with deep recession, drew attention to a specific mechanism of exchange rate depreciation, the so-called balance sheet effects. According to third-generation crisis models, foreign currency exposures in the private sector add to the costs of an exchange rate crisis and narrow the room for manoeuvre of monetary policy. If, for example, a significant portion of companies become indebted in foreign currency, exchange rate depreciation results in a significant increase in the debt burden of the companies concerned, thus impairing their profitability and balance sheet, which may lead to a decline in investment. If banks take into account the value of the company as well upon the evaluation of loan applications, companies with worse balance sheet receive loans only with less favourable conditions or do not receive loans at all. Therefore, investment will be lower, and output may decline as a result of depreciation.[2]

However, indebtedness in foreign currency in itself does not necessarily lead to lower output. Namely, a certain proportion of companies export, and the weaker exchange rate raises their export income as well. Therefore, the key issue is not the amount of foreign currency loans outstanding in itself, but rather its unhedged portion. Unhedged foreign currency exposure – or currency mismatch – means that there is a mismatch between the given company's net foreign currency assets and the net present value of the expected foreign currency incomes.

Perhaps the difference between foreign currency lending and currency mismatch can serve as an explanation for the fact that lending in foreign currency to households has been given much greater attention recently than foreign currency lending to companies. Households have low foreign exchange incomes or none at all. The corporate sector, however, has significant export revenues serving as natural hedge for foreign currency loans. Consequently, depreciation is expected to have a less negative impact on the corporate sector than on households. While in the case of households aggregate statistics reflect the weight of the problem, in the case of companies they provide less information, as the weight of currency mismatch and balance sheet effects depends on the proportion of foreign currency debtors that do not have a natural hedge (i.e. net export income) and on the importance of their role in the macroeconomy. This, however, can be examined only on the basis of firm-level data.

Combining several administrative databases allowed us to carry out an analysis of this kind. The combined database contains companies that are subject to double-entry book-keeping from 2004 to 2010. Companies' balance sheet data, the currency composition of their loans, their export revenues as well as import expenditures are known. This

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[1] This article is based on our study published under no. 2012/08 in the MNB Working Papers series. See Endrész et al. (2012).

[2] For more details on unhedged foreign currency loans, see Eichengreen et al. (2003) and Rancière et al. (2010).

Table 1
Definition of the groups with currency mismatch

	FX loan		HUF loan	No loan
Net exporter				
Net importer	unhedged	↔		
Not engaged in foreign trade	unhedged			

allows us to identify the companies with currency mismatch with a relatively high degree of accuracy.[3]

Currency mismatch is an important subject in terms of monetary policy as well. Firstly, in normal times it weakens the exchange rate channel of monetary transmission: currency mismatch reduces the stimulating effect of a looser monetary policy. Secondly, when the economy is exposed to a major exchange rate shock, balance sheet effects may significantly limit the room for manoeuvre of monetary policy. Depending on the size of corporate exposure, the position of the banking sector, the size of the exchange rate shock and a number of other factors, monetary easing may even become contractionary, especially if the banking sector is also affected, resulting in a significant deterioration in its lending capacity.

In the first part of the article, we define the companies that are considered to be unhedged foreign currency debtors. We examine the characteristics and macroeconomic weights of these companies. Finally, using descriptive statistics, we show the changes in the performance of these firms during the crisis.

DEFINITION OF CURRENCY MISMATCH AND THE CHARACTERISTICS OF THE COMPANIES CONCERNED

The foreign currency exposure of a company may appear in the form of assets, liabilities, revenues and expenditures. If they do not hedge one another, the firm is exposed to the exchange rate risk, i.e. exchange rate changes influence its balance sheet, profitability and market value. Typically, there are export revenues and import expenditures contrasted with FX loans. If the value of FX loans exceeds the present value of the expected (net) FX revenues, the company has an unhedged exposure, which results in a loss in the case of a depreciation.

In practice, it is difficult to determine the size of the net exposure, because stock- and flow-type data have to be compared. Moreover, one may only assume the future FX revenues.[4] Therefore, we are applying a somewhat different definition; instead of precisely measuring the exposure, we create categories. We speak about unhedged exposure when a company has an FX loan but does not have net FX revenue, i.e. it is a net importer, or does not participate in international trade at all (Table 1).[5]

Depreciation has a clearly negative impact on these two groups. A weaker exchange rate adds to their loan burden (balance sheet effect), and the depreciation does not increase the competitiveness of these groups either. Moreover, it even increases the forint value of net importers' import expenditures.

A weakening exchange rate afflicts net exporters as well, if they have FX loans. In their case, however, this is offset by competitiveness effects. The result of these two factors is presumably positive, but the balance sheet effect exists in their case as well.

Making distinctions between companies with currency mismatch is also important because it is well documented in the literature of international trade that companies participating in international trade are more efficient, i.e. the average characteristics of importers and non-trading companies are significantly different.[6] In addition, developments in external and domestic demands have been different in recent years; therefore, it is worthwhile to compare companies with FX loans with their peers within foreign trade categories. As companies with loans are also significantly better than the ones without loans, we also distinguish companies with forint loans. This categorisation (groups according to international trade and loan status) allows identifying appropriate control groups for the evaluation of the performance of foreign currency debtors.

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[3] For a description of the databases, and the cleaning and merging process, see the relevant chapter and appendix of the study by Endrész et al. (2012).

[4] In addition, companies' foreign currency exposure is also affected by the stock of FX derivative positions, e.g. forward deals. On the one hand, the stock of forward positions is a fraction of that of FX loans, on the other hand, it is not available at company level.

[5] It is to be noted that according to the definition the group of net importers also includes companies that are otherwise stable exporters, but their exports in the given year were below their imports.

[6] See Békés et al. (2011) on Hungarian companies.

Chart 1
Average characteristics: foreign ownership and employment

Share of foreign owned firms

Per cent

Employment

Average employment

- Export
- Import
- No trade
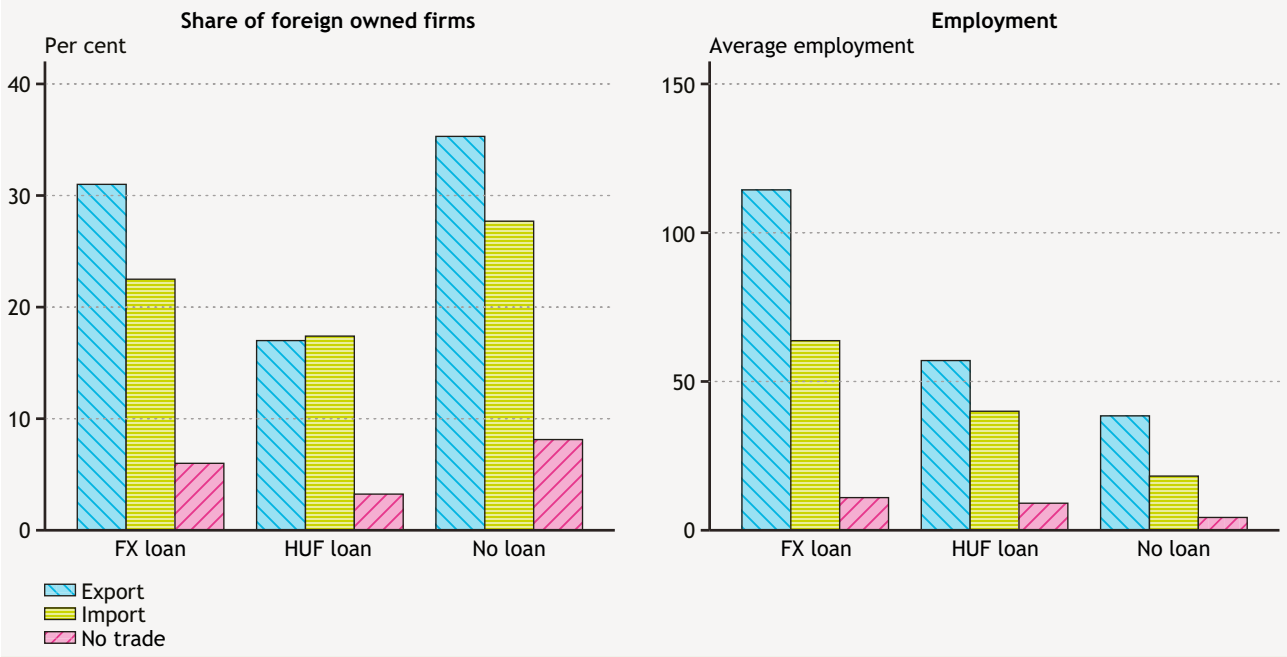
Chart 2
Average characteristics: productivity and indebtedness

Productivity

log TFP

Leverage

Per cent

- Export
- Import
- No trade
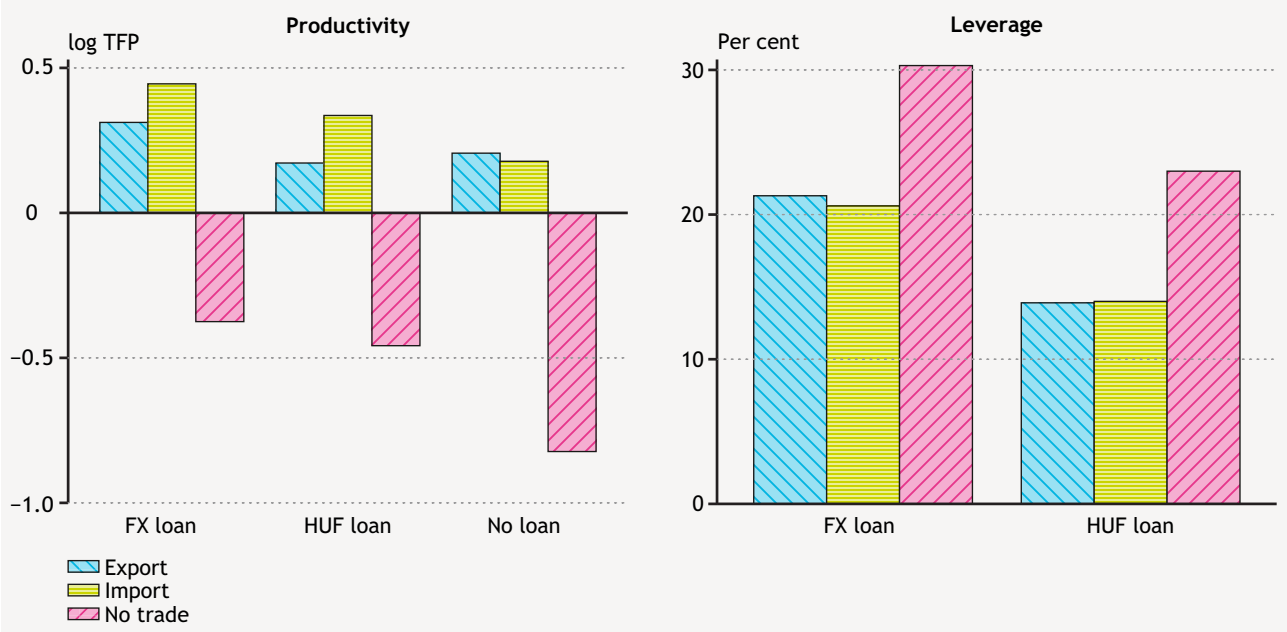
The following is a review of the average characteristics of companies with currency mismatch. We examine the size and average indebtedness of companies, the proportion of foreign ownership and total factor productivity (TFP). Based on Charts 1 and 2, companies with FX loans are usually larger, somewhat more productive and more indebted than the control group (firms with forint loans within the given trading group). However, the comparison also reveals that there are considerable differences between groups by foreign trade and loan status as well. If a firm is engaged in foreign trade and/or has a loan, it is much larger and much more productive than those producing only for the domestic market or those that run their business without borrowing. In addition, foreign ownership is more typical of those participating in foreign trade.

The proportion of foreign ownership is much higher among exporters and importers. The analysis according to loan status reveals the specific financing preferences of foreign-owned companies. The proportion of foreigners is the highest among companies working without loans, their proportion is the second highest within those with FX loans, and foreign ownership is the least typical among companies with forint loans.

In terms of employment, the companies with FX loans and exporters are the largest. They are followed by importers and companies with forint loans.

As for productivity, the foreign trading status is more determining, as the significant differences are between companies that participate in international trade and those that do not, although the average TFP of companies with loans is also higher than the TFP of firms functioning without loans.

Average indebtedness is typically higher among companies with FX loans. This is not surprising, as due to the interest rate spread between forint- and FX-denominated loans the latter allowed higher indebtedness.[7]

MACROECONOMIC WEIGHT OF COMPANIES WITH CURRENCY MISMATCH

The real economy effect of exchange rate depreciation depends on the weight of unhedged foreign currency borrowers in the macroeconomy. Therefore, this chapter examines how high the proportion of these companies is in the main macroeconomic aggregates. Four indicators are examined: value added, employment, investment and loans. The selected year is 2007, i.e. the last one before the crisis.

Chart 3 depicts the share of individual groups of companies (including debtors with unhedged and hedged foreign currency debt) in the macro aggregates. The proportion of companies with unhedged foreign currency debt is the lowest in terms of the number of employees: around 17 per cent in 2007. More than 20 per cent of value added was produced by such companies, and their share in investment was 30 per cent. Exporters with FX loans do not have unhedged exposure, but are also exposed to balance sheet effects. Their proportion is also significant within certain aggregates. Including this set of companies, the proportion

Chart 3
Macroeconomic weight of firms with unhedged FX loans and their weight in banks' loan portfolio

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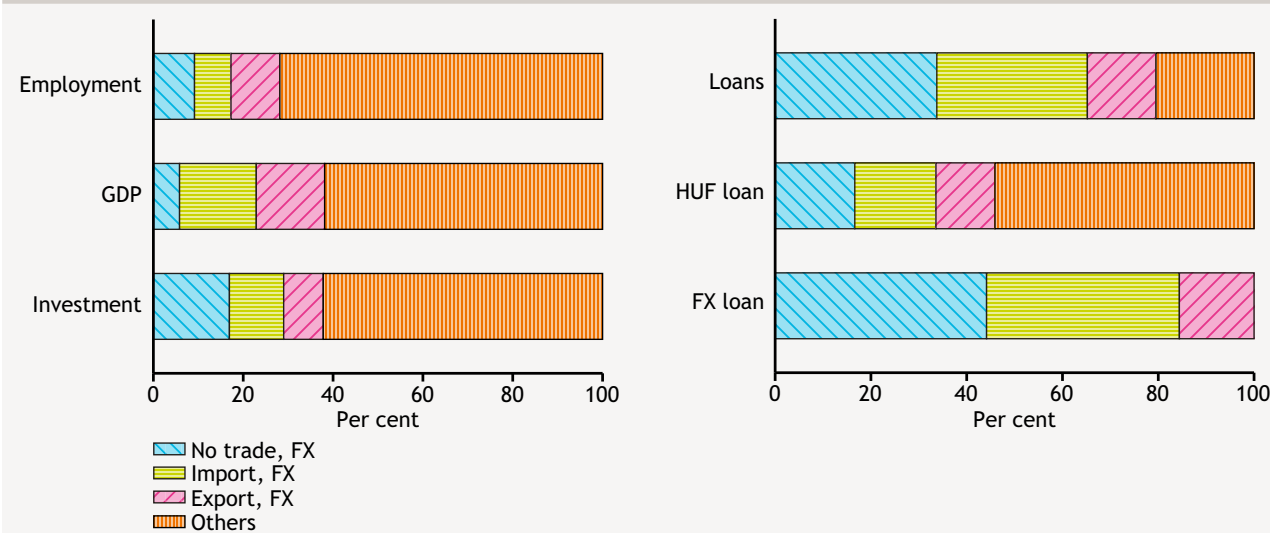
[7] Not only the interest rate spread remained large prior to the crisis, but the uncovered interest parity condition failed as well. This means that the exchange rate movements did not offset the effect of the difference in interest rates.

of the whole group exposed to the balance sheet effect is close to 40 per cent in both output and investment.

The weight of firms with unhedged FX loans is even higher in the loan portfolio of domestic banks.[8] In 2007, these firms accounted for 2/3 of all corporate loans, most of which were FX loans. In terms of its size, banks' indirect exchange rate exposure due to unhedged FX lending to companies compares with the stock of households' FX loans. Just before the outbreak of the crisis, households' FX loans amounted to HUF 3.9 billion. In the same period, companies with currency mismatch[9] had FX-denominated and HUF-denominated loans amounting to HUF 3.5 billion and HUF 1 billion, respectively.[10] Thus, the Hungarian banking sector is exposed to significant indirect exchange rate risk not only through household FX lending, but also through corporate FX lending.

The conclusion that can be drawn from these statistics is that depreciation may have serious real economy effects, as a significant portion of the economy is affected by currency mismatch. It is worth emphasising that the share of companies exposed to depreciation is especially high in banks' loan portfolio. Consequently, the banking sector's lending capacity may also become significantly impaired as a result of depreciation, whereas the subsequent restraining of lending may considerably amplify the direct impact of the depreciation on the real economy (Endrész and Krekó, 2010).

THE IMPACT OF THE CRISIS

During the crisis the forint depreciated significantly, in several waves, weakening by some 20 per cent. The first wave took place in 2008 Q4 and 2009 Q1. If the balance sheet effects worked, we expect that the performance of the firms with currency mismatch worsened because of the depreciation. The data did show this. The probability of default was higher in the case of companies with currency mismatch (and in general with FX loans), and their investment rate and probability of having access to loans deteriorated more strongly.

Methodology

The differences observed in the performance of the groups of companies were examined with various methods. Firstly, we analysed the changes in performance indicators over

time. Here we allowed for changes in the sample of companies within individual groups over time. In the second approach, we worked with a fixed sample over time. We examined how the performance of firms belonging to a given group in 2007 and remaining therein changed after 2-3 years. For the latter approach, for each issue investigated we applied the same methodology, the so-called diff-in-diff estimation, where the following regression is estimated:

$$Y_{i,t+j} = \beta' X_{it} + \sum_{j=1}^{9} \delta_j TLD_{ijt} + \gamma Y_{it} + \mu_s + \varepsilon_{it}$$

The variable on the left is the outcome variable of company i at time t – investment rate, probability of default, probability of obtaining a loan. Variable TLD_{ijt} shows the "foreign trade–loan group" of company i at time t; its value is 1 if the company belongs to group j, and it is 0 otherwise.[11] For a more detailed description of the method, see Endrész (2012).

We are interested in how the performance of the groups changed from 2007 to 2009 and 2010. For this, it is sufficient to examine parameters δ_j. If, for example, j indicates the group of non-trading firms with FX loans δ_j, tells us to what extent the given group's average investment rate or probability of taking on a loan declined or increased relative to 2007. A comparison of the δ_j parameters of the different groups may also answer the question of whether there was any significant difference between firms with FX loans and companies in the control group. Although we control for a number of firm-specific factors, the results do not necessarily imply causality.

Investment

As a result of the crisis, investment in the whole economy declined considerably. Only two groups of companies reached the pre-crisis level by 2010.

Significant differences are observed, depending on whether the given company had FX loans. In each foreign trade category, there was a stronger decline in the investment of foreign currency debtors than in the investment of those indebted in forints or those running their businesses without loans. This applies to net exporters as well, i.e. even in their case it can be assumed that the balance sheet

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[8] Upon the assessment of the macro weights, it is worth remembering that the group of net importers comprises exporting companies as well.

[9] The two figures originate from different sources; one from the credit register, the other from supervisory bank reports. Therefore, the two may be compared only with reservations, but this does not modify the qualitative conclusion.

[10] With regard to households, we do not have information about the forint loans held by households, who have foreign currency exposure as well

[11] Vector X contains the control variables, such as productivity, size, indebtedness and foreign ownership. μ_s sector-specific fixed impact, ε_{ijt} is the error term, β, γ and δ_j are parameters.

