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International experiences and domestic opportunities of applying unconventional monetary policy tools

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MAGYAR NEMZETI BANK

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International experiences and domestic opportunities of applying unconventional monetary policy tools
(Nemkonvencionális jegybanki eszközök alkalmazásának nemzetközi tapasztalatai és hazai lehetőségei)

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Contents

Abstract

This paper provides an overview of the impact of unconventional central bank instruments, the relevant international experiences and the room for application in Hungary. The use of unconventional instruments may be justified by the existence of financial market friction, turmoil, failure or constraint, when instruments that change the size and/or composition of central bank balance sheets may be more efficient in achieving monetary policy objectives than traditional interest rate policy. Empirical analyses found the unconventional instruments applied in developed countries successful in easing market tensions, increasing market liquidity and reducing yields. Although they proved to be unsuccessful in providing a boost to economic growth, they were able to mitigate the fall in lending and output. Vulnerable emerging countries with a lower credit rating and high external debt have much less room for manoeuvre to apply non-conventional instruments. Even liquidity providing instruments, which are otherwise considered the least risky, may result in exchange rate depreciation and flight of capital during a crisis. The interventions that involve risk taking by the government may add to market concerns about fiscal sustainability.

Due to Hungary's vulnerability, high country risk premium and large foreign exchange exposure, most of the instruments applied in other countries would entail financial stability risks at home. In theory, the sharp reduction in the supply of bank credit could provide sound justification for the use of unconventional central bank instruments in Hungary. It should be noted, however, that insufficient credit supply is mainly attributable to a lack of willingness by banks to lend, which can be less influenced by the Bank, rather than to any lack of capacity to lend. In addition to banks' high risk aversion, uncertain macroeconomic environment and economic policy measures affecting the banking sector also decreased willingness to lend, which is beyond the authority of the central bank. Therefore, these instruments at most may have a role in preventing a possible future deterioration in banks' lending capacity from becoming an obstacle to lending in a turbulent period.

JEL: E44, E52, E58, E61.
Keywords: monetary policy, unconventional tools, financial intermediation.

Összefoglaló

Anyagunkban áttekintjük a nemkonvencionális jegybanki eszközök hatásmechanizmusát, nemzetközi tapasztalatait és a Magyarországon történő esetleges alkalmazási lehetőségeket. Nemkonvencionális eszközök alkalmazása akkor lehet indokolt, ha olyan pénzügyi piaci súrlódás, zavar, kudarc vagy korlát áll fenn, ami miatt a monetáris politika céljainak elérésében a jegybanki mérlegek nagyságát és/vagy összetételét megváltoztató eszközök a hagyományos kamatpolitikánál hatásosabbak lehetnek. Az empirikus elemzések a fejlett országokban alkalmazott nemkonvencionális eszközöket eredményesnek értékelték a piaci feszültség mérséklésében, a piaci likviditás növelésében, a hozamok csökkentésében, és bár a növekedés beindításában sikertelennek bizonyultak, a hitelezés és a kibocsátás visszaesését képesek voltak mérsékelni. A rosszabb hitelbesorolású, magas külső adósságú, sérülékeny feltörekvő országok esetében a nemkonvencionális eszközök alkalmazására jóval kisebb a mozgástér. Egy válság során az – amúgy legkevésbé kockázatosnak számító – likviditásbővítő intézkedések árfolyam-leértékelődést és tőkekivonást eredményezhetnek, valamint az állami kockázatátvállalással járó beavatkozások növelhetik a fiskális fenntarthatóságra vonatkozó piaci aggodalmakat. Magyarország sérülékenysége, magas országkockázati felára és devizakitettsége miatt a más országokban alkalmazott eszközök zöme nálunk pénzügyi stabilitási kockázatokkal járna. A nemkonvencionális jegybanki eszközök hazai alkalmazását elsősorban a bankok hitelkínálatának erőteljes visszafogása indokolhatja. Figyelembe kell azonban venni, hogy az elégtelen hitelkínálat elsősorban a jegybank által kevésbé befolyásolható hitelezési hajlandóság, és nem a hitelezési képesség hiányának tulajdonítható. Emiatt ezen eszközöknek legfeljebb abban lehet szerepük, hogy a bankok hitelezési képességének esetleges jövőbeli romlása egy turbulens időszakban ne képezze korlátját a hitelezésnek.