Chart 4

Investment by groups of companies and the result of the diff-in-diff estimation
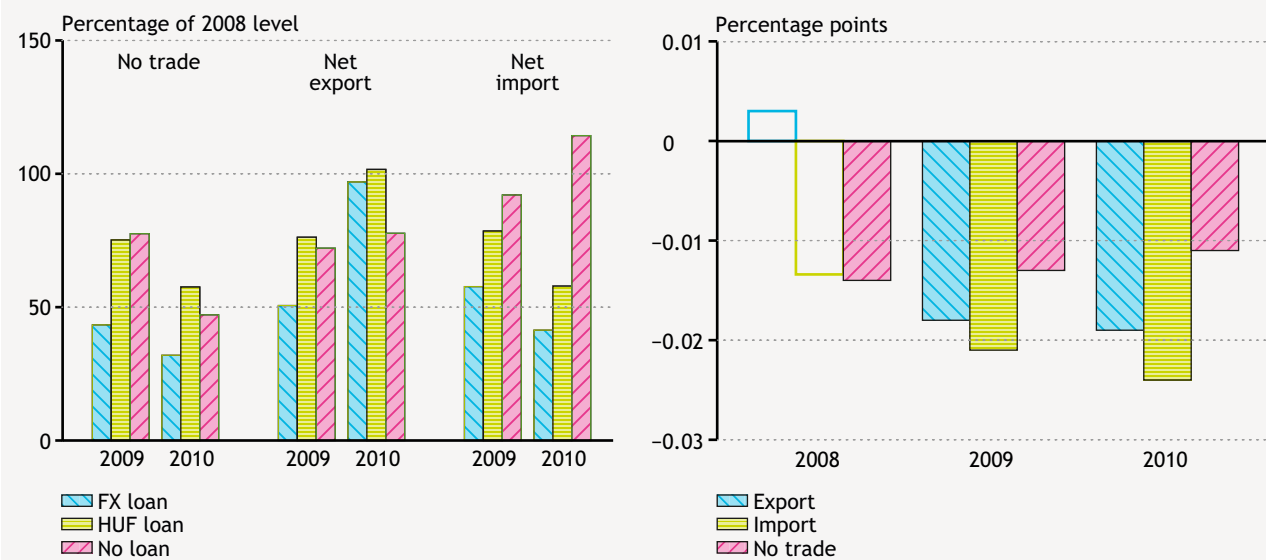
channel played a role. The lag of the two groups with currency mismatch was significant even in 2010.

The diff-in-diff estimations also confirm the above picture. The chart shows the difference of the δ_j parameters of foreign currency debtors and forint debtors by trade status. If it is negative, it means that the decline in the investment rate of foreign currency debtors was greater than that of forint debtors. The full columns indicate significant results. The impact was strong and significant even in 2010 in all the three groups according to foreign

trade status, meaning that there was a major deterioration in foreign currency debtors' performance even in the case of net exporters.

Probability of default

Prior to the crisis, the one-year probability of default was around 1 per cent, and there was no major difference between groups by foreign trade and loan status. Probabilities of default surged after the outbreak of the crisis. Differences between groups also became spectacular: in 2009, the

Chart 5

Probabilities of default within one year and changes in the probabilities of default within one year and two years – result of diff-in-diff estimation
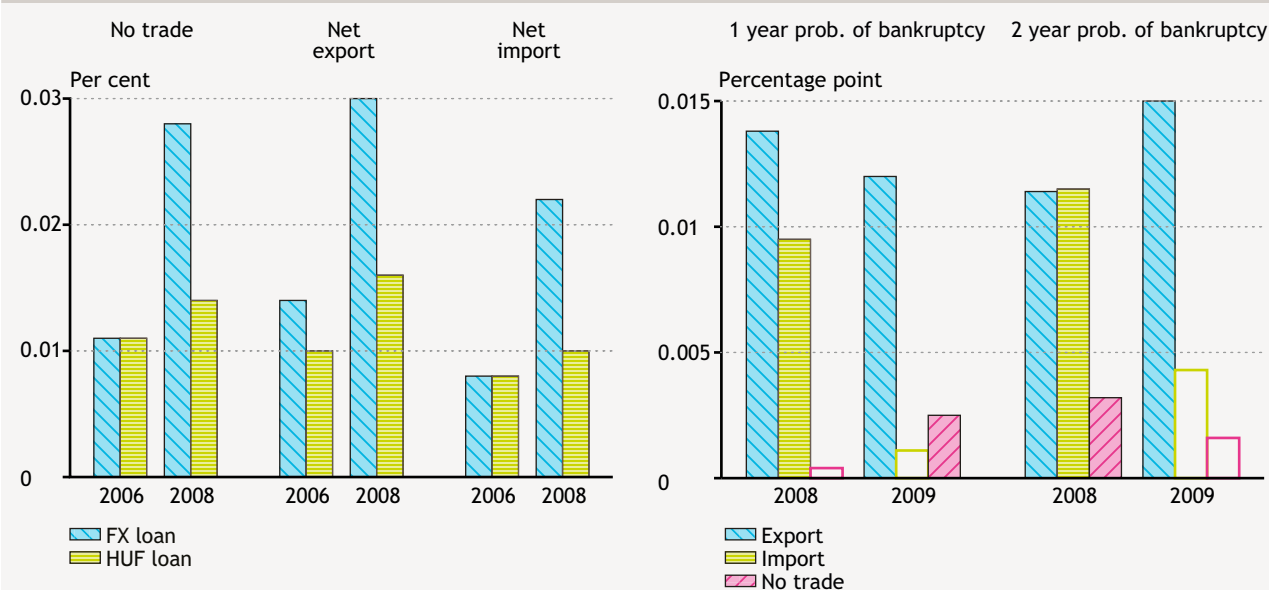
probability of default of foreign currency debtors was twice as high as that of companies with forint loans.

The variable sample and the diff-in-diff estimation yield very similar findings. Controlling for a number of firm-specific characteristics, the probability of default of foreign currency debtors is higher than that of forint debtors, although the significance of the results varies according to foreign trade status and horizon. At the same time, the result of the diff-in-diff estimation also reveals that the disadvantage of foreign currency debtors is the greatest in the case of exporters. This is explained by various factors: firstly, the different dynamics of the export and the domestic market, and secondly, the faster bankruptcy process observed in the case of exporting companies.

Changes in the loan market

Strong adjustment was observed in the loan market. Firstly, companies reconsidered their financing decisions. While the high pre-crisis interest rate spread and low exchange rate volatility had made borrowing in foreign currency attractive, this changed as a result of the crisis. Although the interest rate differential declined only slightly, the exchange rate depreciated, and its volatility also increased significantly. Therefore, demand for FX loans p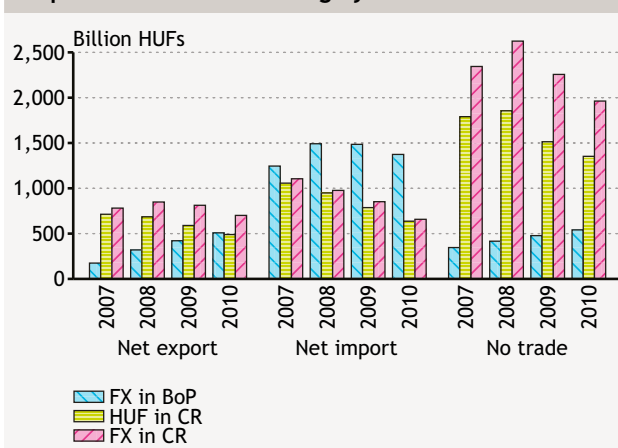resumably fell. Secondly, loan supply also changed, for several reasons. The balance sheet as well as the creditworthiness of foreign currency debtors deteriorated to a relatively greater extent, which was reflected in banks' losses and

Chart 6
Corporate loans outstanding by source of loans

provisioning costs. In addition, banks were exposed to the exchange rate risk through other channels as well – they faced serious FX liquidity shortages. Consequently, banks strived to reduce the indirect and direct exchange rate exposures of their own balance sheets. Accordingly, both demand and supply factors may have contributed to the dispreferential treatment of both FX loans and foreign currency debtors. However, the demand and supply effects cannot be separated.[12]

One of the interesting features of loan market developments is that while lending by domestic banks declined considerably, both the amount and number of loans taken from abroad increased.[13] This can be observed not only in the case of

Chart 7
Domestic, new long-term CHF and EUR loans broken down by previous year's loan status

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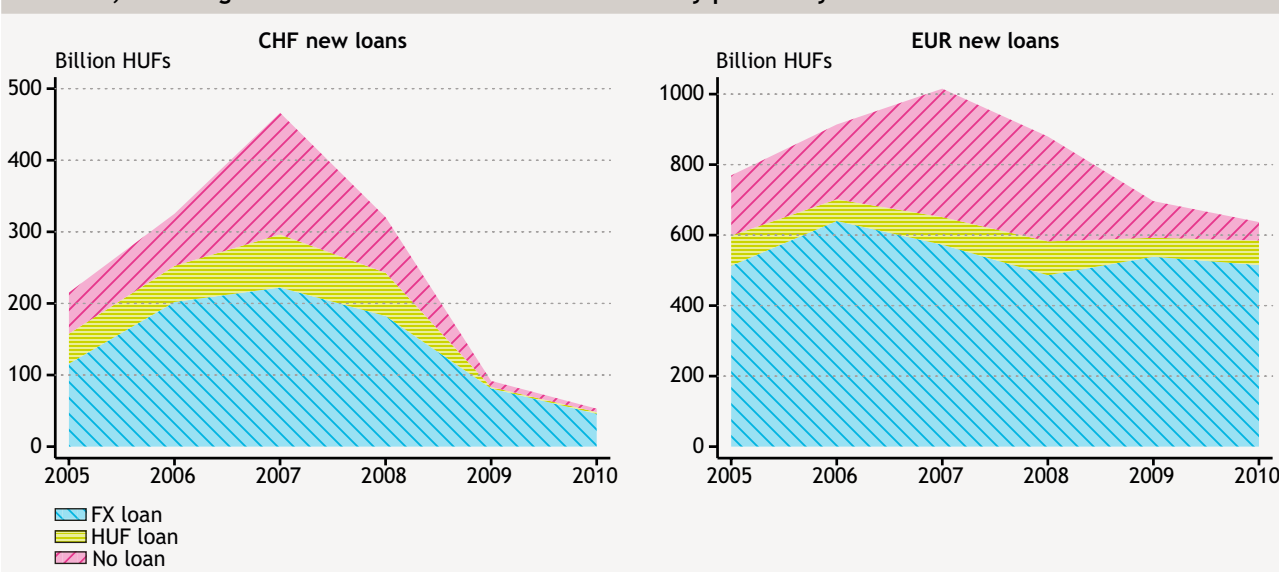
[12] This is attempted by Sóvágó (2011), using bank data.

[13] It is to be noted that because our charts show outstanding debts in forints and at the current exchange rate, their increase partly reflects the effect of the exchange rate. Therefore, we consider it important to mention that the number of loans from abroad also increased.

Chart 8

Domestic, new long-term CHF and EUR loans broken down by foreign trade status

CHF new loans

EUR new loans

- Net export
- Net import
- No trade
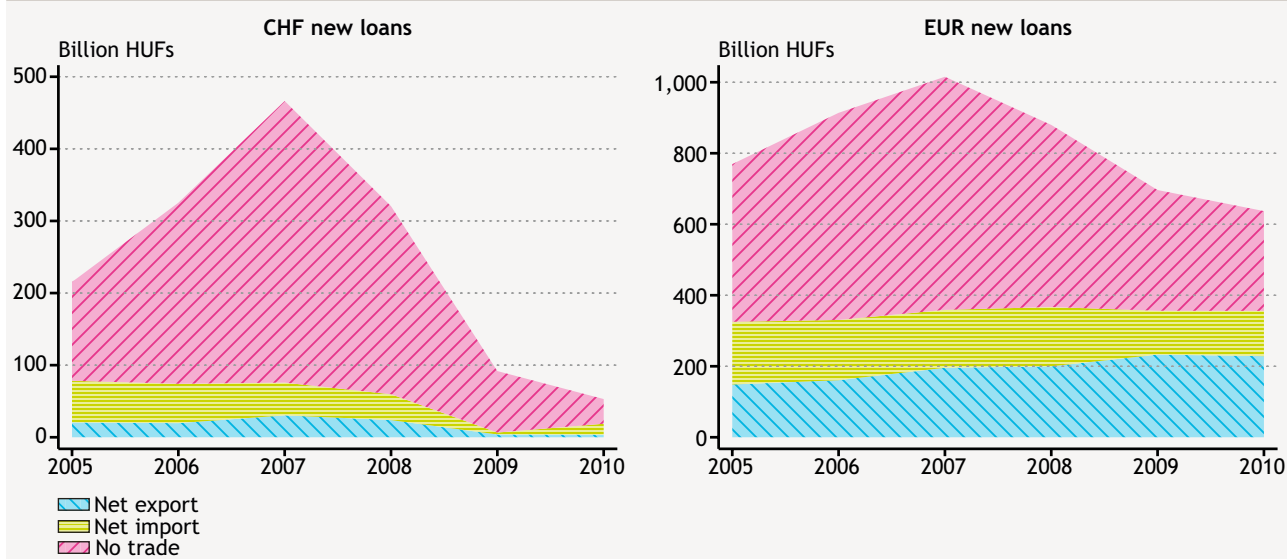
exporters, but also in the case of unhedged FX borrowers. This obvious substitution between the two sources suggests the presence of domestic bank supply factors.

The crisis also entailed a tightening of liquidity constraints. While before the crisis the probability of obtaining access to loans (especially in Swiss francs and euro) was increasing for companies that had not previously had loans, following the crisis these companies almost disappeared from the loan market. Chart 7 shows the long-term domestic FX loan flows, indicating whether the given company had any loans in the previous year, and if yes, what kind of loan.

An examination of FX loan flows according to the foreign trade status reveals that exporters mostly borrowed in euros, i.e. in their case the motive of hedging was stronger. Firms not engaged in foreign trade became indebted in both euros and Swiss francs. However, as a result of the crisis, Swiss franc loans practically disappeared from the loan market, and the proportion of debtors with currency mismatch also declined markedly.

The results of the diff-in-diff estimation also confirm that foreign currency debtors' probability of taking out a loan declined considerably, dropping by some 10-15 per cent in

Chart 9

Change in the probability of borrowing by groups of companies – result of diff-in-diff estimation

FX debt

HUF debt

- 2008 to 2009
- 2008 to 2010
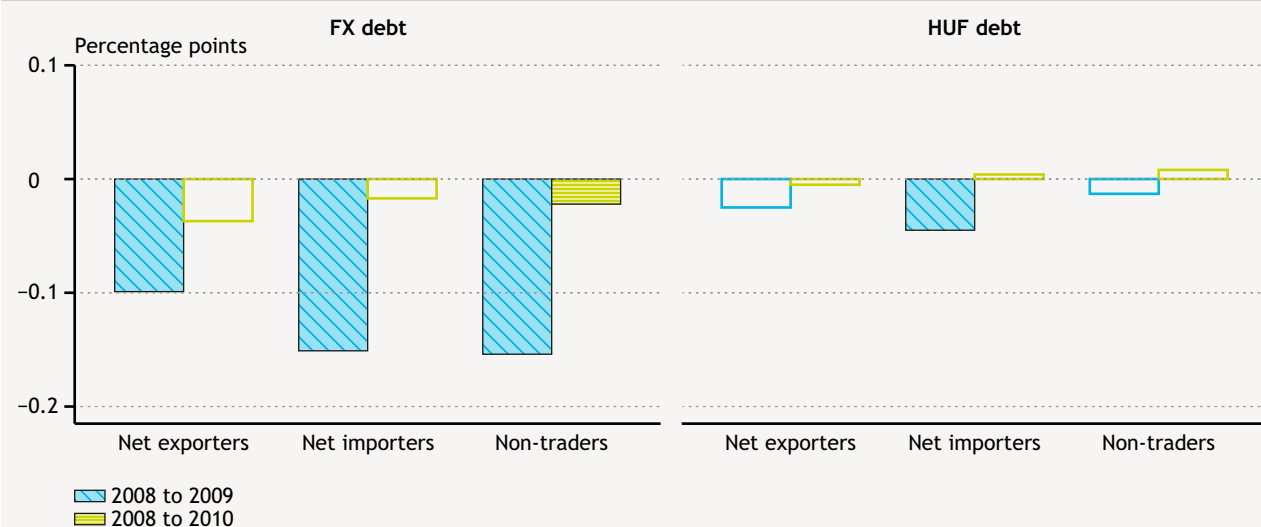
Note: Hollow columns show non–significant results.

Table 2
Change in the macroeconomic weight of firms with currency mismatch

	2007	2011
Domestic loan (CR – Credit register)	59.6%	58.2%
Total loans (CR and BoP)	65.1%	64.6%
Value added	22.8%	19.8%
Investment	28.6%	20.3%

2009. For 2010, the result is significant only in the case of non-trader FX debtors.

CHANGE IN THE WEIGHT OF DEBTORS WITH CURRENCY MISMATCH

As a result of the balance sheet effects and the adjustment, there may even have been a material change in the weight of debtors with currency mismatch following the crisis. The decline is the greatest in the case of investment: their proportion fell from 29 per cent to 20 per cent. At the same time, the changes observed in output and loans outstanding are much smaller. This also means that – depending on the position and resistance of the banking sector – the bank balance sheet channel may continue to play a potentially important role in the case of depreciation.

CONCLUSION

Analyses of micro data show that unhedged foreign currency lending has become significant in the corporate sector as well. The weight of foreign currency debtors that did not have net foreign currency income was significant prior to the crisis: they accounted for almost 30 per cent of investment, whereas their weight in the loan portfolio was even higher (2/3). While prior to the crisis FX lending most probably mitigated liquidity constraints, during the crisis – as a result of the exchange rate depreciation – the performance of foreign currency debtors was worse in relative terms. There was a greater increase in their probability of default and a stronger fall in their investment, while their access to the loan market also deteriorated. These stylised facts suggest that strong balance sheet effects were felt in the corporate sector as well during the crisis. As a result of the balance sheet effects and the adjustment, their weight somewhat declined by 2011, but it can still be considered significant.

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Péter Gábriel and Gergő Motyovszky: Possible impacts of the financial crisis on potential output

In a normal economic cycle, monetary policy decisions are not influenced directly by the size of potential output. In making their decisions, central banks take into account the difference between potential and actual output, i.e. the size of the output gap, which shows the cyclical position of the economy and is one of the main determinants of inflationary pressure. The underlying observation is that monetary policy is unable to influence the trend of potential growth, and it is rather only able to smooth cyclical fluctuations in aggregate demand. At the same time, in the case of a major and persistent economic downturn, when it is possible that permanently falling demand reduces the supply potential as well, by influencing demand and the length of the crisis, a more expansive monetary policy may have an indirect impact on the supply side as well, and may mitigate the damage to potential output. In order to maintain price stability and support recovery from the crisis, it is of key importance for monetary policy to know the size of the output gap and the expected path of potential output.

Following the outbreak of the crisis, the output of most economies declined considerably. The recovery is slow and fragile, and the trend of expansion to be followed by economies after the crisis subsides is uncertain. This study describes the channels through which the financial crisis may have affected potential output and outlines some possible scenarios in connection with longer-term developments in potential output.

INTRODUCTION

As a result of the financial and economic crisis that began in 2008, the majority of the countries in the developed world have suffered the most severe recession since the Great Depression of the 1930s. Recovery from the crisis has been slow, and the output of several economies has not even reached its pre-crisis level. Expansive demand-side economic policy has done a lot to reduce the magnitude of the recession, but the crisis is still very protracted. According to some opinions, the sluggishness of the recovery is attributable to the exceptional strength and size of the financial crisis as well as the insufficiency of economic policy responses. At the same time, many argue that the low growth rate has become persistent not only as a consequence of the decline in demand, which was believed to be temporary, but also because the trend of economic output has also shifted downwards considerably as compared to its pre-crisis level. Moreover, the potential growth rate may also have declined permanently.

Changes in the trend of output are of great importance in terms of monetary policy as well. If potential output has really declined, the size of oversupply in the economy and thus disinflationary pressure as well may be significantly lower than previously thought by central banks. This would also explain why the decline in inflation was not greater and more permanent in parallel with the deep recession and the slow recovery. If the output gap closes, inflationary pressure may strengthen even while growth is weak, and this influences how long the loose monetary policy can be maintained without jeopardising price stability.

At the same time, monetary policy must also take into account that in the case of a major economic downturn the trend of economic output is not necessarily independent of developments in demand. If the length of the recession and the fall in demand also significantly affect potential output, stimulation of aggregate demand by monetary policy may moderate the permanent downswing on the supply side. Accordingly, in the case of a major economic downturn,

monetary policy may have an indirect impact on the supply side of the economy as well. Therefore, it is also important for central banks to map out the extent to which the decline and flattening in the trend of output observed during the crisis are attributable to the fall in demand or to other factors. If demand side factors dominate, it may be worthwhile to consider intensifying monetary easing (even temporarily allowing relatively high inflation), as an upswing in demand may prevent potential output from becoming permanently damaged (Thoma, 2012). If the decline in potential output is mainly attributable to a permanent, structural change in the economy, a similar step would only generate inflation and would have less of an impact on potential output. Longer-term inflation risks may also increase if the damage to potential output was caused by temporary factors. If inflation expectations are not adequately anchored, temporary toleration of higher inflation may cause problems over the longer terms as well.

Based on the above, the size of and expected changes in potential output are of key importance in terms of monetary policy as well. However, potential output cannot be observed directly; it can only be estimated indirectly, on the basis of various theoretical considerations, and its forecasting is also very uncertain. The objective of this study is to discuss the possible effects of the crisis on the production capacities of the economy and the permanence of these effects. For this, the various definitions of potential output are first clarified, and then the possible channels of the impact of the crisis are presented in detail. This study focuses on the debate on the developments in potential output in developed countries (mainly in the United States) and its monetary policy relevance, but may provide lessons for Hungarian monetary policy as well.

VARIOUS CONCEPTS OF POTENTIAL OUTPUT

There are various definitions of potential output, which may even cover significantly different concepts. The common feature of all definitions, however, is that they attempt to capture the supply side of the economy under the title 'potential output'. Accordingly, it can be interpreted as some kind of production capacity of the economy. By contrast, actually measured GDP is also influenced by the aggregate demand present in the economy. Aggregate demand always equals aggregate supply, but the *utilisation* of supply capacities may be different from 'normal', and the

goal is to capture this latter aspect under the term 'potential output'. The difference between actual and potential output, the so-called output gap is the difference between supply capacities attainable in the case of current demand and normal utilisation, and it is an important indicator of the cyclical position of the economy. The above, rather general definition of potential output can be interpreted in several ways. The difference between the various approaches typically lies in what they mean by 'normal' capacity utilisation. The various approaches may result in considerable numerical differences as well in the estimation of both potential output and the output gap.

The most important objective of monetary policy is the maintenance of price stability. Therefore, for central banks measuring potential output and the output gap is mainly important in terms of measuring and forecasting inflationary pressure. The production capacities available in the economy are typically defined in a narrower sense by central banks, as they only take account of the capacities that can start production already in the near term. Moreover, they define potential output as output in the case of 'normal' utilisation, i.e. the level of production capacity utilisation which can be sustained over the long term. The difference between potential output defined as above and actual output can be explained well by fluctuations in aggregate demand and is one of the main determinants of inflationary pressure. In this approach, potential output may also be defined as the level of GDP that can be achieved and maintained using the production factors available in the economy without creating inflationary pressure (ECB, 2011).[1]

In another approach, potential output means the long-term trend of GDP. This is determined by structural factors in the economy, such as technological progress, the rate of population growth, the institutional system of the economy (protection of private property and contracts, educational system, market regulations, predictable economic policy), and the structural policies that change these factors, and by the structural characteristics and rigidities of the various markets (ECB, 2011). The majority of these factors only change slowly over time, and therefore the trend calculated based on them also only changes slowly. Actual output may be significantly different from potential output defined as above for a longer period as well. This approach can mainly provide useful information for economic policy questions, answers to which require a longer-term forecast

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[1] It is important to emphasise here that this does not mean the output achievable in the case of the 'maximum' utilisation of production capacities in the literal sense. It is conceivable that if demand increases suddenly, the economy is *physically* able to reach this level of output, but only in parallel with generating higher inflationary pressure (Okun, 1962). This status, however, is not sustainable, as the adjustment of prices will eventually reduce demand as well (unless inflationary pressure is maintained by further demand shocks). Accordingly, 'normal' utilisation of supply capacities is identical to the lack of inflationary pressure.

of GDP (which may even exceed a period of ten years). This includes the issue of the sustainability of government debt, in respect of which GDP developments constitute one of the most important factors.

Box 1

Definition of the output gap according to a New Keynesian approach

In terms of developments in inflation, a shorter-term concept of potential output is also considered relevant by the New Keynesian school. In this model framework, the deviation of actual GDP from potential output is allowed by the stickiness of prices. If prices do not adjust themselves perfectly flexibly, following a shock, aggregate demand will not always be equal to the supply capacities (under normal utilisation conditions). If price adjustment is slow, companies' capacities may be temporarily over- or underutilised, if demand requires so. In this case, potential output can also be defined as the so-called *natural* level of output that would exist in the absence of nominal rigidities and the presence of perfectly flexible prices (Clarida et al., 1999). In this case, the output gap can be interpreted as the difference between actual ('sticky-price') output and natural/potential ('flexible-price') output. This *does not* equal the deviation of actual GDP from its long-term trend, which sets in not only in the absence of nominal rigidities, but also in the absence of shocks, in the so-called *steady state*.

This last conclusion is worth emphasising. The deviation of actual output from its long-term trend (the steady state) can be divided into two parts. One of these is the deviation of natural output from the shock-free steady state, i.e. from the trend. This shows to what extent the normal production capacities deviate from their long-term equilibrium values as a result of the shocks to the supply side of the economy. The other part is the difference between actual GDP under nominal rigidities and the natural output that sets in in their absence; accordingly, this difference can be interpreted as the deviation of actual demand from normal supply capacities. This latter difference stems from the fact that prices cannot adjust perfectly flexibly.

If the concept of 'short-term' potential output is used, the output gap can be interpreted as the second part of the above breakdown. If the concept of 'long-term' potential output that occurs in the steady state is used, the output gap can be interpreted as the *sum* of the first and second parts, and shows not only the size of excess demand or excess supply, but also the temporary impact of the shocks on production capacities. The short-term concept may be very volatile as a result of shocks, whereas the long-term potential output is less volatile, as it shows the level of output in a state without shocks.

Prior to the crisis, the growth of developed economies followed a rather stable trend, and potential outputs (as well as the output gap) quantified on the basis of the two types of approaches were also close to one another. In the crisis period, however, there was a considerable difference between the two approaches. The potential output calculated on the basis of the first approach followed the change in actual output faster, while the trend quantified on the basis of the second approach remained more stable.

Box 2

Output gap estimates for the US economy

The two types of approaches have also led to a significant difference in the estimation of the US potential output. Phillips curve-based measures (proposed by Laubach and Williams [2003]) show a significantly lower potential output and, accordingly, a negative output gap which is smaller and closes earlier during the crisis than the production function-based measures of the Congressional Budget Office (CBO) (Weidner and Williams, 2012). While the CBO indicates approximately 1 percentage point lower but positive potential growth, according to the method proposed by Laubach and Williams, potential output declined in 2009. Accordingly, as opposed to the

CBO's output gap lasting for 10 years and standing above 5 per cent for a long time, this method points to the gap closing in 2012 and 2013 (Chart 1). The estimation method based on the Phillips curve (inflationary pressure) can probably better capture short-term potential output, which is relevant for monetary policy, as compared to the CBO's production function-based estimate, which assumes a much smoother trend and can rather be identified as output that can be sustained over the longer term (which is relevant, for example, in terms of the sustainability of government debt).

Chart 1
Estimate for the output gap of the US economy
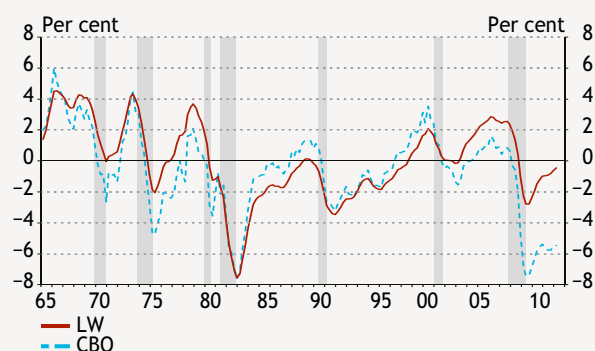
Note: The estimates shown in the chart used a 2012 Q1 information base.

IMPACT OF THE FINANCIAL CRISIS ON POTENTIAL OUTPUT

The financial crisis and recession that started in 2008 can be interpreted as a very serious negative demand shock, as economic agents suffered a significant loss of wealth with the bursting of the asset price bubble and were compelled to spend a greater part of their income on debt repayment. As a result, a significant amount of demand disappeared from the economy. The decline in demand proved to be permanent, which is in line with the observation that after financial crises the reduction of debt is a protracted process and recovery takes longer (Reinhart and Rogoff, 2009). At the same time, most of the developed countries were characterised by a build-up of imbalances prior to the crisis. Therefore, presumably it would not have been possible to maintain their growth within the pre-crisis structure over the longer term. Reallocation across economic sectors is a time-consuming process, and may affect the developments in potential output over the short and long run as well.[2]

At the beginning of the crisis, aggregate demand fell significantly in most economies, inflation declined considerably, and several developed countries faced risks of deflation. In terms of monetary policy, it was clear that significant monetary easing was needed in this economic environment. The main challenge was that merely reducing the base rates would have been insufficient to achieve the necessary easing. The protracted crisis also represents a significant challenge for monetary policy decision-makers.

It is highly probable that as a result of the persistently negative output gap the supply capacities of the economy have also been damaged, meaning that the output gap 'closes from above', i.e. declines in spite of the fact that no material growth in actual GDP is observed. In terms of monetary policy, this issue is extremely important, because if potential output also declined during the crisis, the output gap is smaller than we had previously thought. This would explain why inflation does not decline more strongly, which should happen in the case of a permanently negative output gap. If the output gap closes, inflationary pressure may strengthen even while growth is weak, and this influences how long loose monetary policy can be maintained without jeopardising price stability. It cannot be excluded, however, that the inflation that was observed during the crisis and that was relatively high compared to the fall in demand was a result of other factors, and the output gap continues to be wide and negative. In this case, a looser monetary policy is justified, as premature tightening would break the otherwise weak recovery from the crisis. Tightening of the looser conditions is also undesirable when potential output has declined, but the damage is not yet permanent and can be reversed by accelerating the upswing. However, it is important to emphasise that in this case temporarily high inflation can be tolerated without jeopardising longer-term price stability only if longer-term inflation expectations are adequately anchored.

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[2] The unsustainability of the earlier trend of economic growth may be a consequence of other factors as well, not only of the fact that it was a 'bubble' not justified by the fundamentals. For example, in the case of catching-up economies, with the progress of convergence, growth is expected to slow down from the earlier values. Another reason may be that the labour market is becoming global, which requires very strong adjustment on the part of developed economies in order to preserve their competitiveness.

Box3
Debate on potential output and monetary policy in the United States

The monetary policy relevance of potential output and the main arguments for a smaller or larger output gap can be clearly followed in the debate on the Fed's interest rate policy as well.

According to those who argue for declining potential output (Bullard, 2012; Andolfatto, 2012), the crisis damaged the supply side of the economy as well. In addition, they believe that the output gap, which is smaller than previously thought , is also a consequence of the unsustainability of the earlier observed trend, which only reflected the pre-crisis bubble and not real potential output. Accordingly, the decline in GDP following the bursting of the bubble has to reflect at least partly the return of the trend to the level justified by fundamentals. Therefore, the output gap compared to the pre-crisis trend is inevitably overestimated. For example, this also explains the phenomenon why inflation does not decline to a greater extent, as should occur in the case of a large negative output gap (Ip, 2012).

However, according to the so-called 'saltwater' economists (e.g. Paul Krugman, 2012; Tim Duy, 2012 or Janet Yellen, 2012 [Vice Chair of the Fed]), who typically belong to the New Keynesian school, the protracted crisis is caused by demand side problems stemming from balance sheet adjustment due to the financial crisis. The consumption and investment of economic agents which are repaying their debts decline for a considerable period, but this does not represent an erosion of the supply potential. The lack of stronger disinflation, in turn, is attributable to the firmly anchored inflation expectations and the feed-through of higher energy prices. In this case, the output gap also continues to be very wide and negative, and thus economic policy stimulus must be increased further (Avent, 2012). Further easing is also voted for by those who emphasise that potential output in terms of monetary policy is not completely exogenous, and the stimulation of demand may prevent permanent damage to supply capacities, as well as help to drive potential output back to its long-term trend (Thoma, 2012).[3]

For monetary policy decisions, it is important to have the most accurate possible view of the contribution of permanent and temporary factors to the decline in economic output, i.e. how the path of potential output may change over the longer term. At the same time, the current size and future trend of potential output continue to be surrounded by high uncertainty. First, the impact of the crisis is difficult to measure. Second, economic policy measures also have a material influence on future potential output. Therefore, in connection with longer-term growth prospects most international institutions typically develop several scenarios, which are significantly different from one another.

Not long after the onset of the crisis, the European Commission (2009) outlined three scenarios in connection with longer-term developments in potential output. In the first scenario, although potential output declined during the crisis, this was only a temporary phenomenon, and supply capacities did not suffer permanent damage. With the passing of the crisis, potential output will return to the earlier trend, and thus there is no loss in level over the long term. Compared to the pre-crisis potential growth this requires faster potential growth right after the crisis to offset the effect of the recession on output. In the second scenario, there will be a permanent decline in the level of potential output. Following the decline during the crisis, potential growth will only return to the earlier rate, and thus the shortfall in level will not be compensated: the economy will follow a new trend that is parallel with the earlier one, but at a lower level. In the third scenario, the potential growth rate is also permanently damaged after the crisis, thus leading to increasingly accumulating output losses over the long term compared to the pre-crisis trend.

A detailed overview of the channels through which the financial crisis affects the elements of potential output is presented in the following section. This may provide information on the conditions in which the above outcomes take place with higher probability. For the survey of the

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[3] Although it is not related to the debate on the output gap, it is worth mentioning that *temporarily* higher inflation is popular even among those who believe that the way out of the crisis and the liquidity trap situation which underlines the ineffectiveness of traditional monetary policy is the reduction of real interest rates by raising inflation expectations. In the United States, the Federal Reserve is highly credible, and thus presumably there is insignificant risk that *temporarily* higher inflation will jeopardise long-term price stability via a permanent increase in expectations.

Chart 2

Three possible scenarios for the development of potential output

No permanent loss in the level of output

- - Pre-crisis trend
—— Actual output

Permanent loss in the level of output

- - Pre-crisis trend
—— Actual output
- - Trend after the crisis

Permanently lower growth rate of potential output

- - Pre-crisis trend
—— Actual output
- - Trend after the crisis
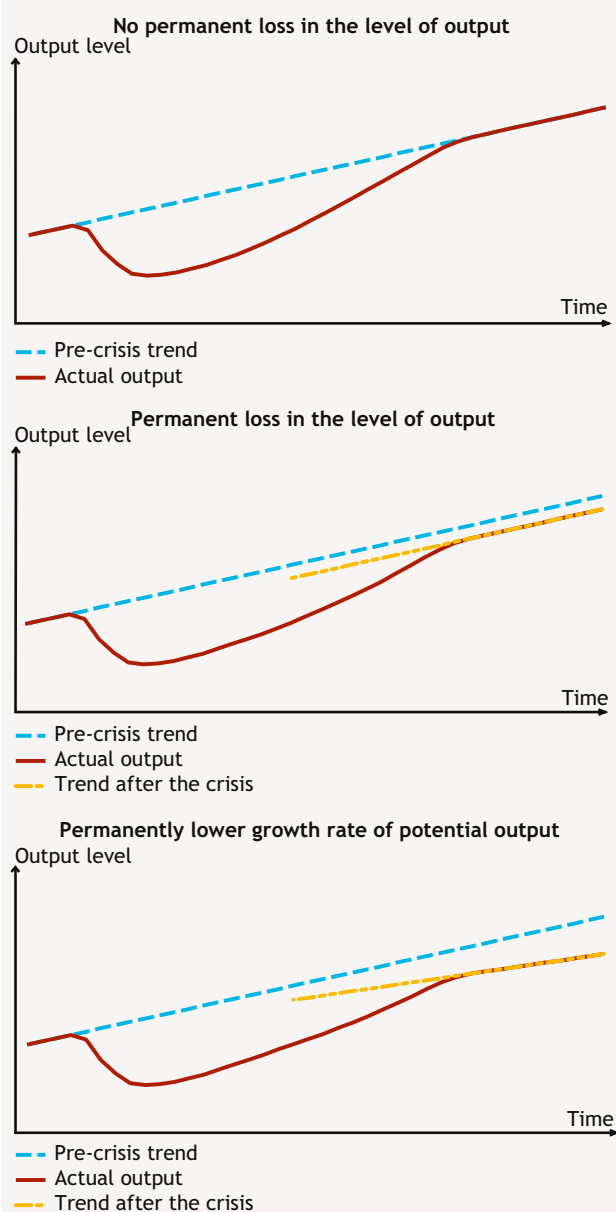
Note: The dashed lines indicate potential output (before and after the crisis), whereas the continuous line shows the current GDP. The difference between the two is the output gap. The level of the curves represents the level of output, whereas their steepness depicts the growth rate of output.
Source: EC, 2009, p. 48.

potential channels we use the production function approach, i.e. we analyse how the crisis may affect longer-term developments in capital, labour and total factor productivity (TFP).

RETURN TO THE PRE-CRISIS TREND

The first and at the same time most favourable outcome is a return to the pre-crisis trend. As a result of the recession

and the unfavourable demand outlook, the decline in investment activity is a natural phenomenon, leading to a slower expansion or perhaps a decline in the capital stock. However, if the unrealised investment is implemented after the passing of the crisis and with an upswing taking place in demand again, a higher investment rate will be observed during a transitional, catch-up period, and thus in terms of the production capacities there will be no permanent difference in the levels compared to the pre-crisis trend. In this scenario, the increase in unemployment is also only a temporary, cyclical phenomenon. It facilitates the return of unemployment to the pre-crisis levels if the recession is relatively short (hysteresis is smaller), the labour market is flexible, and in general there are no significant structural rigidities in the economy, e.g. no economic policy decisions that have a permanently adverse effect on labour market incentives are taken during the crisis.

Overall, the probability of this scenario is higher if the crisis is not too long, the pre-crisis economic structure does not require any major changing, and the reallocation of resources takes place within a relatively short period of time.