Summary

This paper provides an overview of the effect of unconventional central bank instruments, the relevant international experiences and the room for application in Hungary.

Similarly to the original objective of central banks,[1] the ultimate goal of unconventional monetary policy instruments applied during the financial crisis is to keep inflation close to the target (to avoid deflation) as well as to prevent the collapse of financial intermediation and, through that, to reduce the extent of the economic downturn. Accordingly, unconventional instruments can be interpreted as supporting the main objectives of monetary policy, and their application may be justified by the existence of financial market friction, turmoil, failure or constraint, when instruments that change the size and/or composition of central bank balance sheets may be more effective than traditional monetary or fiscal instruments. Basically, two situations can be distinguished when the application of these instruments may be justified:

- First, during the crisis some developed countries reduced their respective policy rates to close to zero; therefore, monetary easing, which continued to be necessary, was only possible by using alternative means. In this case, unconventional instruments practically replace and substitute conventional instruments that lose their efficiency.

- Secondly, unconventional instruments attempt to alleviate disruptions in a financial market playing an important role in monetary transmission; these disruptions are reflected in low liquidity and unjustified spreads. In this case, unconventional instruments complement monetary policy by restoring transmission; accordingly, their application may be justified even when the interest rate is higher than zero.

Three types are distinguished according to the modes of interventions:

- facilities that provide liquidity to commercial banks,
- direct interventions in the credit market,
- purchase of government bonds.

Facilities providing liquidity to banks and **refinancing** transactions can mainly be efficient in terms of lending, when banks struggle with difficulties obtaining funds, funding costs of banks are too high compared to the policy rate, or too many assets become illiquid in the balance sheets of banks. However, this set of instruments is ineffective if bank lending is primarily limited by banks' poor capital position. Moreover, no result can be expected in the case when credit supply declines for other reasons, for example, due to longer-term intentions of balance sheet deleveraging or a significant increase in banks' risk aversion. At the time of the market panic following the failure of Lehman Brothers, when interbank markets dried up, many developed and emerging market central banks applied instruments that ease liquidity strains.

Bank liquidity providing measures are the least risky group of measures. However, they are effective in the case of the most limited set of problems.

[1] Instead of their full names, the most often mentioned developed market central banks are referred to by their accepted abbreviations: Fed (Federal Reserve System or Federal Reserve Bank of New York, USA), BoE (Bank of England, UK), BoJ (Bank of Japan, Japan), ECB (Eurosystem or European Central Bank), SNB (Swiss National Bank, Switzerland).

In the case of **direct interventions in the credit market** (purchases of corporate securities and mortgage bonds, direct lending), the central bank establishes direct contact with the private sector, takes over the latter's credit risk, and is thus able to exert a direct influence on risk premia. Direct interventions may be more effective than indirect ones, if non-bank instruments play an important role in the funding of the private sector or if the structural problems of the financial intermediary system that cannot be eased by monetary policy instruments justify the by-passing of the banking system.

Direct interventions in the credit market entail various risks. First, the credit risk that becomes included in the balance sheet of the central bank may result in a loss for the central bank, and thus, ultimately, in a fiscal cost. Second, the interventions may result in unintended sectoral distortion or distortion according to company size, and thus in an inefficient allocation of funds.

Essentially, this group of instruments was mainly applied by the central banks of some developed countries. First, this is explained by the fact that only a few countries have developed securities markets, through which the lending conditions of the private sector can be influenced effectively. Second, due to the credit risk taken on by the central bank and potential fiscal costs, only highly credible central banks have dared to apply these steps.

Typically, some highly credible central banks that reached the zero lower bound used large-volume **government bond purchase** programmes to stimulate aggregate demand and moderate the risk of deflation by reducing longer-term risk-free yields and increasing the amount of money in the economy. By contrast, the government bond purchases by the ECB were motivated by the sharp increase in and overshooting of the yield spreads of some riskier euro-area member countries. In this case, the objective was to ease liquidity tensions in the government bond market, to restore monetary transmission and to avoid a self-fulfilling sovereign debt crisis.

Within unconventional instruments, it is particularly government bond purchases that raise the problem of compatibility with inflation targeting or, in general, with the role of an independent central bank that considers price stability as the primary objective. The borderline between monetary financing and serving the objectives of liquidity or transmission is also not clear.

By reducing the general government's financing costs, government bond purchases may delay fiscal adjustment that might be necessary. In an unfavourable case, this may also undermine confidence in the fiscal authorities and in the independence of monetary policy. When purchases are applied with the objective of macroeconomic stabilisation or in times of government bond market turbulences, credible monetary and fiscal policies are fundamental conditions for successful application. When there is lack of credibility, if the fear of monetary financing becomes dominant in investors' expectations, government bond purchases may eventually result in an excessive increase in inflation expectations and thus also in a rise in government bond yields, which runs contrary to the intentions.

Available **empirical analyses** determined the unconventional instruments applied in developed countries to be successful in easing market pressures, increasing market liquidity and reducing yields. Far fewer estimates have been prepared in respect of the instruments' effects on the real economy. Analysing the instruments of the ECB, the Fed and the BoE, these studies came to the conclusion that although the programmes were unable to kick-start growth, the fall in lending and GDP would have been significantly greater without them. However, we are still far from being able to completely evaluate the effects and costs of direct credit market interventions and government bond purchases. For the time being, the way of reducing central bank balance sheets, i.e. the exit strategy, cannot be seen yet. It is also not clear what effect the extensive use of asset purchases may have on inflation expectations and on the credibility of central banks over the longer term.

In **emerging countries** with a lower credit rating and high external debt, there is much less room for manoeuvre to apply unconventional instruments. During the recent crisis, emerging countries also applied liquidity increasing instruments, but direct interventions in the credit market and government bond purchases occurred only rarely, and mainly in emerging markets that can be considered more developed.

This can only be partly explained by typically lower market tensions, the lesser extent of recession and the lower danger of deflation in emerging countries, and also by the fact that the interest rate level typically did not decline to close to

zero. Extensive use of unconventional instruments is primarily constrained by vulnerability: for countries with a lower credit rating and high external debt, systematic and large-scale liquidity expansion poses risks, as it may result in a depreciation of their currency and in capital flight. On the other hand, a wide range of the instruments applied may ultimately entail fiscal costs, which is affordable only for countries whose fiscal sustainability is not questioned and that have an independent and credible central bank. Otherwise, an intervention may add to the country risk premium and thus to the social cost of the intervention. Finally, securities markets (securities issued by corporations and banks) serving as a potential field for interventions are non-existent or underdeveloped in most of these countries.

As there is no danger of deflation **in Hungary,** and the lower bound of the nominal interest rate is not relevant either, a general easing of monetary conditions cannot be included in the MNB's objectives. Moreover, due to the significant foreign currency exposure of the private sector, a depreciation of the forint entailed by monetary easing would also involve financial stability risks.

In Hungary, the use of unconventional instruments may primarily be justified by the sharp reduction in the supply of credit by domestic banks. The tightness of credit supply is mostly explained by domestic banks' low willingness to lend and, to a lesser extent, by their weakening lending capacity. In addition to banks' high risk aversion, uncertain growth prospects and economic policy measures affecting the banking sector also contributed to low willingness to lend. Following the quick recovery after the first wave of the crisis, banks' lending capacity started to weaken again as of end-2011, due to an increase in foreign currency liquidity tensions as well as a deterioration in the quality of loans and a decline in the capital buffer as a result of the early repayment scheme.