PERMANENT DECLINE IN LEVEL

In the second scenario, the trend of potential output declines permanently compared to the trend observed prior to the crisis. Similarly to the first scenario, the decline in demand observed in the crisis hinders investment and decelerates the expansion in capital stock. However, if the crisis is protracted, it may also happen that production capacities – at least partly – adjust to the drop in demand, and thus the decline in the level of the capital stock is permanent. In addition, it is also conceivable that the pre-crisis structure of the economy requires a major transformation. This may result in stronger capital accumulation in certain sectors and industries, while in other sectors a considerable portion of the capital stock may become obsolete. Practically, it is equivalent to the increase in the extent of depreciation and the faster erosion of the capital stock during the crisis (EC, 2009). The expansion in capital stock may remain slow as long as the sectoral reallocation lasts. A good example for this in connection with the crisis of the euro area periphery (typically Spain and Ireland) is the bursting of the bubble observed earlier in construction and the real estate market, as a result of which a considerable portion of the construction capital stock, which is difficult to use in other sectors, became redundant.

Examining the impacts from the labour side, if the recession lasts long enough, long-term structural unemployment may

reach a higher level. One of the underlying reasons is the so-called hysteresis effect (Blanchard and Summers, 1986), according to which the human capital of those who are unemployed for a long time degrades in this period, and some of their skills are lost forever. This reduces their later employability, and as a result they are not able to compete with the employed any longer, so they will not have any material impact on the changes in wages either. A drawn-out recession may have an adverse effect on the activity rate as well. If the unfavourable employment outlook lasts long, it may deter people from entering the labour market, or unsuccessful jobseekers may leave the labour market for this reason *(discouraged worker effect)*. Both effects are particularly strong in the case of disadvantaged, unskilled labour, who may be ousted from the labour market permanently.[4]

The adverse effect on structural unemployment may be stronger in economies with rigid labour market institutions. If the labour market is rigid, labour is less mobile and it is difficult to retrain people, the structural reallocation that becomes necessary because of the crisis can take place only slowly, which also results in a steady increase in unemployment (Basanini and Duval, 2009). Economic policy measures may also affect longer-term developments in employment. During recession it is easily conceivable that as a crisis management measure the government extends or increases the unemployment benefit, but it may also occur that it burdens labour with higher taxes in order to restore the fiscal balance (EC, 2009). A permanent decline in employment may also occur if the government makes it easier to leave the labour market, for example by supporting early retirement. Prior to the crisis, immigration contributed considerably to the expansion of the workforce and economic output in several developed economies. The protracted economic downturn may slow this process as well (EC, 2009).[5]

Overall, the probability of a permanent decline in the trend of potential output increases with the protraction of the crisis or if significant restructuring is needed in the economy compared to the pre-crisis status, which may lead to the depreciation of the capital stock and a steady increase in unemployment. Rigidities in the economy or economic policy measures may also add to the probability of a permanent decline.

LONG-TERM DECLINE IN POTENTIAL GROWTH

In the third and at the same time least favourable scenario even the rate of potential growth suffers permanent damage, leading to a widening gap between the level of potential output and the pre-crisis *trend*. It is important to emphasise that the flattening of potential output may also result from several processes which require significantly different economic policy responses. Recession and financial crisis may damage the longer-term growth potential as well, but it is also conceivable that the earlier trend only represented a bubble, and thus the decline or flattening in the trend is partly a consequence of the bursting of the bubble, and in this sense we do not speak about a decline in potential growth, but about a return to the 'real' potential justified by fundamentals. Accordingly, if the level and growth rate of potential output were previously overestimated, after the current decline in GDP no return to the earlier trend and growth rate can be expected, and the leeway for economic policy responses is also smaller.[6]

At the same time, the financial crisis may restrain growth in potential output even beyond the correction of the earlier excessive growth rate. Increasing risk aversion, growing uncertainty and a resulting tightening of lending conditions as well as a steady increase in risk premiums can be expected after more severe financial crises. All of this adds to the user costs, which may affect the investment rate, and thus the capital stock expands only slowly for a longer period of time, restraining the rate of potential growth. In addition to the increase in user cost, higher uncertainty also discourages investment, as it is more worth to postpone it (Pindyck, 1991).

The typical result of a protracted bank crisis and increasing uncertainty is that the financial intermediary system is less able to allocate the resources available in the economy in a manner which ensures their most efficient use. The underlying reason for this phenomenon is that, along with the increase in user costs and interest rates, asymmetrical information problems (selection of the nonviable companies and moral hazard) grow in financial intermediation, which may thus result in a failure of otherwise desirable transactions, making capital allocation less efficient

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[4] The crisis may have a positive effect as well on the activity rate – although presumably this is not typical – if the decline in households' income encourages the earlier inactive members as well to start working *(encouraged worker effect)* (Furceri and Mourougane, 2012).

[5] Immigration is likely to slow down only if the economic outlook of the given country deteriorates *relative to* the neighbouring countries. Otherwise, migration may even increase.

[6] The improbability of returning to the earlier trend can be explained not only with the bubble that built up in the pre-crisis years (see Footnote 3).

(Mishkin, 2004, p. 622). This loss of efficiency also has an adverse effect on potential growth.

Of the factors of production, capital accumulation and total factor productivity (TFP) are the ones where the above effects that restrain potential growth primarily appear. Due to the aforementioned tighter lending environment and balance sheet adjustment following the crisis, investment in research and development may decline considerably, affecting innovation and thus technological progress as well. R&D investment is typically procyclical anyway, and the less favourable financial environment only exacerbates and makes this effect more lasting (Barlevy, 2007). It is also conceivable that the increase in user cost has a greater negative impact on more innovative sectors, where productivity expansion typically used to be faster. Accordingly, resources flow into the sectors where productivity expansion is relatively slower, which also affects TFP growth (EC, 2009).[7]
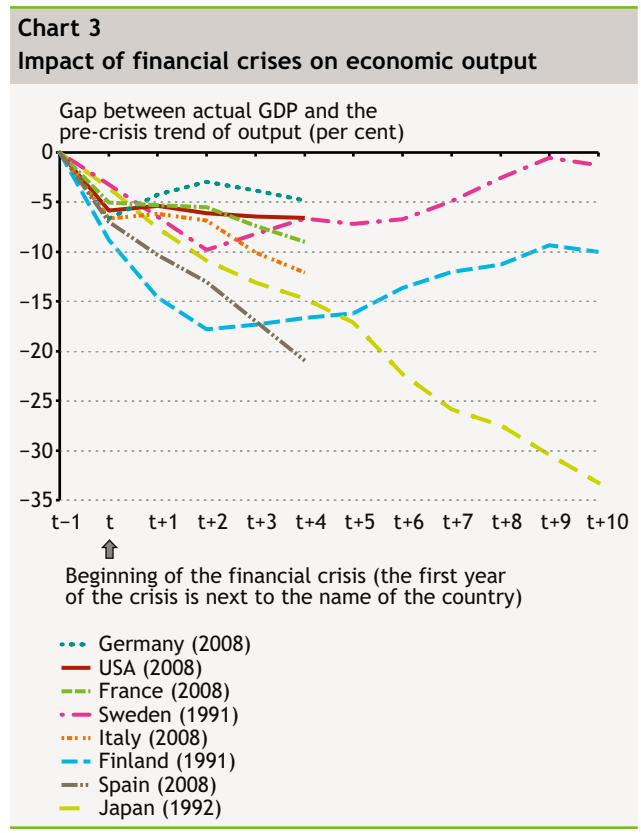
Developments in longer-term potential growth may significantly be influenced not only by the financial crisis, but also by the economic policy responses to the crisis. Some fiscal tools stimulating economic activity (for example investment in infrastructure) may be beneficial to potential output, and it is also possible that some governments launch structural reforms that have long since been desirable due to the compulsion arising as a result of the financial crisis. On the other hand, as a result of the fiscal expansion during the crisis, the weight of the government sector in the economy may permanently increase, and government debt may start to follow a rising trend; these factors have a negative impact on long-term growth.

WHICH SCENARIO MAY TAKE PLACE?

Past financial crises provide examples for each scenario. Of the crises of the 1990s, it is worth comparing the Swedish, Finnish and Japanese experiences. Each crisis was preceded by financial liberalisation, which led to credit and asset price bubbles, followed by a financial crisis and a significant economic downturn. At the same time, the longer-term effect of the crisis on economic growth varied considerably in the case of the three countries. The management of the Swedish banking crisis has been considered exemplary ever since, because they managed to clean banks' balance sheets relatively fast. In addition, considerable progress was achieved in the fields of fiscal and monetary policies as

well (e.g. the introduction of inflation targeting), and thus the Swedish economy did not suffer any permanent loss compared to the pre-crisis trend. In the Finnish economy, financial liberalisation resulted in a problem similar to the one observed in Sweden, while the economic downturn was further deepened by the loss of eastern markets. The economic downturn resulted in a significant increase in unemployment, and a great number of those who lost their jobs were permanently excluded from the labour market. As a result of the increase in permanent unemployment, Finland was unable to reach the pre-crisis growth path even after a decade. The period following the financial crisis in Japan is an example for the third scenario. The steady decline in the potential growth rate of the Japanese economy is primarily attributed to the incorrect economic policy responses. Neither the banking sector nor the corporate sector was interested in writing off the losses, which led to a permanent deterioration in the efficiency of the financial intermediary system and a decline in the potential growth rate.

Although all three scenarios are possible on the basis of earlier experiences, empirical studies examining the many

Chart 3
Impact of financial crises on economic output

Gap between actual GDP and the pre-crisis trend of output (per cent)

Beginning of the financial crisis (the first year of the crisis is next to the name of the country)

- Germany (2008)
- USA (2008)
- France (2008)
- Sweden (1991)
- Italy (2008)
- Finland (1991)
- Spain (2008)
- Japan (1992)

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[7] Recession may restrain TFP growth via various channels, but may have positive consequences as well; thus the net effect is ambiguous. An economic downturn has a 'cleansing' effect, in so far as the least productive companies are driven out of the market (Caballero and Hammour, 1994). In addition, during crises, companies may pay more attention to more efficient utilisation of existing capacities and cost reduction, which may also add to productivity (Aghion and Saint-Paul, 1993).

crisis episodes (Furceri and Mourougane, 2012; Abidad et al., 2009 and Barell et al., 2010) have found that following financial crises the supply potential typically remains below the pre-crisis trend even over the longer term. It is a less robust consequence, but according to some studies the rate of potential growth also decelerates after a financial crisis (e.g. Benati, 2012). Comparing the developments in the current crisis with earlier crisis experiences, we can also say that for the time being no pattern that would clearly support one scenario or another has emerged yet. The interaction of the economic and bank crises as well as the sovereign debt crisis considerably reduces the probability of the most favourable outcome in several countries. Furthermore, it is important to emphasise that – in contrast with the earlier cases – the current crisis is much more global, making favourable outcomes even less likely. In more developed countries, the economy stimulating steps of fiscal and monetary policies have so far significantly reduced the size of economic downturn. However, avoiding the worst scenario requires the introduction of structural policies that treat the structural rigidities of the economy and stimulate TFP growth and innovation (EC, 2009).

SUMMARY

With the protraction of the financial and economic crisis, it is becoming increasingly probable that the supply potential of the affected economies will also be damaged. For this reason, the output gap may close 'from above' (with a fall in potential GDP), the disinflationary effect may decline even in parallel with weak demand, and this influences how long the loose monetary policy can be maintained without jeopardising price stability. At the same time, in the case of a major economic downturn, the trend of economic output is not necessarily independent of monetary policy steps. If the protraction of recession and the fall in demand also affect potential output significantly, the stimulation of aggregate demand by monetary policy may moderate the permanent downswing on the supply side.

In view of the above, it is an important question for central banks as to how the longer-term trend of economic output has changed during the crisis and what the underlying factors may be. However, longer-term developments in economic output are difficult to predict in the current uncertain environment, and therefore most international institutions prefer to use various scenarios. Which scenario will eventually take place in individual economies depends on a number of factors. It depends on the extent to which the pre-crisis economic structure must change, how flexibly the economy can adjust to the changed environment and, last but not least, on the economic policy responses. Within the realm of economic policy responses, demand stimulating

measures may mitigate the decline in output and the degradation of capacities, but the structural, supply side measures aimed at easing the resource reallocation necessary due to the changed economic environment and at supporting investment and innovation are at least of the same importance.

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

Our article discusses the 2012 European Union regulation on naked CDS positions[1] and its effects on CDS market developments in Central and Eastern European EU Member States. Although following the adoption of the regulation in March, an adjustment period of nearly seven months was available until it became effective, in the emerging European markets a considerable proportion of actors reacted to the changes only relatively late, in the first half of October. The concentrated closing of short CDS positions within a short period of time significantly reduced the CDS spreads of the countries in the region. We examined this direct effect and found that as a result of the regulation itself, both the average regional and the Hungarian CDS spread shifted 50 basis points downwards, with the resulting difference proving to be permanent. This shift makes the comparison of CDS spreads more difficult both in cross-sectional and in time series terms. At the same time, we are of the opinion that the dynamics of CDS spreads may provide good guidance regarding the shifts in individual countries' risk perception even after the regulation came into force on 1 November.

INTRODUCTION

In the past decade, credit default swaps (CDS) have become extremely popular among market participants. The essence of these transactions, which can be used for risk management, hedging and speculative purposes, is that the issuer of the CDS provides insurance against the default of the issuer of a debt security for a specific, regular fee. The fee paid by the buyer of the CDS is called the CDS spread. As the developments in CDS spreads follow the probability of default of the issuer (companies, states) of the insured product, the spread has become one of the most important indicators of risk assessment in recent years.

During the crisis that broke out in 2007, several EU Member States introduced restrictions on short positions,[2] as it occurred that in extreme situations speculative use of assets may exacerbate market panic, and by increasing financing costs it may in itself add to the probability of default. In March 2012, the European Council decided to introduce a community-level regulation to harmonise individual countries' similar legislation. Prior to the entry into force of the regulation in November 2012, intensive restructuring took place in the volume and spread indicators of the CDS market, suggesting that the regulation itself may have had an impact on the spreads. As this shift cannot be interpreted as a real change in risk assessment, in the article it is referred to as the 'technical effect'.

First, our article provides a brief overview of the most important details of the regulation, followed by a presentation of its impact on the developments in regional CDS spreads and market activity. After this, simple econometric methods are used to estimate to what extent the regulation – *ceteris paribus* – influenced spreads. This is followed by the discussion of some dilemmas related to the regulation, and finally we draw the conclusions.

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[1] European Council: Regulation (EU) No 236/2012 of the European Parliament and of the Council of 14 March 2012 on short selling and certain aspects of credit default swaps: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:086:0001:0024:en:PDF.

[2] A market player holds a short position regarding a financial asset if the value of his position increases if the asset depreciates. For example, the CDS is suitable for building a short position that is profitable in the case of a fall in the prices of an issuer's bonds.

DETAILS OF THE REGULATION

General observations on the EU regulation on short selling and credit default swaps (CDS)

During the financial crisis that developed after September 2008 and the financial market turbulence which strengthened again as a result of the debt problems of the euro area, EU Member States introduced various measures to restrict short securities transactions. In 2010, European decision-makers began to agree on the need to create a single, community-level regulatory framework dealing with short sales. The primary objective of the harmonisation effort was to make the varying regulatory solutions in the different Member States efficient, to increase transparency in relation to holding short positions in certain securities and to facilitate coordination among Member States, whilst also allowing Member States to act in unison regarding the measures to be introduced in the case of exceptional circumstances that may occur in the future.

In addition to the regulation related to short securities transactions (limiting short equities transactions and government securities transactions, notification obligation concerning net short positions), the Council Regulation announced on 24 March 2012 and the Commission regulations setting forth the technical details also institute a prohibition on taking uncovered CDS positions.

On the regulation of uncovered CDS transactions

Our analysis is focused on the part of the EU regulation that concerns CDS transactions and on its effect; therefore, the rules created in connection with the CDS positions are described in more detail. The regulation basically prohibits the taking of uncovered sovereign CDS positions, i.e. cases when opening a CDS position does not occur for the purpose of hedging a natural long position held vis-à-vis the underlying entity. The prohibition applies to CDS transactions concluded after 25 March 2012, i.e. following the entry into force of the Council Regulation. Existing transactions qualifying as uncovered pursuant to the spirit of the Regulation may be maintained until expiry of the relevant contracts. However, pursuant to the regulation of the European Commission, the Regulation only entered into effect as of 1 November 2012, meaning that market participants had a nearly 7-month grace period to adjust to the rules. The prohibition on taking uncovered positions applies to each CDS referencing EU Member States or supranational organisations as well as the CDS index concerning sovereigns, irrespective of the location of concluding the CDS transaction and the residence of the natural person or legal entity that concludes the transaction.

However, pursuant to the Regulation, the hedging of exposures to certain types of assets and liabilities by sovereign CDS purchases is not considered as taking uncovered CDS positions. This pertains to corporate exposures where the success of the activity of a company depends directly or indirectly on the EU sovereign or a group of sovereigns. In the case of indirect exposure (for example, a company invests in government securities of another Member State), a close correlation between the value of the assets of the company and the price of the government security must be proven by a correlation test. If a strong correlation exists, the exposure to the company can be covered with the CDS referencing the issuer of the government security held by the company. Direct corporate exposure arises, for example, when the majority owner of the company is an EU Member State. In this case, upon purchasing the CDS used for hedging the exposure to the company, the Regulation considers a strong correlation to automatically exist.
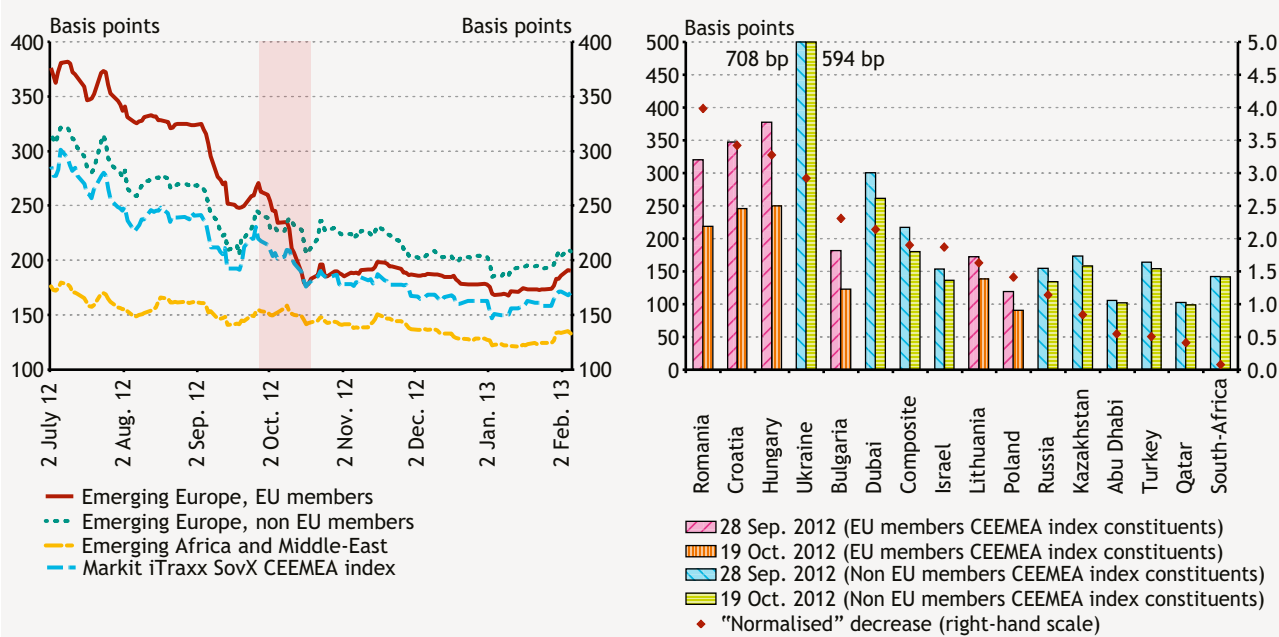
The Regulation also clarifies the issue of proportionality between the asset/liability intended to be hedged and the CDS as means of hedging. Regarding duration, the governing rule is that, also taking account of market conventions and liquidity conditions, the duration of the hedged asset and that of the CDS should be as close to one another as possible. In practice, this means that a 10-year sovereign government security can be hedged by the rolling of a CDS with a maturity of 5 years, and in parallel with that a market participant may also hedge a 2-year government security with a 5-year CDS, provided that he also closes the CDS position upon the maturity or sale of the government security. With regard to the sizes of positions, the Regulation distinguishes between static hedging to be applied in the case of direct exposures related to government securities and dynamic hedging used in the case of indirect exposures. In the former case, the nominal value of the CDS position may not exceed the nominal value of the asset to be hedged, whereas in the latter case not only the duration, but the sensitivity of the given asset must also be taken into account upon comparison of the positions.