The central bank does not have any means to encourage willingness to lend. Due to banks' weakening capital position and their intention to reduce their balance sheets, central bank instruments by themselves are only able to increase banks' credit supply to a limited extent. However, central bank interventions that by-pass the banking system entail the taking of significant credit risks, and the underdevelopment of direct capital market financing makes them practically unattainable. What the central bank can basically contribute to – through the instruments that improve the liquidity situation of the financial intermediary system and facilitate access to longer-term funds – is that banks' capacity to lend will be less of an obstacle once their willingness to lend recovers.

Market concerns about the sustainability of Hungarian government debt, the high sovereign risk premium and, more generally, the lower credibility of economic policy, however, require especially great caution in the application of unconventional instruments. Instruments that involve taking higher risks by the central bank and government bond purchases by the Bank may entail a further deterioration in investor confidence and eventually a flight of capital.

1 Introduction

During the extremely significant downturn and financial turmoil resulting from financial crisis that started in 2007, it became obvious that monetary policy was unable to achieve its objectives by changing short-term interest rates and using traditional instruments. Consequently, central banks used instruments that were different from the traditional ones. During the crisis years, considerable experience was accumulated in connection with the application of unconventional central bank instruments, and the first assessments were also prepared. Our analysis provides a comprehensive overview of the unconventional monetary policy tools applied in recent years, summarising the main types of the various instruments as well as the conditions, outcomes and lessons from their use. Based on the experience gained in recent years, we also draw some conclusions concerning the applicability of the various instruments in Hungary.

1.1 WHAT ARE UNCONVENTIONAL INSTRUMENTS GOOD FOR?

The ultimate goal of unconventional instruments was to keep inflation close to the target (to avoid deflation), to prevent financial intermediation from collapsing and to reduce the extent of economic downturns. Major central banks basically justified the use of unconventional instruments in two different ways. One of the main reasons for the intensive use of instruments resulting in an expansion of central bank balance sheets during the crisis was that, as a consequence of the monetary easing necessary due to the prospects of recession, the central bank interest rate sank to almost zero in several developed countries, i.e. further monetary easing through short-term interest rates was no longer possible (zero lower bound, hereinafter: ZLB). In this situation, the central bank is able to improve financing conditions by guiding inflation expectations as well as by introducing liquidity increasing measures and expanding the central bank balance sheet and/or changing its composition.

However, the ECB[2] and Borio and Disyatat (2009) emphasise that the application of unconventional instruments may be justified even in the case of an above-zero central bank policy rate, if the transmission mechanism is seriously impaired for some reason. If serious disorder occurs in a financial market that plays an important role in the transmission process, interest rate policy may be ineffective. For example, due to market panic or a sudden loss of confidence, an extremely high premium may appear in a financial market, or the market may dry up completely in certain cases. This is what happened, for example, following the failure of Lehman Brothers, when the sudden disappearance of trust between market participants resulted in the collapse of interbank markets. In cases like this, targeted unconventional instruments may be more efficient than interest rate policy, even if the interest rate level could still allow a general monetary policy easing. With various means, unconventional measures are designed to manage a premium or anomaly considered to be unwarranted in a given sub-market. Intervention is also justifiable when premia reflect actual risks ex ante, but central bank intervention efficiently stimulates demand, and thus spreads become unjustified ex post. In summary, unconventional instruments try to reduce the difference between the central bank policy rate and the various forms of external financing.

It is true in the case of both approaches that unconventional instruments do not conflict with the primary objective of monetary policy, but rather support achievement of the central bank's inflation target and often help avoid deflation, by complementing the conventional instruments, or substituting them in the case of a ZLB. The use of unconventional instruments may be justified by the existence of financial market friction, turmoil, failure or constraint, when instruments changing the size and/or composition of central bank balance sheets may be more effective than traditional monetary or fiscal instruments.

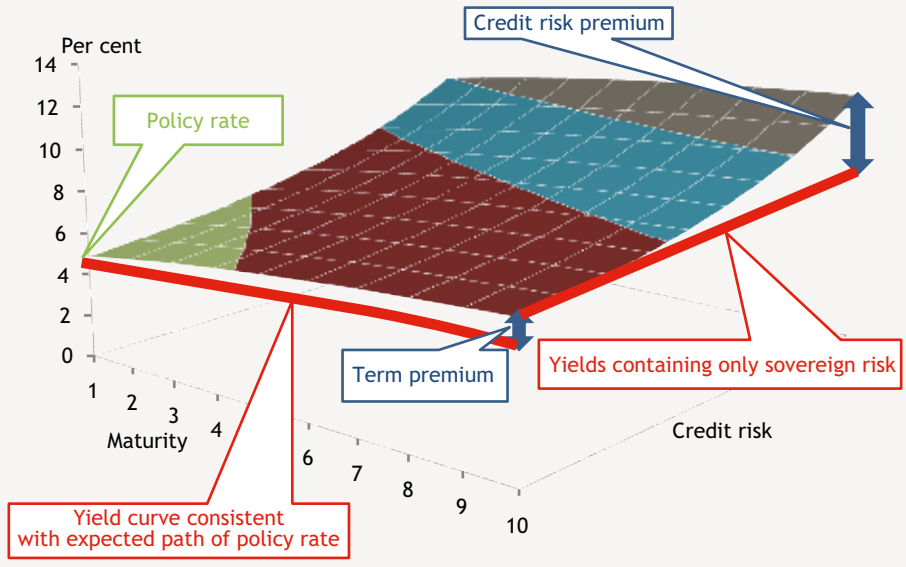
[2] In its communications, the ECB laid great emphasis on distinguishing the strategy of applying unconventional instruments from that of the Fed in the USA in terms of quality as well (Trichet, 2009; Bini Smaghi, 2009; Stark, 2011). The quantitative instruments of the Fed are basically replacing, substituting instruments instead of the standard instruments, after the latter lost their efficiency. By contrast, the ECB's unconventional instruments complement the standard ones that have not (yet) lost their efficiency. The objective of the ECB was to restore the proper functioning of transmission.

Unconventional instruments can be broken down into two basic types, along two dimensions (maturity and the extent of credit risk) (Chart 1).

The objective with one of the groups of instruments is to reduce and flatten the *risk-free* yield curve. In addition to longer-term government bond purchases, central bank liquidity providing measures in which the central bank commits itself at a fixed interest rate for a longer period of time also belong in this category. The purpose of flattening the yield curve was also served by the commitment of the central bank to maintain a lower policy rate for a longer period of time, i.e. to reduce expectations of a policy rate increase.[3] The long-term risk-free yield also contains a term premium, in addition to the expected interest rate. Typically, moderation of the long end of the yield curve included reducing both expectations regarding the expected interest rate path and the term premium above it. The longer end of the yield curve was intended to be influenced expressly by the central banks in those countries in which – due to the close-to-zero short-term interest rate level (e.g. the Bank of England, the Bank of Japan and the Fed) – a significant monetary impulse could only be generated by reducing long-term yields.

The objective of the other group of measures was to reduce the risk premium appearing in one of the credit markets on a segment of the yield curve. For example, this group comprises corporate bond purchases undertaken to reduce corporate credit risk, liquidity providing measures to help reduce interbank market yields that increased sharply due to lack of confidence and also the purchase of government bonds, if its objective is to reduce higher-than-justified sovereign risk premiums (e.g. in the case of the ECB, as described in Chapter 6.2).

Chart 1
Stylised chart of the maturity and risk structure of interest rate transmission



According to the method of intervention, the instruments applied can be classified into three groups:

- facilities that provide liquidity to commercial banks,
- direct interventions in the credit market, and
- purchases of government bonds.

The risks and the impact mechanism are rather distributed along this dimension. Therefore, the instruments are evaluated below according to this classification (the various categorisations and definitions are presented in Box 1).

[3] For example, the Fed, the BoC, the BoJ, Riksbank and the BoE promised to maintain an extremely low interest rate level for a protracted period of time.