IMPACT OF THE CDS REGULATION ON CDS SPREADS IN THE REGION

The EU regulation prohibiting uncovered CDS positions had a major impact on both market spreads and volumes. Although the grace period for closing the uncovered transactions could have allowed a smooth transition, analysis of CDS market data suggests that a portion of the closures was concentrated in the first half of October, i.e. close to the date of the Regulation becoming effective (1 November 2012). As a result, Central and Eastern European

Chart 1

Changes in spreads in the three country groups of the CEEMEA region (left panel) and in the countries monitored in the CEEMEA index (right panel)

Emerging Europe, EU members
Emerging Europe, non EU members
Emerging Africa and Middle-East
Markit iTraxx SovX CEEMEA index

28 Sep. 2012 (EU members CEEMEA index constituents)
19 Oct. 2012 (EU members CEEMEA index constituents)
28 Sep. 2012 (Non EU members CEEMEA index constituents)
19 Oct. 2012 (Non EU members CEEMEA index constituents)
"Normalised" decrease (right-hand scale)

spreads deviated spectacularly from the spreads of other regions.

One of the most obvious ways of examining the technical effect on CDS spreads is a comparison of the CDS developments in the EU Member States of the region with the CDS developments in emerging countries that are similar, but not affected by the Regulation. Decomposition according to geographical regions of the changes in Markit's (5-year) CDS index that comprises the countries of the CEEMEA region is a suitable tool for undertaking such a comparison. The three well-distinguishable regions[3] are constituted by units comprising the EU Member States, emerging countries outside the EU but geographically belonging to Europe and the states belonging to the African/Middle Eastern region.

Using the weights included in the index allows the calculation of how the composite spreads of the three regions changed over the recent period. Our analysis focuses on the events of the past three quarters. Overall, market sentiment in the countries of the region was influenced not only by the CDS

regulation, but by several other important events as well. Of them, the EU Summit at end-June 2012, the statements by the President of the ECB that stabilised the markets in the summer, the ECB's September decision on the – conditional – purchase of the government securities of periphery countries and the launch of the Fed's QE3 programme in September also deserved special attention. All of these events resulted in a fundamental improvement in global investor sentiment, and through that in the assessment of emerging regions. Looking at the developments in CDS spreads, the immediate effect of the above favourable events was perceived until mid-September, followed by some stagnation. Until that period, the spreads of the three country groups of the CEEMEA region followed practically the same dynamics, adjusted for sensitivity to market shocks (left panel of Chart 1).

In the first three weeks of October, however, remarkably different trends were observed: while the spread of the EU Member States included in the composite index fell sharply, the average spread of the other two country groups only tended to stagnate or the decline was much less significant.

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[3] Grouping of the countries monitored in the Markit iTraxx SovX CEEMEA composite index: **European Union:** Bulgaria, Poland, Lithuania, Hungary, Romania, Croatia (In our survey we saw that – presumably because of its forthcoming EU membership – the behaviour of Croatia was similar to that of the other EU Member States, so it was classified into this group of countries in our analysis. However, due to the low weight of the country, this does not have any material effect on our findings.); **Emerging Europe:** Kazakhstan, Russia, Turkey; **Emerging Africa:** Abu Dhabi, South Africa, Dubai, Israel, Qatar.

In fact, analysts started to focus on this phenomenon as of mid-October, when several major institutions[4] published detailed analyses, calling attention to the fact that the – disproportionately large – decline in the spreads of the EU Member States of the region was presumably related to the closing of open uncovered CDS positions. After the Regulation became 'live' on 1 November, the developments in the three groups of countries were more characterised by co-movement again. All this meant that the average spread of EU countries remained permanently below the level of other emerging European countries.

It is worth examining the changes in the aforementioned period at the level of individual countries as well. The right side of Chart 1 depicts the decline in the spreads of the countries included in the CEEMEA composite index in the first half of October, presenting the shift in absolute levels and 'normalised' as well.[5] The application of the latter allows the exclusion of the distorting effect that countries with higher nominal spreads respond to one unit of shock with a larger price change.[6] It is clearly visible from the chart that EU Member States significantly overperformed in the period under review. The greatest relative declines in spreads were observed in Romania, Croatia and Hungary; in these countries the decline in spreads was 3.5–4 times greater than the average two-week decline.
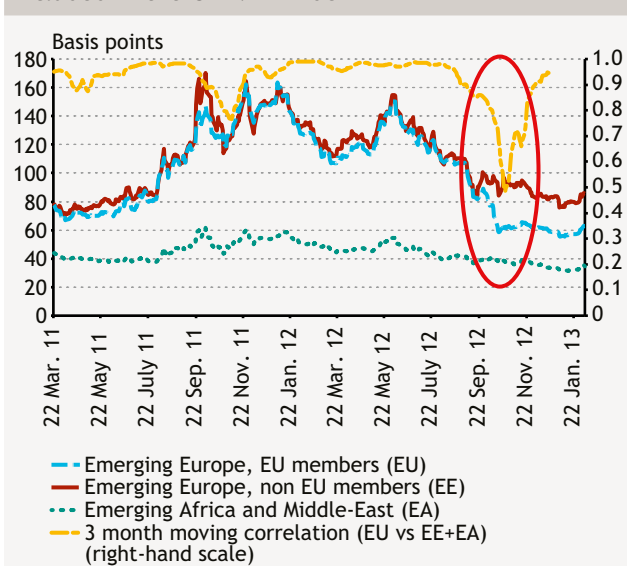
The question arises as to whether the considerable decline in spreads in the EU Member States of the region was related merely to the crisis management of the euro area. It is conceivable that the improving assessment of the monetary union mostly concerns the EU Member States in the CEEMEA region. However, this is contrary to the fact that the deviations experienced across spreads evolved only as of early October, i.e. well after the announcement of the critical measures in the summer and at the beginning of September. This is well illustrated by the rapid fall in the correlation coefficient between the composite spreads of EU Member States and the other two country groups (Chart 2). Apparently, both the size and the continuity of the decline in the coefficient were unprecedented in the previous two years. After hitting bottom in mid-October, the correlation started to strengthen again, and by end-2012, when the critical period was not included in the moving time interval any longer, the correlation coefficient returned to its earlier high level.

Chart 2
Correlation of the CDS-spreads of the country groups included in the CEEMEA index

- – – Emerging Europe, EU members (EU)
- —— Emerging Europe, non EU members (EE)
- ···· Emerging Africa and Middle-East (EA)
- – – 3 month moving correlation (EU vs EE+EA) (right-hand scale)

IMPACT OF THE CDS REGULATION ON MARKET VOLUMES

The EU regulation may have had an impact on the decline in spreads observed in the first half of October through two channels simultaneously. Firstly, as a result of the sudden oversupply, the mass, forced termination of positions may have had a price reducing effect. Secondly, merely the expectation that the loss of a portion of the demand for CDS transactions would result in a permanently lower demand for the product may have prompted market makers to adjust their quotations downwards. The contributions of the two channels to the decline in spreads may have varied across Member States. The quantitative effect may have primarily been stronger in the countries that have an active and significant market, where the narrowing of the CDS spread may have been triggered by an activity with a higher than usual volume, aiming at the termination of positions.

It is worth examining the impact of the EU regulation on the quantitative indicators of the European CDS market on the basis of the data of the Depository Trust and Clearing Corporation (DTCC).

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[4] Of the analysts followed by us, Barclays was the first to deal with the subject in detail, when it published its relevant paper on 19 October (Barclays, 2012). However, within a short time J.P. Morgan, Credit Suisse and Commerzbank also published similar analyses (J. P. Morgan, 2012; Credit Suisse, 2012; Commerzbank, 2012).

[5] The 'normalised' decline was calculated by taking the ratio of the decline in spreads between 28 September and 19 October 2012 to the two-week average (absolute) change experienced in the first three quarters of 2012. Demonstrating it on the example of Hungary it means that the value of 3.27 shown in the chart is the quotient of the 128 basis point decline that took place during the period under review and the average two-week change of 48 basis points.

[6] Kocsis and Nagy (2011).

Box 1

Key terms related to the quantitative indicators of the CDS market

The **Depository Trust and Clearing Corporation (DTCC),** a clearing house operating in the United States, has published CDS market aggregate position data on a weekly basis since 2008, where, in addition to the indices, the most detailed information can be accessed regarding the top 1,000 single name entities with the highest turnover.

Gross notional: The sum amount of all outstanding open CDS transactions (calculated at nominal value) concerning a single reference entity.

For example: Participants 'A' and 'B' conclude a CDS transaction regarding sovereign 'S' at a nominal value of USD 5 million through dealer 'D'; where 'A' is the seller in the transaction between 'A' and 'D', and 'B' is the buyer in the transaction between 'B' and 'D'. In this case, the gross notional volume increases by the sum of the two 5-million dollar transactions, i.e. by USD 10 million.

Net notional: The sum amount of net CDS protection (calculated at nominal value) bought by new buyers, regarding a single reference entity. This indicator shows the maximum net flow of money between market participants upon the occurrence of a credit event relating to the particular reference entity specified in the CDS contract. Participants' total net exposure is best captured by the net notional.

For example: In the above example, dealer 'D' concludes transactions in both directions, so his position remains unchanged; the net position of participant 'A' increases with the purchased CDS of USD 5 million, while the net position of participant 'B' changes with the sold CDS of USD 5 million. In this case, the aggregate net notional increases by a total USD 5 million. In the CDS market, end-user participants usually conclude transactions with dealers, who often continue to conclude these transactions among one another, multiplying the number of transactions. Accordingly, the net notional typically amounts to only a fraction of the gross notional.

Market risk transaction activity indicator: This indicator takes into account – in gross terms – the transactions (new trades, termination of an existing transaction, assignment of a leg of an existing CDS contract to a third party) that aim at changing the risk position of the individual participants. The indicator does not include transactions stemming from central counterparty clearing and portfolio compression or maturing transactions, as the first two do not change participants' risk positions, whereas maturity is not an active market event.

For example: If in the above example participant 'A' wants to close his position: 1) he may conclude a transaction with a nominal value of USD 5 million in the opposite direction with 'D'; 2) 'A' and 'D' may terminate the already existing contract with mutual agreement before maturity; 3) participant 'A' assigns the seller position of the contract between him and 'D' to third end user 'E', and thus the original contract remains, but from then on participants 'D' and 'E' are on the two sides of the deal. CDS market activity increases in these cases. If the position of player 'A' closes as a result of maturity, it will not appear in the activity indicator.

How can conclusions regarding forced position closing be drawn from developments in quantitative indicators?

Drawing conclusions regarding the forced termination of uncovered CDS positions is possible only in an indirect manner, on the basis of a joint examination of net notional and activity indicators. The following can be established concerning the connection between the two indicators: market activity may modify the net notional in any direction, but from the other side, while an increase in the net notional volume requires market activity in any case, a decline in net notional does not necessarily mean an active closing of positions: the

maturities of transactions in themselves may result in a decline in notional volume.

If a participant intends to terminate his net short CDS position (as he may have been forced to do so pursuant to the Regulation), it entails a decline in the net notional only if no other market participant is willing to assume the given short position (in net terms) (middle panel, Chart 3).

The surge in the activity indicator already suggests that forced, concentrated position closures due to the entry into force the Regulation took place, as it shows an unusual, major rearrangement in market participants' risk positions. If, however, we see that in parallel with the surging activity

Chart 3

Possible impact of concluding a new transaction on the aggregate net stock in a simplified market with three participants

| Initial positions | New contract /activity increases and net notional unaffected | New contract /activity increases and net notional decreases |
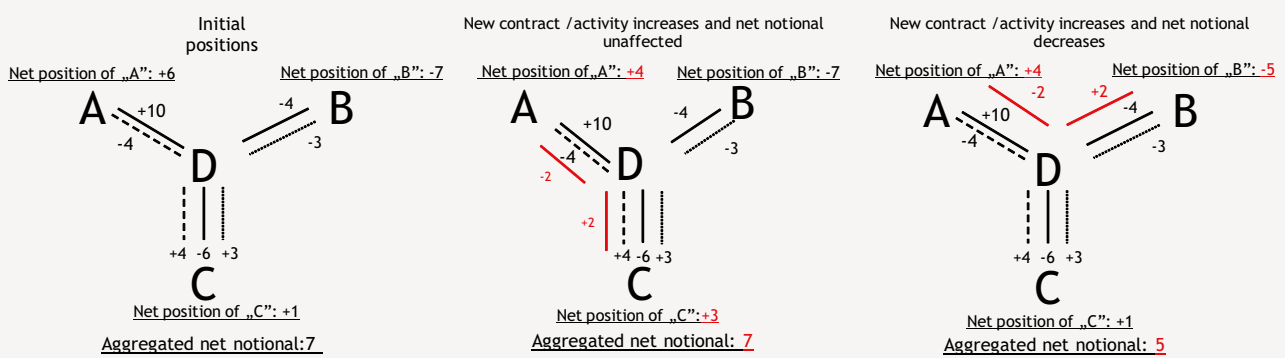
there is also an intensive decline in net notional, and this decline is not caused by maturities, we can come to the conclusion that on the demand side, with the elimination of the segment that has built up the uncovered position, the buyer's side was dominated by the end users who originally had a net seller's position, and not by the participants that originally had a net buyer's position (and intended to hedge).

The forced position termination due to regulation is typically a situation when no change takes place in the comprehensive market assessment of the fundamentals, but certain participants still want to close considerable amounts of their positions. In this case, end-users are willing to enter the buyer's side of the CDS market only at lower prices, and thus dealers are compelled to reduce the spreads. Then the participants that originally had long

credit positions can close their positions by purchasing the CDS whilst realising profits.

Quantitative changes in the Eastern European region

Analysis of the quantitative data of the countries in the region reveals different trends in terms of the net CDS volumes across the geographical regions in the critical month of October: in parallel with the decline in net notional of EU Member States, net notionals in the African and Middle Eastern regions were rather stagnant, while they increased in the European countries outside the EU. As the DTCC data release does not show maturities for October (as opposed to, for example, the 2.2 billion maturity in gross terms observed on the week ending 20 April 2012; Chart 4), the decline in net notional was the result of the closure of a portion of existing transactions.

Chart 4

Changes in net CDS notional for the countries included in the Markit ITraxx Sovx CEEMEA index series in a breakdown by regions (left panel). Aggregate activity indicator of the countries included in the Markit ITraxx Sovx CEEMEA index series (4-week retrospective moving average) in a breakdown by regions (right panel)

- Emerging Africa
- European Union
- Emerging Europe (right-hand scale)
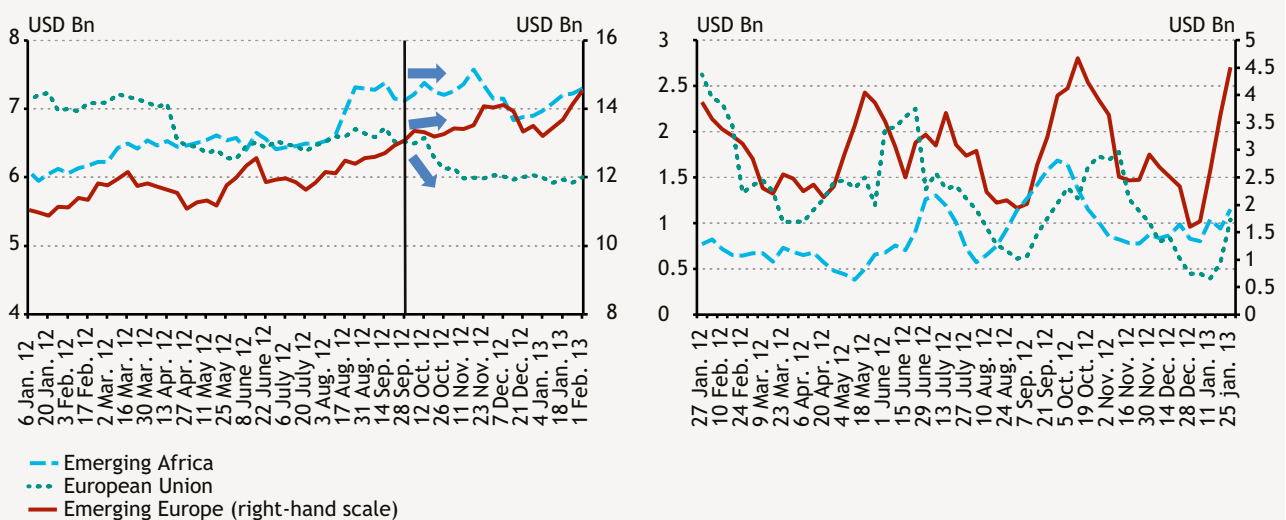
This is also suggested by the activity indicator of the East European EU countries, which also indicates elevated activity in October, similarly to the aggregate for the EU as a whole (see the relevant box). At the same time, it is worth noting here that of the CDS markets of the countries included in the CEEMEA index only some can be considered active.[7] Therefore, it may happen that as a result of the technical effect of the regulation, the differences expected in quantitative developments between individual CEEMEA

regions are less pronounced due to the individual factors. From the other side, in turn, the decline in the EU CEEMEA net notional in October was mostly related to Hungary, and essentially it was also the Hungarian and Polish markets where the activity indicator increased considerably. Accordingly, the conclusion can be drawn that – contrary to West European EU countries – in the East European region the price reducing effect of the regulation was more dominant through the expectation channel.

Box 2
Effect of the regulation prohibiting uncovered CDS positions on CDS market volumes in the EU
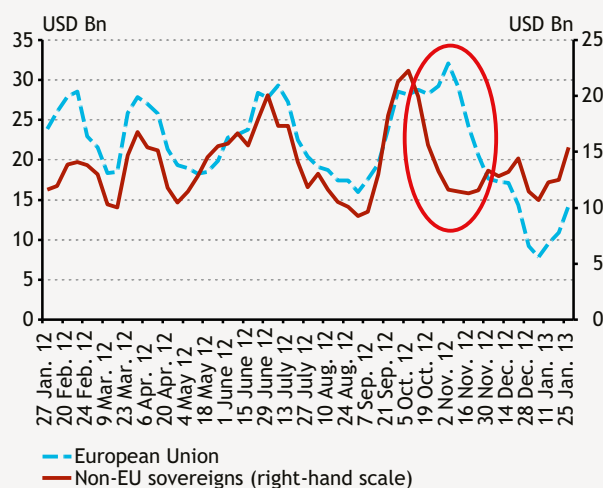
We came to the conclusion above that in the case of Central East European EU Member States the CDS regulation had a stronger effect on spreads through the expectation channel. At the same time, in the EU as a whole (mainly as a result of the much larger market) the closing of positions also had a pronounced direct impact.

Examination of the aggregate net CDS notional of EU sovereigns reveals that although a decline was observed in the first half of the year as well, the process really accelerated as of the second half of the year, i.e. from early August. Presumably, in addition to the regulation, the favourable reception of the euro area crisis management measures by the market also played a significant role in the decline in the net EU CDS notional. Nevertheless, the different dynamics of the decline in net notional in the countries belonging to the periphery and the core of the euro area as well as the dissimilar trends observed in the activity indicators of EU and non-EU sovereigns make the market influencing effect of the regulation perceptible. Except for the month of October, in terms of dynamics[8] the aggregate activity indicator of EU and non-EU

Chart 5
Changes in the aggregate activity indicator of EU and non-EU sovereigns
(four-week retrospective rollover average)

sovereigns mostly moved together in 2012. At the same time, while in October the level of the non-EU indicator declined, the end-September high activity continued within the EU. As the decline in net notional was not related to the extreme number of maturities in this period, the conclusion can be drawn that the regulation resulted in concentrated position closures. Another message of the indicator is that after the regulation entered into force, market activity within the European Union sank below the level typical of the previous years, which may indicate falling demand due to the prohibition on taking uncovered positions.

ESTIMATE FOR THE MAGNITUDE OF THE TECHNICAL EFFECT OF THE CDS REGULATION

As described above, in October 2012 the CDS market developments in the EU Member States in the region deviated from the trends observed in other emerging

countries, which, considering the previous strong correlation, indicates that the regulation applying to the EU sovereigns had a material impact on the market. In this section, we attempt to estimate the impact of the regulation on CDS spreads. First, the developments in the region are analysed, and then the findings concerning Hungary are discussed.

[7] Within the CEEMEA index, of the EU countries the Hungarian and the Polish CDS markets explain 60 per cent of the regional developments both in terms of net notional and activity. Mainly the Russian and the Turkish markets dominate within the emerging Europe, and the South African one dominates in the African and Middle Eastern region.

[8] The cyclical character of the indicator stems from the elevated activity observed upon the maturity of standardised CDS transactions at the ends of quarters (20 March, 20 June, 20 September, 20 December).

Chart 6

Path of the composite CDS index of EU member emerging countries and the alternative path of the Hungarian CDS spread estimated using a simple univariate regression, based on the co-movement with the composite index of non-EU members

Difference (right-hand scale)
Emerging EU composite
Trajectory based on the dynamics of the non-EU composite

Difference (right-hand scale)
Hungarian 5 year CDS spread
Trajectory based on the dynamics of the non-EU composite
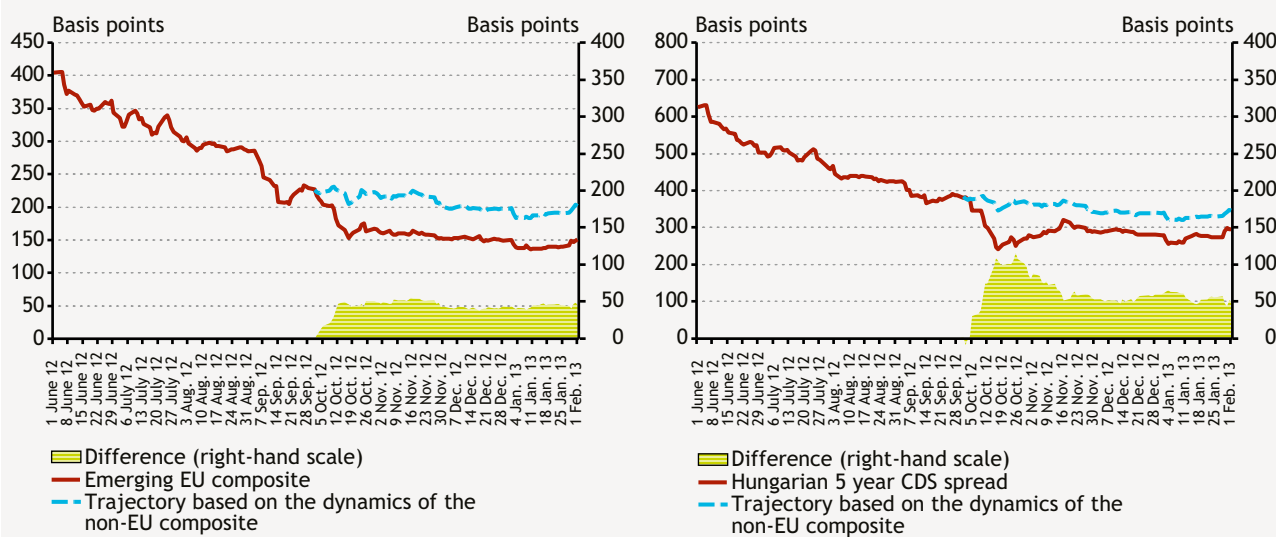
What portion of the decline in CDS spreads is attributable to the regulation in the region?

According to Chart 2, the comparison of the CDS indices concerning emerging countries within and outside the EU may serve as a good basis for examining how the technical-type factor arose in the case of other countries in our region. The relatively strong correlation between the indicators broke at the beginning of October 2012. The previously close co-movement, however, allows conclusions to be drawn regarding an alternative path of the EU index from the movement of the non-EU index after September. This is the hypothetical path that the EU average would have followed without the introduction of the new regulation, presuming that its earlier correlation with the non-EU spreads remained in place. The alternative path is estimated using a regression method (Chart 6); for details of the calculation, see the Appendix.

It is important to emphasise that the regression used here is based on the relationship between daily changes; therefore, in spite of the very convincing matching we do not consider it suitable for long-term calculations. However, our essential findings are not affected by this circumstance, as on the basis of the chart the breaking of the connection between the two time series is limited to the two or three weeks from the start of the alternative path (1 October).

As shown on the left side of Chart 6, according to our calculations, in the case of the CDS index of emerging EU countries there was an almost immediate, 50 basis point technical effect, which remained practically unchanged in the following months.

Our findings indicate a one-off shift in levels, after which the earlier correlations and dynamics prevailed again.[9] This observation may be consistent with a one-off CDS selling wave during which, with the disappearance of participants holding uncovered short positions, a 50 basis point part also became excluded from the price of the product. Possible explanations are discussed later.

What portion of the decline in CDS spread is attributable to the regulation in Hungary?

In the calculations regarding the magnitude of regional deviation we used composite indices. Although they capture the underlying regional developments well, due to the diversification they are less suitable for the identification of national-level developments. In the case of Hungary, a short-lasting, country-specific deviation from regional developments was experienced.

In connection with the Hungarian CDS spread, two methods were used to examine the shift that took place as a result

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[9] Although the separation of the indicators may mean a region-specific change in investor sentiment, we consider it unlikely for several reasons. Firstly, the easing of tensions related to euro area and global crisis management had presumably taken place during the previous weeks. Secondly, during earlier changes in sentiment, the two indices showed a very close comovement, and thus nothing justifies their different response to similar developments. Thirdly, in the first two or three weeks of October there were no serious international measures or news that could have resulted in a regional improvement of this size.

of the new regulatory system. First, similarly to the method applied for the regional estimate, the co-movement with the index of non-EU emerging countries was taken as a basis for the calculations. Accordingly, the 'technical' effect related to the new regulation may have explained some 50 basis points of the decline in the Hungarian CDS spread in 2012 H2 as well (right panel, Chart 6). At the same time, in the case of Hungary the difference between the path that materialised and the one calculated with the regression was not a result of an immediate, one-off shift, i.e. its changes over time were different from the dynamics of the regional shift. According to our calculations, the deviation from the alternative path increased to 100 basis points within a few days at the beginning of October. Later, it only reached the 50 basis point level experienced in the case of the regional index by mid-November, following gradual decline. It is important to emphasise that our method does not give an answer to what extent the initial 100 basis point difference was explained by technical or country-specific factors.

The other method to estimate the technical effect is based on a multivariable regression.[10] In this case, the calculations were not carried out on the basis of external indicators, but with the help of alternative risk indicators that reflect the risk assessment of domestic assets from various aspects and that previously moved together with the CDS spread relatively well. In selecting the list of explanatory variables, we took into account that the new CDS regulation may have had an effect on FX bond spreads and government securities yields as well; therefore, these indicators – and the indicators that are insignificant from a statistical point of view – were not included in the list of variables.[11] As a result of the calculation based on alternative indicators, the picture of the changes in the technical effect is similar to the previous one: following an immediate deviation of 80–100 basis points, the difference estimated on the basis of the regression became stable at around 50 basis points by mid-November.

Accordingly, our experience was that in early October – in the most intensive period of the regional decline in spreads attributable to the technical regulation – the decline that took place in the Hungarian CDS spread exceeded the regional average considerably. One possible explanation is that in parallel with the decline of technical nature, a real premium also became excluded from the domestic spread, i.e. the relative market assessment of Hungary also

improved. The separation of these fundamental and technical-origin effects is rendered difficult by the fact that in the period under review Hungary was in the focus of investors' attention in several matters whose impact on risk assessment is hard to assess. However, the movement of the regression path calculated using alternative domestic risk indicators may serve as a basis. Accordingly, the decline in the spread in October may have been a result both of technical and real improvements, but regarding their size we are unable to formulate a solid statement. The domestic risk premium somewhat increased from mid-October to mid-November, i.e. presumably real deterioration also took place in risk assessment. However, the rate of this deterioration was exceeded by the increase in the CDS spread; accordingly, the difference declined to 50 basis points, presumably partly as a result of the gradual correction of the technical and partly of real country-specific shifts.

DILEMMAS ARISING IN CONNECTION WITH THE REGULATION

On the basis of the regression estimate we concluded that the introduction of the CDS regulation in itself resulted in a permanent, 50 basis point decline in the CDS spread of the EU Member States in the region. This decline in the spread is to be understood in addition to the effect of the improvement taking place in global sentiment and the change that took place in the country-specific assessment of the states concerned. However, several questions may arise in connection with our findings. In the following, we attempt to find answers to the two dilemmas that we consider the most important.

How can we explain that the 50 basis point decline has become permanently included in market pricing?

In terms of the comparability of Hungary's risk assessment over time, one important question is why no correction of the technical effect was experienced in the spreads following the disappearance of the additional demand stemming from the forced closures after 1 November. This may mostly be explained by the change that possibly took place as a result of the regulation in the aggregate demand for the CDS transactions announced for the countries of the region. In general, the demand side of the product is heterogeneous: basically, two types of

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[10] For details see the Appendix.

[11] The set of variables that served as the basis for the calculations: HUF/EUR exchange rate, implied volatility of the HUF/EUR exchange rate, risk reversal of the HUF/EUR exchange rate (skewness), CCIRS (cross currency interest rate swap) spread, 5-year forward government securities yield 5 years ahead.

participants can be distinguished. One of the groups of investors use CDS products to hedge the (default, interest rate etc.) risks related to their existing assets. The other group concludes CDS transactions for trading purposes, 'speculating' on the changes expected in the market perception of various countries. From the latter aspect, the CDS transaction is an especially popular product because it requires much less capital compared to performing the same transaction by purchasing the underlying product, i.e. the foreign exchange denominated asset. The fact that in the majority of emerging countries the CDS markets are more liquid[12] than the markets of FX bonds have similar effects.

The prohibition on taking uncovered CDS positions may have reduced the 'speculative' demand for CDS. At the same time, it did not have to influence the supply side, as the selling of a CDS contract is considered as a long position. As a result, a new equilibrium may have arisen between demand and supply, i.e. the elimination of the 'speculative' demand component may have resulted in the permanent inclusion of the decline in spread.

In other words, the traded product has essentially changed: compared to the earlier situation it is 'worth less', because the CDS written for the countries in the region cannot be applied in one of its ('speculative') functions. In terms of the remaining of the above effect over the longer term it is an important question how market participants will react to the regulation. It is conceivable that trading will be diverted to other markets (e.g. FX market or government securities futures market), but based on earlier experiences it is also possible that market participants will attempt to circumvent the rules by implementing financial innovation in order to continue to use the CDS market for taking speculative positions.

Are the developments in the CDS spread following the entry into force of the regulation still a reliable indicator of the changes taken place in the risk perception of EU Member States?

It is a fair question as to whether the developments in the CDS spread can still be considered an adequate risk indicator if the CDS product written for EU Member States has essentially changed. Examining the developments in the CDS spreads of EU countries, we see that the technical type of effects prevailed before the regulation entered into force. The dynamics of price changes in the EU Member States of the region did not deviate significantly from that of the other CEEMEA countries after 1 November, and the

correlation coefficient between the spread movements of country groups rose once again to the high level observed earlier. All of this indicates that the CDS spreads of the countries affected by the regulation behave in line with the earlier regularities again.

Although the considerable decline that took place in market activity and the volatility of spreads until the end of February may theoretically indicate the drying up of the CDS market, no material deterioration has been experienced in the price indicators of liquidity. Accordingly, we believe that these phenomena are already more related to the favourable trends observed in global markets than to the regulation: in the period under review, the most important risk indicators (e.g. EMBI, VIX) and the CDS spreads of non-EU emerging countries followed a similar trend. Based on this, we think that although the 50 basis point shift in the CDS spreads of the countries of the region (attributable to the regulation) makes it difficult to compare the nominal levels in terms of time and cross-section, the dynamics of the spreads may continue to provide good guidance regarding the changes taking place in the relative market assessment of individual countries.

CONCLUSION

Our article discussed the CDS regulation that entered into force in the European Union in 2012 and its effects. According to our analyses, in October 2012 the CDS market developments in the EU Member States in the CEE region can be clearly distinguished from the trends observed in other countries, which, considering the previously very strong correlation, indicates that the regulation applying to the EU sovereigns had a material impact on the market.

The decline in the CDS spread attributable to the regulation was estimated using a regression method, based on which an around 50 basis point reducing effect was found both in the case of the regional index and Hungary. According to our calculations, in the case of the regional index this effect may be considered a one-off, permanent shift; in Hungary, it took place after a somewhat longer adjustment process.

Our findings suggest that the shift in the CDS spreads of the countries of the region attributable to the regulation makes it difficult to compare the present and past situation, as well as the EU and non-EU nominal levels. At the same time, for several months now, the relationship between the spreads have reflected the correlations observed earlier, and thus the dynamics of CDS spreads may continue to

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[12] Varga (2009).

provide good guidance regarding the changes taking place in the market perception of individual countries.

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APPENDIX

Results of regressions

Table 1
Connection of alternative risk indicators and the CDS spread – regression coefficients and significance levels

Constant	5x5 forward bond spread	EUR/HUF	EUR/HUF risk reversal	EUR/HUF implied volatility	5 year CCIRS spread
−0.075 (0.84017)	0.223 (0.00003)	0.089 (0.00029)	2.143 (0.00000)	8.345 (0.00636)	8.015 (0)

Table 2
Connection of alternative risk indicators and the CDS spread – goodness of fit and significance

R^2	0.537
Adjusted R^2	0.532
F statistics	103.920
F stat. P-value	0.000
DW statistics	1.856
DW stat. P-value	0.046

Table 3

Connection of non-EU and EU CDS indices

Constant	−0.132 (0.328)
Coefficient	1.063 (0.000)
R^2	0.845
Adjusted R^2	0.845
F statistics	2,469.969
F stat. P-value	0.000
DW statistics	2.047
DW stat. P-value	0.664

Table 4

Connection of the non-EU and the Hungarian CDS indices

Constant	−0.101 (0.771)
Coefficient	1.456 (0.000)
R^2	0.601
Adjusted R^2	0.600
F statistics	679.505
F stat. P-value	0.000
DW statistics	1.478
DW stat. P-value	0.000

Chart 7

5-year Hungarian CDS spread and the regression path calculated on the basis of alternative indicators
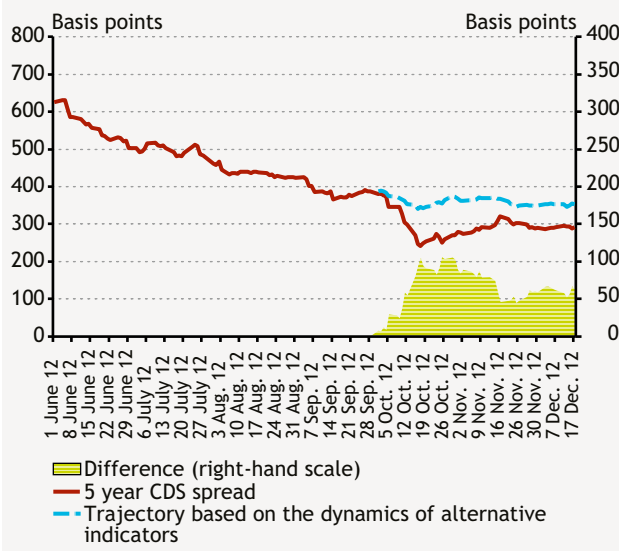
Balázs Krusper and Katalin Szilágyi: How can an interest rate rule reflect real economic considerations?

Since March 2011 the projections published by the Magyar Nemzeti Bank have been prepared using the Monetary Policy Model (MPM), in which interest rates are determined endogenously as a function of macroeconomic variables. This paper explains the characteristics of the interest rate rule of the model. First, the interest rate rule assures that monetary policy stabilises inflation over the appropriate horizon (generally approximately eight quarters), that is, it achieves medium-term price stability. Second, it takes into account the considerations of the real economy (both directly and indirectly), that is, it does not make excessive real economic sacrifices to achieve its primary objective. We demonstrate through simulations in the MPM model that monetary policy can attach more weight to real economy considerations if it broadens its horizon, that is, if it becomes forward-looking. This means that if monetary policy looks through short-term surges in inflation, then in the event of an adverse cost-push shock it need not aggravate the slowdown of the real economy to combat inflation. Moreover, this forward-looking rule which neutralises only second-round effects provides for more favourable trade-off between the objectives of inflation and the stability of the real economy than a direct increase in the weight of real economy consideration in the interest rate rule.

INTRODUCTION

Since March 2011 the projections published by the Magyar Nemzeti Bank have been prepared using an endogenous interest rate path. This means that the projection is not meant to answer the question of how the key variables would change assuming that the central bank remains passive and does not change the prevailing interest rate. Instead, we attempt to identify the interest rate path needed for inflation to develop in line with the inflation target over the time horizon relevant for monetary policy. The resulting projection assumes that the central bank 'does its job' as specified in its mandate and reacts to macroeconomic processes.

In determining the interest rate path, we need to consider that the primary objective of monetary policy is to achieve and maintain price stability, and – without jeopardising the primary objective – monetary policy also strives to smooth economic cycles, that is, it pays special attention to the output gap (the difference between actual output and its potential level). Furthermore, the central bank also takes into account financial stability, as because the efficient operation of monetary transmission requires the uninterrupted operation of the financial intermediary system.

Accordingly, the interest rate rule used in the projection assures that monetary policy stabilises inflation over the appropriate horizon (generally approximately eight quarters), that is, it attains medium-term price stability. Furthermore, it takes into account the considerations of the real economy, that is, it does not make excessive real economic sacrifices to achieve its primary objective. Finally, the interest rate rule tries to mitigate the effects of any shocks arising from the financial markets in that it directly responds to changes in the risk premium.

The paper demonstrates that the interest rate rule describing the systematic behaviour of monetary policy may take into account real economic considerations both directly and indirectly. Direct reaction means that the central bank immediately responds to any change in the output gap, thereby dampening fluctuations in the real economy. Another, less direct mechanism which is also conducive to incorporating real economy considerations is when the central bank reacts to expected medium-term inflation, or it looks through one-off changes in the price

level that do not affect the underlying inflation rate. We have incorporated the direct reaction and both types of indirect solutions into our interest rate rule: it aims for the stabilisation of forward-looking inflation with the effects of changes in indirect taxation filtered out. We also demonstrate that broadening the horizon of monetary policy (i.e. increasing the forward-looking nature of inflation reaction) provides for better trade-off than intensifying direct real economy reactions would in cases where the two possible central bank objectives, the stabilisation of inflation and output, would require interest rate responses in opposite directions.