Box 1
Credit easing, quantitative easing, qualitative easing: taxonomies and definitions

There are various taxonomies of unconventional central bank instruments. The instruments that expressly aim at improving the conditions of lending to the private sector are known as *credit easing,* although several definitions of this term exist. The narrowest definition (e.g. Ishi et al., 2009) classifies into this category the direct credit market instruments that by-pass the financial intermediary system (purchases of corporate and mortgage bonds, direct lending) and focus on a credit segment in a targeted manner.

In a wider interpretation (e.g. Bini Smaghi, 2009; ECB, 2010), the liquidity enhancing instruments provided to the banking sector are also included, although here the credit market effect is indirect and it also depends on the behaviour of the banking sector. This is why Bini Smaghi (2009), for example, calls these measures indirect or endogenous *credit easing*. In the widest definition, which is applied by the Fed, the purchasing of government bonds is also considered a *credit easing* instrument, because it also improves the conditions of lending to the private sector indirectly, through the decline in long-term yields.

According to Bernanke (2009), the difference between *credit easing* instruments and the quantitative easing applied by Japan is that in the former the emphasis is on the assets side of the central bank balance sheet: the assets included in the balance sheet of the central bank reflect the market segment on which it wants to have a direct impact. The term *qualitative easing* reflects a similar train of thoughts (Goodfriend, 2009; Buiter, 2008). As opposed to *quantitative easing,* its essence is the change in the composition of the central bank balance sheet and not its expansion.

By contrast, the Bank of Japan focused on increasing the quantity of liquidity and defined objectives in terms of the size of the liability side of the central bank balance sheet; the composition of the asset side of the central bank balance sheet was incidental.

In other taxonomies (e.g. Bini Smaghi, 2009; Ishi et al., 2009), *quantitative easing* is used for indicating the purchase of longer-term government bonds.

1.2 THEORETICAL MODELS OF UNCONVENTIONAL CENTRAL BANK INSTRUMENTS

The theoretical models of unconventional instruments focus on financial frictions. In the model of Gertler and Karádi (2011), the financial intermediary system faces endogenous balance sheet constraints. Due to the agenncy problem, basically banks' capital position determines the banks' ability to obtain funds and, through this, credit spreads and lending. Central bank intervention results in welfare gains because, unlike financial intermediaries, the state is able to obtain unlimited amounts of funds by issuing risk-free government bonds. Central bank lending means an efficiency loss compared to the financial intermediary system. However, during a crisis the latter faces especially strong fund-raising constraints, which in turn leads to a sharp increase in the net gain on central bank intervention. Therefore, unconventional instruments are worth applying only in case of financial distress, because net gains disappear following the recovery of the financial intermediary system and economic activity. In this model, intervention – as it is justified by financial frictions – makes sense not only when the policy rate is zero, but the expected gain on the intervention is higher with a ZLB.