THE ROLE OF MONETARY POLICY AND CRITERION FOR ITS SUCCESS

Macroeconomic variables are diverted from the equilibrium path by various shocks, returning to equilibrium gradually through various adjustment mechanisms. Economic policy (including monetary policy) may help to achieve that shocks divert variables to the smallest possible degree and that they return to the equilibrium path as soon as possible after the shock. Monetary policy is successful if it can reduce the volatility of important variables, that is, if it can stabilise the economy.

The macroeconomic indicators that are of key importance for monetary policy are inflation and output. According to the Central Bank Act, the primary objective of monetary policy is to achieve and maintain price stability. In other words, the central bank is successful if it can minimise the deviation of inflation from the target. On the other hand, without jeopardising the primary objective, monetary policy also strives to smooth real economic cycles, that is, it pays special attention to the output gap.[1]

In certain cases, inflation and the output gap move in the same direction. For instance, in the event of a positive consumption shock the output gap widens while demand pressure increases inflation. In such cases, the direction of interest rate actions can be easily determined because both inflation and real economic considerations justify a rate increase: the goals of stabilising inflation and the real economy are not in conflict.

In other cases, however, considerations relevant for monetary policy would demand interest rate measures in opposite directions. This tends to happen at times of cost-push shocks. Let us consider, for instance, an oil price increase. In this case the output level declines, the output

gap becomes negative temporarily while inflation rises due to the cost pressure. Monetary policy faces a trade-off: reducing inflation would require higher interest rates but this would open the negative output gap even wider. Consequently, the goals of stabilising inflation and the real economy are in conflict, that is, disinflation demands a sacrifice in the real economy. In such cases, the response of monetary policy depends on the weight attached by the policymaker to the different objectives: the stabilisation of inflation and the real economy (which in this case require monetary policy actions in opposite directions).

MODELLING MONETARY POLICY – THEORETICAL CONSIDERATIONS

If we want to model the behaviour of monetary policy, the above considerations are best captured by a loss function. The loss function contains the deviation of the target variables (inflation and output gap) from their equilibrium values. This reflects the fact that monetary policy seeks to stabilise both inflation and output along the long-term equilibrium path. The further the current value of the variables is from the equilibrium level and the longer it stays there, the greater the loss.

In addition to inflation and output gaps, the change in the nominal interest rate also tends to be included in the loss function. That is because central banks, with the exception of extreme cases, change interest rates gradually, in several steps and they try to avoid major interest rate movements that have the risk of a fast reversal. Therefore, the loss function can be expressed as follows:

$$Loss = w_1 \ (deviation \ of \ inflation \ from \ its \ target)^2 + w_2 \ (output \ gap)^2 + w_3 \ (interest \ rate \ change)^2 \qquad (1)$$

This formulation relies on two assumptions. First, divergence from the equilibrium level causes the same magnitude of loss for monetary policy in both directions, that is, both positive and negative deviation is costly. Second, the further a variable departs from the equilibrium level, the greater the loss. This means that if, for instance, inflation is significantly above target, a 1 percentage point additional increase has more severe consequences than a same magnitude of increase with inflation starting from a level near the target (for example because of the higher risk of expectations becoming unanchored). The same rationale applies to the real economy: in the event of a deep recession any further decline in output is more detrimental than it would be if output had been close to the potential

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[1] In line with mainstream macroeconomics, we assume that monetary policy has no effect on long-term economic trends. Thus monetary policy can only stabilise the output gap, the cyclical component of the output, while it has no influence over potential output.

level. Finally, the coefficients of the variables (w_1, w_2 and w_3) express the preferences of policymakers, that is, the weight they attach to each variable.

Accordingly, monetary policy-making can be interpreted as searching for an interest rate path that minimises the value of the loss function. Consequently, we need to determine how to derive an interest rate path from the given loss function.

We have two options for this. First, the interest rate path that minimises the value of the loss function can be computed directly in the course of any projection. Among best practice central banks, only the Norwegian central bank applies this method.

The other option is to incorporate an interest rate rule in the projections that shows the reaction of monetary policy to changes in the various macroeconomic variables (e.g. expected inflation, output gap).[2] This approach is more common because the interest rate rules make it easier to understand the factors that play a key role in achieving an interest rate consistent with the projection. Consequently, the interest rate path is easier to communicate to the general public, and thus allows for more transparent monetary policy making.

The key consideration for the design of the interest rate rule is to minimise the value of the loss function. This requirement is generally satisfied if the interest rate rule contains the variables that monetary policy wishes to stabilise. Consequently, the two approaches lead to similar results. It is easy to see that the loss function can almost always be well represented with a much simpler interest rate rule.

It should be noted that the choice between the two options is fundamentally a modelling (technical) issue: a decision on the way to reflect the rule-based behaviour of monetary policy in the projection. For both options, we assume that the central bank systematically reacts to changes in the macroeconomic situation by adjusting the interest rate, that is, it is committed to rule-based behaviour. Rule-based behaviour is important so that the central bank can coordinate the expectations of economic agents and thus provide guidance in their forward-looking decisions.

MODELLING OF MONETARY POLICY – THE INTEREST RATE RULE

The following factors are considered in designing the interest rate rule:

1. **Price stability:** According to the Central Bank Act, the primary objective of the MNB is to achieve and maintain price stability. Consequently, we need an interest rate rule that stabilises inflation over the horizon of monetary policy, assuring that inflation is in line with the target.

2. **Real economic considerations:** In certain cases, the immediate stabilisation of inflation would require major real economic sacrifices; therefore, the rule must also take into account the output gap (directly and/or indirectly).

3. **Financial stability considerations:** Dysfunctions in the financial intermediary system have severe macroeconomic consequences; therefore, monetary policy must strive to prevent such occurrences. We present this by making the rule consider any temporary increase in the risk premium.

4. **Theoretical preferences of policymakers:** When the considerations of the stabilisation of inflation and the real economy are in conflict, the weights attached to the various considerations need to reflect the preferences of policymakers.

As the first step of designing the interest rate rule, we need to specify the scope of variables that monetary policy will react to. Then, in the next step we need to set the size of the reaction.

Interest rate rules in international practice

Table 1 shows the variables included in the interest rate rules of the projection models used by best practice central banks and various international organisations.

The review of international practices offers important lessons. First, inflation is always included in the interest rate rule. The central banks reviewed use a total inflation indicator (rather than inflation net of tax changes) while experience shows that interest rate policy tends not to

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[2] As the interest rate rule describes the response of monetary policy to changes in variables, it is also called a monetary policy reaction function.

Table 1
Variables in the interest rate rule – international outlook

	Central bank / International organization	Variables in the interest rate rule			
		Inflation		Output gap	Financial stability
		Horizon (quaters)	Price index		
1	Canada	4	total inflation	yes	–
2	Czech Republic	4	total inflation	–	–
3	Norway	0	total inflation	yes	interest rate gap
4	Sweden	0	total inflation	yes	real exchange rate
5	New Zealand	0	components of inflation*	–	–
6	United Kingdom	0	total inflation	yes	–
7	ECB	0	total inflation	yes	–
8	IMF	3	total inflation	yes	–
9	European Comission	0	total inflation	yes	–
10	**Hungary**	**4**	**inflation excluding indirect taxes**	**yes**	**cyclical component of the risk premium**

* Differentiates between the inflation of traded and non-traded goods.

respond to indirect tax rate changes.[3] Furthermore, with the exception of New Zealand,[4] they do not differentiate between components of inflation, that is, they react to changes in core inflation and non-core inflation with the same force.

The second lesson: monetary policy takes into account real economic considerations. However, central banks use different methods for this purpose. The most common solution is to directly include the output gap in the interest rate rule (e.g. Norway, Sweden, United Kingdom, ECB, European Commission). Another possibility is to extend the horizon of forward-looking inflation: the more forward-looking the inflation monetary policy reacts to, the more it looks through the direct price increasing effects of shocks and, implicitly, the more it takes into account the considerations of the real economy (e.g. Czech Republic). This is because the medium-term inflation outlook is affected by the demand environment rather than by one-off cost-push shocks. Finally, another factor increasing the weight of real economic considerations is the keener reaction of monetary policy to the component of inflation that moves closely together with the output gap (e.g. the inflation of non-traded goods such as in New Zealand). As the solutions are substantively similar, they can also be combined, which is the route chosen by Canada or the IMF.

Interest rate rule in the MPM model

The same considerations were taken into account in designing the MPM model.[5] The interest rate rule contains the interest rate of the previous period (R_{t-1}), the long-term neutral rate of interest $(\bar{R}_t)$, the expected deviation of inflation from its target $(\hat{\pi}_{t+4})$, the output gap $(\hat{Y}_t)$ and the deviation of the risk premium from its long-term value $(\widehat{PREM}_t)$:

$$R_t = \delta_1 R_{t-1} + (1 - \delta_1)[\bar{R}_t + \\ + \delta_2 \hat{\pi}_{t+4} + \delta_3 \hat{Y}_t + \delta_4 \widehat{PREM}_t] \tag{2}$$

As in most examples, monetary policy responds to changes in the price index of the total consumer basket in our case as well. However, as indirect tax rates in Hungary have been subject to countless changes in recent years, this aspect is worth incorporating explicitly. Consequently, the interest rate rule contains a price index net of indirect tax rate changes.

Considerations of the real economy are presented in the interest rate rule of the model through three channels. First, the output gap is included directly. Second, we filter out from inflation the effects of tax changes; monetary policy does not react to those. Finally, the interest rate depends on the inflation rate projected four quarters

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[3] For more detail, see Felcser (2013).

[4] In New Zealand monetary policy places more emphasis on the inflation of non-traded goods. This is because New-Zealand is a commodity exporter, and thus global commodity prices have a direct and strong effect on the total price index.

[5] For the detailed description of the MPM model see Szilágyi et al. (2013).

ahead rather than the current rate. This indirectly captures the behaviour that monetary policy responds only to the second-round effects of price-level-increasing shocks.

CALIBRATION OF THE INTEREST RATE RULE

Next, we explain how we calibrated the interest rate rule in light of the above considerations. We focus on the choice between the possible ways of taking real economic considerations into account. The answer to that question depends on the characteristics of the economy concerned and the size and frequency of economic shocks; there is no single right choice.

To answer the question, we performed a simulation to establish the volatility of inflation and of the output gap with different interest rate rules if the Hungarian economy is subjected to shocks that are shown to be typical based on historical evidence.[6] As the objective of monetary policy is to stabilise these two variables, the interest rate rules that keep both inflation and the output gap low are considered to be good.
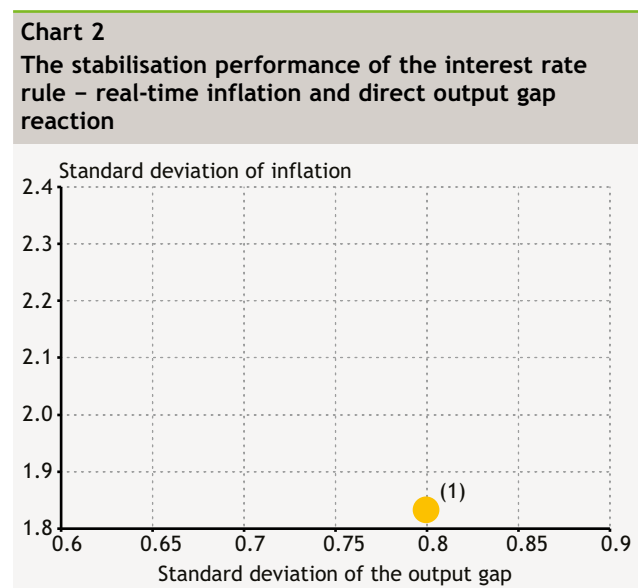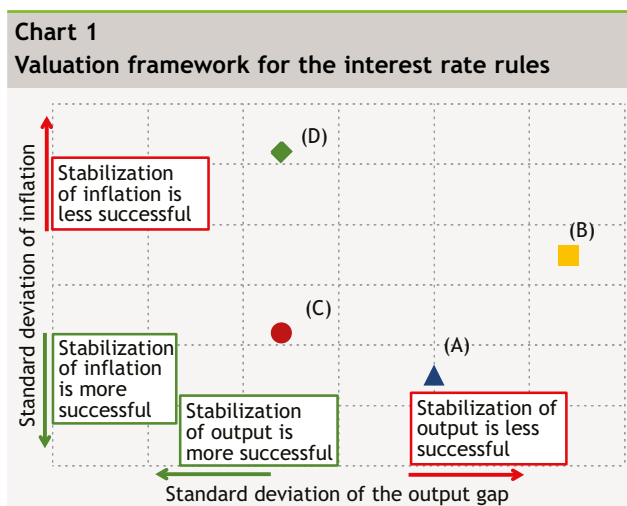
Chart 1 illustrates how the various interest rate rules can be judged in this framework. The dots in the chart show the volatility of inflation and of the output gap under the given interest rate rule. The horizontal axis shows the standard deviation of the output gap. In other words, the further left the result is positioned, the more successfully monetary policy stabilised the real economy. The vertical axis denotes the standard deviation of inflation. Monetary policy is successful in stabilising inflation if its variance is low, that is, it occupies a lower position in our chart.

This approach is helpful in assessing the cost-benefit tradeoffs determined by the various interest rate rules. For instance, in Chart 1 the rule that takes us to point (A)[7] is clearly better than Rule (B) because it is more successful in stabilising both inflation and the real economy. By contrast, the choice between Rule (A) and Rule (C) is not that clear: the latter is better at reducing the volatility of the output gap, but this has a cost in terms of inflation. We face the same trade-off between Rule (A) and Rule (D) but the extent is different: relative to Rule (C), the same real economic benefit has a much higher inflation cost. Consequently, if we have to choose from among these four rules, then

1. we can exclude Rule (B) as Rule (A) is better in every respect;

2. we can also exclude Rule (D) as Rule (C) allows for better trade-off relative to (A) than (D) does;

3. the choice between (a) and (C) depends on the preferences of policymakers.

In our international benchmarking we have seen that the most common interest rate rules include real-time inflation and the output gap. Therefore, we chose such a rule as our starting point. Chart 2 shows the extent that this interest rate rule stabilises inflation and the output gap.

Chart 1
Valuation framework for the interest rate rules

Chart 2
The stabilisation performance of the interest rate rule – real-time inflation and direct output gap reaction

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[6] In the simulation, we simultaneously used demand, supply and financial shocks. We drew the shocks from a normal distribution with zero average. The variance of the corresponding distribution is identical with the historical variance of the shock concerned.

[7] Hereinafter we call this Rule (A).

Chart 3

Changing the interest rate rule – different coefficients of the output gap

Standard deviation of inflation

Increasing the coefficent of the output gap

Increasing the coefficent of the output gap

(1)

Standard deviation of the output gap

Chart 5

Weight of cost sensitive products in inflation

(average of 2002–2012)

Per cent

Central Eastern Europe | Hungary | Western Europe

Note: We classified Bulgaria, the Czech Republic, Estonia, Poland, Latvia, Lithuania, Hungary, Romania, Slovakia, Hungary and Romania in Eastern Central Europe. The category of Western Europe includes the other EU Member States.
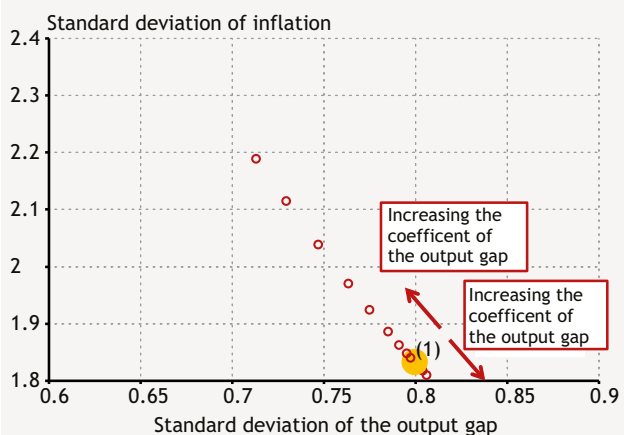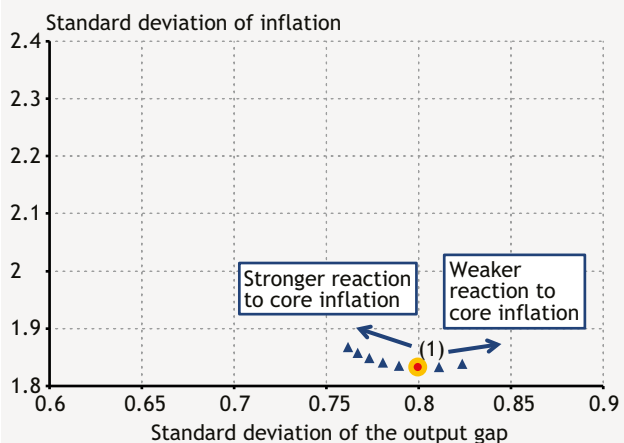*Source: Authors' calculations on the basis of Eurostat data.*

Chart 3 illustrates the outcome of changing the coefficient of the output gap. We can see that the higher the coefficient, the more successful monetary policy becomes at stabilising the real economy, but this comes at a substantial cost in terms of inflation. Reducing the coefficient moves us in the opposite direction.
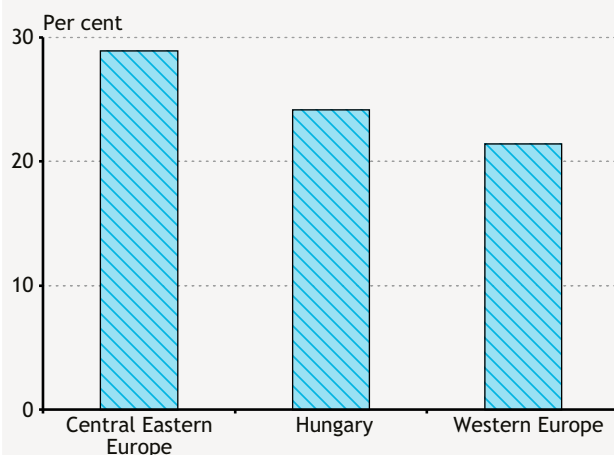
Next, we examined the consequences of a stronger monetary response to changes in core inflation. As core inflation and the output gap show a closer co-movement than other items outside core inflation, this also increases the weight of real economic considerations implicitly. Chart 4 shows that we face a trade-off in this case as well: if the real economy becomes more stable, the volatility of inflation increases.

Chart 4

Changing the interest rate rule – stronger reaction to core inflation

Standard deviation of inflation

Stronger reaction to core inflation

Weaker reaction to core inflation

(1)

Standard deviation of the output gap

Finally, the third option is to increase the forward-looking nature of inflation foresight. If monetary policy takes into account the expected future inflation rate, it looks through the direct price level increasing effects of shocks and responds only to second-round effects. This method may be useful if the economy is often hit by cost-push shocks and these shocks have a strong impact on inflation. In the case of Hungary, the inflation components that are driven by costs[8] have a larger weight than in Western European countries (Chart 5). Accordingly, we can expect that it may be expedient to make the inflation reaction forward looking.

As indicated in Chart 6, the rule that looks one or two quarters ahead performs better in terms of stabilising both inflation and the output gap than the reference rule. Any further extension of the horizon has inflation costs, which continue increasing and at a certain point both inflation and real economic performance start to deteriorate.

If we compare the three changes presented above, we can decide which one offers more potential to reflect real economic considerations in the interest rate rule. Chart 7 shows that if the horizon of the inflation reaction is changed, the stabilisation of the output gap is much more successful, while its inflation cost is much smaller than in the case of the adjustment of the coefficient or weight of core inflation. In the projection, we use interest rate rule (2) because any more expansion of the horizon (an upward

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[8] Food, petrol and market energy.

Chart 6

Changing the interest rate rule – more forward-looking inflation reaction

Chart 7

Comparison of the various adjustments

(1) Interest rate rule containing concurrent inflation reaction.
(2) Interest rate rule in the MPM model.

The interest rate path included in the projection relies on a rule that stabilises inflation on the horizon of monetary policy, while also taking into account of real economic and financial stability considerations. Considerations of the real economy are reflected through three channels. First, the output gap is included directly in the interest rate rule. Second, monetary policy takes into account inflation net of tax changes. Third, the interest rate depends on the inflation rate projected rather than the real-time rate. The latter two factors are conducive to indirectly incorporating real economic considerations. The analysis we conducted indicates that increasing the weight of real economic considerations would incur significant inflation costs, irrespective of whether it is achieved by increasing the direct real economic reaction or the forward-looking nature of the model.

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move in the green diamonds) would incur significant inflation costs. The figure also reveals that this rule takes best account of the considerations of inflation and stabilisation of the real economy.

CONCLUSIONS

The projections published by the MNB take into account the systematic behaviour of monetary policy, which we incorporate in the projections through the interest rate rule of the MPM model. Based on the review of the interest rate rules used by other central banks (and international institutions) for projection and/or policy analysis, we can conclude that the modelling of monetary policy is consistent with international best practice.

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MNB Panel Discussion with Olivier Blanchard

(Péter Benczúr)

A citizen of France, Olivier Blanchard has spent his professional life in Cambridge, U.S. After obtaining his PhD in economics at the Massachusetts Institute of Technology in 1977, he taught at Harvard University, returning to MIT in 1982, where he has been since then. He is the Class of 1941 Professor of Economics, and a former Chair of the Economics Department. He is currently on leave from MIT, as Economic Counsellor and Director of the Research Department of the International Monetary Fund.

Mr. Blanchard is a macroeconomist, who has worked on a wide set of issues, from the role of monetary policy, to the nature of speculative bubbles, to the nature of the labour market and the determinants of unemployment, to transition in former communist countries. In the process, he has worked with numerous countries and international organisations. He is the author of many books and articles, including two textbooks on macroeconomics, one at the graduate level with Stanley Fischer, and one at the undergraduate level.

He is a fellow and Council member of the Econometric Society, a past vice president of the American Economic Association, and a member of the American Academy of Sciences.

– The first topic of our discussion is current monetary policy issues. I would like to start by raising two issues. First, there are many new proposals floating around about modifying, or even abandoning, inflation targeting as a monetary policy strategy. Some argue that the current inflation targeting regimes should be replaced by more flexible versions or even by 'nominal GDP targeting'; or that inflation targeting should be complemented by financial stability considerations. Second, even if we stick to inflation targeting, is there a case for setting a higher target than what we previously thought of as the optimal inflation rate?

– These first questions could be the topic of the next three days! But there may be some key points. First, inflation targeting per se has shown its limits. If you look at many countries before the crisis, inflation was on target, the output gap was relatively stable and yet, things behind the scenes were developing in a way that we got into the crisis. So, it is absolutely obvious to me that the goal of the monetary authority / financial supervision authority (and the slash is important and I will come back to it) must be much broader than just targeting inflation or targeting the mix of the output gap and inflation. We know now that it can look like we are achieving perfection, and still have a system which is incredibly dangerous behind the scenes.

This implies that the monetary authority / financial supervision authority has to have a larger number of targets: inflation, output, the composition of output (for example if housing becomes a big part), and the composition of assets and liabilities in the financial sector. I think these are all very important targets. At the same time, fortunately, there are more tools as well: not only the policy rate, but also intervention in markets other than the short-term bills market, and then there are macroprudential tools. And so, I think that is point 1: many targets, many tools.

Now, the next issue is that this becomes a really complicated problem when you have all these targets and all these instruments. Can you as a first approximation keep inflation targeting and the policy rate as what the monetary authority mainly does and have a financial supervisor in charge of macroprudential tools? And here the answer is that they do interact. When the monetary authority decreases the policy rate, it changes the incentives of financial institutions in terms of the type of risk they take. The rate cut probably increases risk taking in the financial system, so macroprudential tools are needed. And, the same way, macroprudential tools are likely to have a macro effect. Suppose you decide that there is a housing boom and you are going to use maximum loan-to-value ratios in order to limit the amount of borrowing. This is going to have an effect on housing, which was your objective, but it is going to have an effect on the economy through the demand for housing investment.

In a world of benevolent and competent policy-makers you would want to put everything under one roof with one authority, which understands all the implications and takes all the decisions. In reality, I think it makes sense to have some separation of the two – to have a monetary authority and to have a financial supervision authority.

The question is how much separation. Countries around the world are exploring different ways. If there is no separation, there is only one institution having all the tools – that can create dangers. If you have an independent central bank and you have a government which is in charge of using a large set of macroprudential tools, it could clearly misuse them for political reasons. If you separate the two institutions completely then the lack of communication is clearly an issue. We have seen this in various countries. So you try to find ways. My sense is that the UK compromise might be a good thing: that you have two committees – the Monetary Policy Committee and the Financial Stability Committee – in the same building, they interact and try to take a set of coherent decisions. So I think that is point 2.

Point 3 is thinking about the mandate of monetary policy, whether it is inflation targeting or output, or a mix of output and inflation targeting. The crisis has not changed my views very much. I like the US mandate, which is that the central bank is in charge of making sure that inflation is right and the output gap is small and then it tries to do the best it can. It does not have explicit weights on inflation and the output gap. I see nominal GDP growth targeting as just forcing the weights to be equal, since you have nominal GDP growth as the sum of real GDP growth and inflation. That makes it more explicit that there is some commitment to output, but it seems to me more like a trick than major progress.

– There might be a major difference between the way inflation targeting is usually implemented and what, say, nominal GDP targeting would do. The question is whether it is an output gap measure that enters your objective function or it is the level itself which is not just the deviation from the trend.

– Conceptually, what you need to do when thinking about monetary policy or any policy which is going to affect demand is to think about the output gap. And nominal GDP is more a wording of the issue, rather than dealing with the issue. We have to think about output gaps. I suspect the reason you ask this question is also the reason I ask myself the same question…. There is a puzzle here.

On the one hand, we tend to think that in most countries, output is much lower than it could be. We clearly see demand falling. We haven't explicitly seen potential supply falling, but we have the sense that it has also fallen but not by as much. So, on the one hand, I think most of us think that it's quite a way to go back to the old path… Not even the old path, but the path which is feasible.

Let me say a bit more on this. I suspect that we can't go back all the way to the old trend. Historical experience from financial crises shows that you don't go back to the old path; you typically go back to the same growth rate but with a level difference. So, there has clearly been something on the supply side which we may not fully understand. But the decline is not as big as the decrease in actual output, so there is an output gap. So, that's one. But then, we have been trained, and I believe correctly, in thinking that if there's a positive output gap, so output is below potential, then there should be some downward pressure on inflation. If you think that expected inflation is now anchored by inflation targeting, the inflation should be lower. This has happened on a very low and limited scale, and Hungary is an example of that, but it is true in general.

So it seems that the output gap is fairly large, but the pressure on inflation, core inflation in particular, is very small. So the question is what to do next, right? Which I think is probably your question.

I have come to a conclusion, but at this stage it is rather just a hypothesis. I'll try to make it into a paper and if you have insights, I would be happy to listen. The main idea is that we have to distinguish short-run potential output and long-run potential output. Suppose you have an economy where there is a recession that has been going on for six months or a year – the kind of normal, cyclical movement that we have seen in the past. Unemployment has increased, output has decreased, but what has happened to potential output? Here, I simply define potential output as the level of output where there would be no upward or downward pressure on inflation.

Presumably, if the recession has been short, firms haven't changed their ways drastically. Perhaps they have decreased the number of hours, they have laid off some people, but to a large degree they have hoarded labour. They probably haven't changed their production practices very much. So if demand came today, firms would probably go back to the way they did business six months or a year ago. The output gap is there, we can see it, and then we go back.

Suppose instead that we are in the position where many countries are today, that there has been no growth or even negative growth for three or four years. By now, firms have really had to adjust. They must have stopped hoarding labour because it is too costly. They may have closed plants, which they could in principle reopen but it is more complicated. They changed the whole way they do business. Now suppose demand increases a lot. Firms would have to hire workers; they would have to reopen plants and so on – which are all very complex processes. I think firms would very quickly face various adjustment costs, leading to inflationary pressure. So, the longer the recession goes on, the more short-run potential output goes down. So, the output gap remains small. Just a bit more demand today creates inflationary pressure.

Suppose that this is the explanation. Then the policy implication is that even if you have a small output gap, it does not mean that there's no room for boosting demand. If you increase output a bit, potential output is going to increase as well. It is like Achilles and the turtle: you move, but you never quite get there. So maybe in the end you can actually increase demand substantially more without inflationary pressures – so long as you do not do it too quickly.

Two more points on this notion of a short-run output gap. The first is that it is related to hysteresis, but it is not the same: I am not talking about permanent effects; I am talking about adjustment costs. The second is that it might be worth looking at the data. The story would imply that the longer the recession has lasted, and the longer unemployment has been high, the smaller the gap and the pressure on inflation. This might be captured by a Phillips curve which has, instead of the difference between current unemployment and the natural rate, the difference between current unemployment and some weighted average of past unemployment. Initially, you have the output gap and downward pressure on inflation, but as you continue, the gap becomes smaller and the pressure on inflation goes away. I think such an empirical approach would have clear policy implications.

And then the last point: what is the long run output gap? It is very hard to know because all we see is the short run, the pressure on inflation. I think the main question is: Why should the crisis have decreased potential output and the natural growth rate very much? First, has the natural rate of unemployment increased? In the short run, when the financial and the housing sector decrease in size, the natural rate will be higher because of matching problems. But the net worker flows this implies are small relative to the gross flows which happen all the time (the movement of workers which takes place even if there's no change in the composition of production). Probably the estimates are about 1 percent more unemployment in the US; and it will not last long because people adjust. So why should the natural rate have increased much? My sense is that it should not have.

I was in Latvia earlier this year. The question, as you may know, is whether Latvia is a great success or a great failure. The Latvians think it's a great success, *Paul Krugman* thinks it's a great failure. What you conclude depends on your theory on the output gap.

The Latvians say that output by now has decreased by about 15 to 20 percent, but that's nearly all potential output, the output gap is close to zero. Unemployment before the crisis was 6-7 percent; it's now 15… that's all an increase in the natural rate. We don't have a current account deficit any more. Life is tough, but that is the way it is.

Paul Krugman says that if the natural rate of unemployment was 6 percent before the crisis, how can it be 14 percent today? What are the factors which would explain such an increase? And he says no, that's not the natural rate, that's the actual rate! The natural rate is probably still where it was before the crisis, 6 percent. So you have 8 percent to grow and if you're going to do that, which you haven't done yet, you're going to need an enormous adjustment in competitiveness in order to keep your current account down. And so his conclusion is total failure. The truth is probably somewhere in between.

The bottom line is that I do not see why the natural rate should be very different in the future from what it was before the crisis – although the actual rate may have been below the natural rate then. I do not see why productivity growth would be fundamentally different. I can see some effect on productivity of a more constrained financial sector for some time, so there is a level effect. And, so my sense is that the long-run output gaps are still fairly large.

– Coming back to the theory that you have just described, the short-term and longer-term potential output. That works as long as we assume that rebuilding lost capacity is easier than building new capacity – which implies that the potential growth rate after the crisis is actually faster than before. Do you agree with this characterisation?

– Since there has been less investment during the crisis, the capital stock is smaller than before. This decreases potential output. If we think that after the crisis we are going to return to similar investment rates as we had before, then the capital-output ratio will increase again. During this period, potential output growth will be, other things equal, faster than it was. But eventually, we will get to the pre-crisis capital-labour ratio, in which case what matters is total factor productivity. I do not know the rate of TFP growth, but I see no reason to think that it is very different from what it was before the crisis. Still, you are right that there is a period during which you get faster growth temporarily because you restore capital to its old relative level.

– I would add two qualifications. One is that the Great Moderation created a financial environment where a long-term liquidity illusion led to higher-than-potential investment levels for a decade or even more. And therefore I would expect that long-term trend growth would be a bit smaller than previously. The other thing is that we may still not fully understand the consequences of the globalisation process of the last 15 years. Its effect on wages and the competitive position of individual countries can be dramatic. And the adjustment that it requires to regain a country's competitive position on a systemic level may be a very serious challenge.

– Both concerns are very important. The second in particular opens a can of worms.

There is no question that at least some types of investment were too high in the 2000s. Housing is obvious, but maybe the investment rate in general was too high. To that extent, growth was maybe too high. I do not think, however, that an investment rate which is two percent lower in terms of GDP would have very strong quantitative implications for capital accumulation and potential growth, but qualitatively you're right.

As for the second issue, there is a deep question as to how to define potential output. Think in terms of the production function approach: we use labour, we use capital and we use TFP, we put them together and then produce. We just talked about the endogeneity of capital, but there is also the endogeneity of labour and that gets back to the natural rate and that gets in turn to issues like globalisation.

So, just to take an example, Portugal was part of global value chains and had a few niches, for example, in the automobile sector. They have more or less lost those, which means that now they have a very hard time finding what their comparative advantage is and it may well be that the wage consistent with a given level of employment is actually lower than it was before. If workers do not accept a decrease in the wage, then the natural rate will be higher, and if the natural rate is higher then potential output is lower.

You tend to think about the natural rate as something unrelated to globalisation. In reality, the change in the wage which is needed may easily depend on external conditions. So it may well be that the potential output in some countries (e.g., Portugal) is actually lower than we might have thought, so I take your point.

– I'd like to go back to the theory of potential output that you outlined, and my question is about its policy implications. There is clearly a role for policy interventions if there is some sort of externality behind this short-run output gap concept.

– No, there is no need for externalities. You could simply formalise this by assuming that the adjustment cost to an increase in production is increasing in the length of time during which a firm (or a country) has been operating at low levels.

– In such a case, would the policy of subsidising short-term employment, labour hoarding make sense?

– The rationale behind labour hoarding is that if you think the downturn is not going to last too long, you wait and try to save on the adjustment costs. But eventually labour hoarding is costly. Now the question is whether you want subsidies to avoid the adjustment costs.

– I think in a similar way, we were proposing in 2008–2009 to the government to offer guarantees on the loans of SMEs for example, arguing that if SMEs lose their markets, the additional cost of getting them back is higher than the possible cost of the government guarantee.

– Right. This is very similar to the discussion of the Dutch disease, for example. There you discover oil, and there is capital inflow which causes an appreciation. This makes your traded sector uncompetitive, so some of your tradables firms go out of business. And when investors do not like you any more, some of those lost sectors might not come back. It is indeed an open question: does it make sense to subsidise some industries in such cases? There are a number of papers which argue that that's indeed a reasonable policy, but the question is open.

– We are approaching our time limit and the next topic would have been turning more to academia and macro, which we cannot meaningfully address in five minutes. But let us still give it a try. You wrote a very interesting overview of the state of macro[1] around 2008–2009. Have your views changed since that article?

– That paper was written before the crisis and came out just around the crisis. And I had to explain myself a lot to Paul Krugman for the sentence: 'the state of macro is good.' I suggest you read the whole paragraph, from which the sentence is taken, and you will see that I gave in fact a fairly balanced assessment. Since then I have written a paper with *Giovanni Dell'Ariccia* and *Paolo Mauro* called 'Rethinking macroeconomic policy' in 2010,[2] which is an update of that.

My reaction is that the crisis has been good for macro (not so good to macro, which clearly came up short) in two ways. The obvious one is that while we had not seriously thought about the financial sector before the crisis, now it is central. Everybody is working on it. And the supply response is quite amazing: if I look at the proportion of, say, NBER working papers (which are listed on the net) which have something to do with the crisis, it is very high. I was surprised at how quickly the profession was able to recognise that there was something happening outside. So that is good news.

There are some ideas which are now central to macro, such as liquidity for example, which really were not there before. There were very good papers about them, but they were written by kind of outsiders – by the Jean Tiroles and Andrei Schleifers of the world – and though they turned out to be very relevant, they were not incorporated in macro. My sense is that we are starting to get a good sense of the financial system, of what financial networks mean.

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[1] Blanchard, Olivier (2009), "The State of Macro", *Annual Review of Economics,* Vol. 1, pp. 209–228, URL.

[2] Blanchard, O., G. Dell'Ariccia and P. Mauro (2010), "Rethinking macroeconomic policy", *Journal of Money, Credit and Banking,* Vol. 42 Iss. s1, pp. 199–215, URL.

I think the crisis has liberated us from the sin that I had identified in my state of macro paper, which is that until 2008, if you were a macroeconomist and you submitted a paper in macro, you could not do partial equilibrium. This was considered unacceptable. You had to have a DSGE machine. So you had an insight, which would be Section 1, which is all what people should read, and then to please the editor, you had to add something like habit persistence, and the 'change in the change' in the cost of investment or whatever else. And that I viewed as incredibly detrimental. I think you should start with your insight, and then maybe at some stage you incorporate it into a fully fledged model, but you do not test whether a theory is right based on whether it fits the entire economy through a DSGE model. I think this phenomenon is gone (or at least going), because people have realised that the world is so complex that, if you understand one part of it, that is a contribution.

So I now see many more papers which look at one thing in an intelligent way and try to find evidence directly. Maybe somebody else will put it into a DSGE model later on, but you do not have that obligation any more.

Nevertheless, what I find at the Fund is that we still need models, and they have to have dynamics, be general equilibrium in nature, and give an important role to expectations. Put another way, we still need dynamic, stochastic general-equilibrium macro models. The reason is that we still have questions like what happens to growth in China if Brazil introduces a tax on imports. If I think really hard, maybe I can give the sign, maybe not. And I surely cannot give you the magnitude, and I'm not sure anybody can. But we should try, so we still need these DSGE machines.

In terms of models and tools, we are now at a point where we have a financial sector which is starting to look like the financial sector. We can look at the effect of say, capital adequacy ratios on intermediation and on output. Think of the 100-page papers that *Michael Woodford* writes now on heterogeneous agents, borrowers, lenders, so we moved away from the representative agent model. So in terms of the set of tools we have, I'm impressed by the progress the profession is making.

– And what is your view of handling expectations? I mean many people argue that the rational expectations hypothesis is a key cornerstone or bottleneck of general equilibrium macro models.

– I think we now accept that, for various reasons, agents do not behave in a way that the prototype expected utility maximiser does. Whether it is due to expectations or all kinds of things, I think there is, again, good work on it.

It is still the case that if I do a DSGE model, I would probably use rational expectations, because I do not think we yet have an alternative. I think there is much more thinking recently about the causes of excess leverage. Was it due to incentive structures and rational responses to them? Was it agency theory in some way? Or was it irrational expectations and if so, what does it mean precisely?

I think there is a lot of interesting work about these issues, but I do not see anything yet which can be introduced in our basic macro models. But again, this 'let a hundred flowers bloom' approach is very nice, and you are now allowed as a macro-economist to write a paper with bounded rationality – which *Chris Sims* or *Tom Sargent* had been exploring even before the crisis – and not blush.

Publications of the Magyar Nemzeti Bank

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

Papers

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

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

MNB Working Papers
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Regular publications

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

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

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

Annual report: Business report and financial statements of the Magyar Nemzeti Bank / Éves jelentés: A Magyar Nemzeti Bank adott évről szóló üzleti jelentése és beszámolója
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Féléves jelentés: Beszámoló az MNB adott félévi tevékenységéről (Semi-annual report: Report on the MNB's operations in a given half-year)
Only in Hungarian; published once a year.

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

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

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

Public finance review / Elemzés az államháztartásról
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