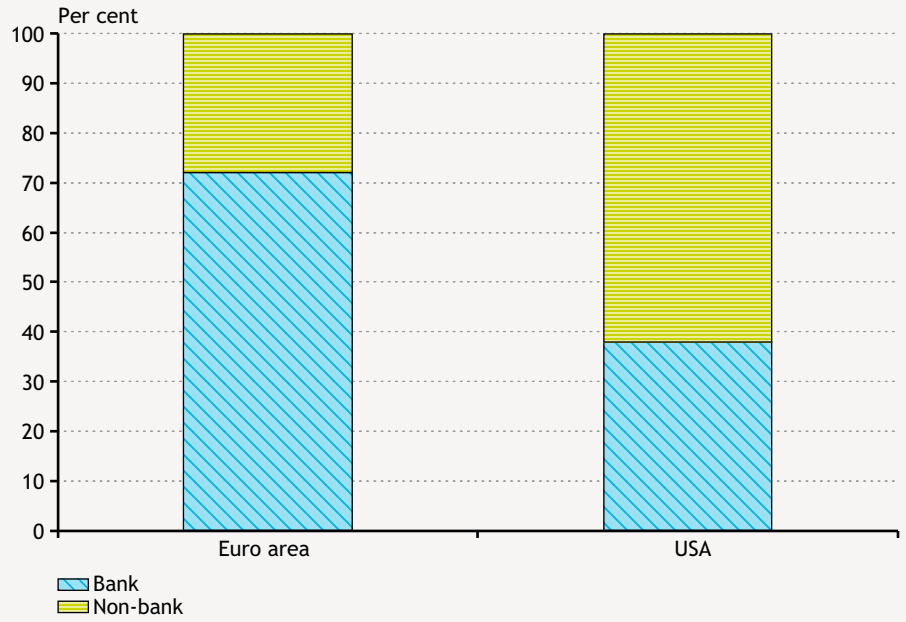
In the new-Keynesian model of Curdia and Woodford (2010a, 2010b) complemented with the financial intermediary system, the source of financial frictions is the asymmetrical information between banks and borrowers, which makes lending costly, and the spreads between deposit and lending rates increase. Similarly to the model of Gertler and Karádi (2011), unconventional intervention results in welfare gains only in the case of turmoil of the financial intermediary system, i.e. in times of financial crises, when the costs of financial intermediation increase dramatically and credit spreads surge. Moreover, the authors make a distinction between various types of unconventional interventions. They examine the change in the size and composition of the central bank balance sheet, and come to the conclusion that while pure quantitative easing – increasing bank reserves – is ineffective, in case of turmoil in the financial intermediary system, targeted credit market interventions, in the course of which the central bank comes into direct contact with the private sector and purchases risky assets, may stimulate economic growth. Similarly to the article by Gertler and Karádi (2011),

they also come to the conclusion that with a zero lower bound of the nominal interest rate the welfare effect of credit policy is greater.

1.3 THE ROLE OF FINANCIAL INSTITUTIONS

Which of the various types of instruments are used and to what extent a given central bank uses them partly depends on the type of the financial shock as well as on the nature and cause of the market turbulence. In addition, however, the choice of instruments is also influenced by the institutional characteristics of the financial system of the country. Direct interventions in the credit market were mainly applied widely in countries where direct capital market instruments have a significant role in the funding of companies (e.g. US, Japan). By contrast, among the ECB's instruments (in line with the dominance of bank financing which is typical of European countries), indirect ones that provide funds for banks had the greatest weight within unconventional central bank instruments (e.g. Bini Smaghi, 2009) (see Chart 2).

Chart 2
Debt financing structure of non-financial corporations
(average of 2004–2008)



Source: Moutot (2011).

1.4 GENERAL SIDE EFFECTS, CHALLENGES

One difficulty in practice is that it is not always easy to identify the cause of the appearance of a given financial market problem or premium: whether the premium appears as a result of unwarranted, temporary market turmoil or there is a permanent increase in risks that can be attributed to fundamentals. Therefore, the extent of the risk taken by the central bank and the expected costs also cannot be clearly judged or assessed in advance.

In addition, a general risk associated with the use of unconventional instruments is that over the longer term it may impair the operating conditions of a given market by practically substituting for the market. It is difficult to find the optimum setting of the conditions to be applied. Therefore, the market may become too dependent on central bank financing, and the conditions provided by the central bank may be too attractive, reducing the motivation for the restart of normal market functioning (Bini Smaghi, 2009).

Moreover, in the case of most instruments there is no guarantee that the liquidity created will ultimately result in a recovery in aggregate demand and economic growth. In an environment of weak demand and weak banking, the portfolio

restructuring triggered by systematic and large-scale liquidity providing programmes may result in capital flows into countries that have greater growth potential, instead of promoting domestic economic growth (CIEPR, 2011).

The structure of our study is as follows: the main types are analysed in Chapter 2, in line with the above group of three. We provide a brief summary of what types of problems the different instruments may basically solve, what conditions are required for their successful application, what risks and costs may arise and what questions are raised by exiting the instruments. We also briefly touch upon the additional risks and problems raised by the application of unconventional instruments in emerging countries. Chapter 3 summarises the experiences with the use of unconventional instruments as well as the empirical analyses and estimates of the effectiveness of the instruments. On the basis of the lessons from the previous chapters, Chapter 4 discusses the applicability of unconventional instruments in Hungary. The Appendix provides a detailed presentation of the instruments used by major central banks and the results of the programmes.

2 Types of unconventional instruments

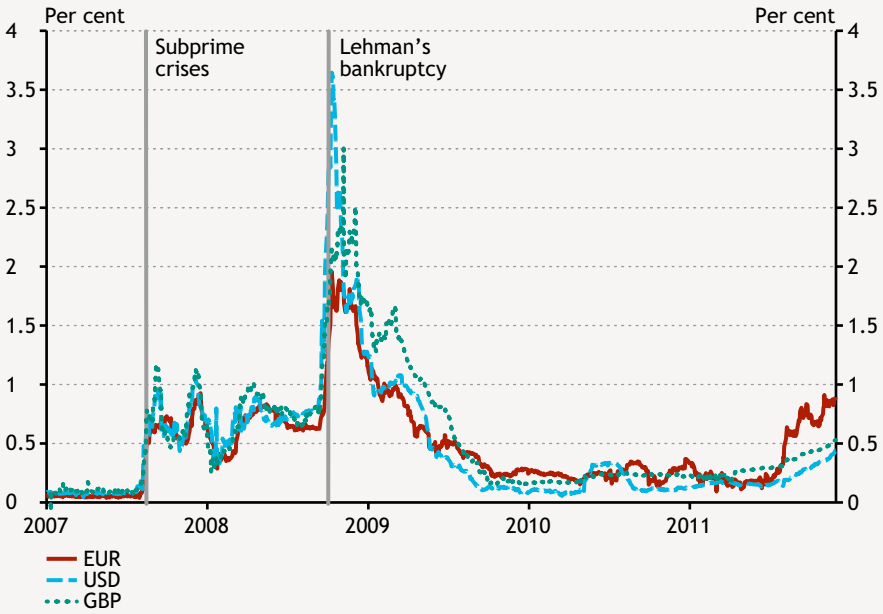
2.1 LIQUIDITY PROVIDING INSTRUMENTS

Liquidity providing instruments basically consist of loans and refinancing facilities provided for the financial intermediary system. In many cases, central banks modified and expanded their own previously existing traditional liquidity instruments, using much larger (often unlimited) quantities and more favourable conditions than before.

2.1.1 Primary objective

The objectives of applying these instruments are to stabilise key financial markets, restore transmission and strengthen the lending capacity of banks by mitigating their liquidity tensions. The wide-ranging application of liquidity providing instruments was primarily warranted by the confidence crisis following the Lehman Brothers' default. The functioning of interbank markets was seriously disturbed, which was reflected, inter alia, in an unusual surge in the spreads between interbank market yields and the policy rate as well as in a dramatic decline in interbank market turnover (Chart 3). Accordingly, banks' cost of funds increased sharply, and the stoppage of the various financial markets threatened with the freezing of monetary transmission and the collapse of financial intermediation. The policy rate was unable to play its role of orienting monetary conditions relevant for the private sector, and the danger that financial market turbulences would have a negative impact on the economy was real.

Chart 3
The spread between three-month interbank rates and the OIS rates



Source: Reuters.

Accordingly, the use of liquidity providing instruments is usually justified if the banking system is characterised by liquidity tensions, if banks are struggling with difficulties in obtaining funds, or if illiquid but not 'toxic' assets are causing problems, and the liquidity problems of the financial intermediary system jeopardise bank lending. In other words, if an

excessive premium (counterparty risk premium, term premium, liquidity premium, etc.) appears in a financial market that plays an important role in bank financing or in the market of an asset important in banks' balance sheets.

2.1.2 Impact mechanism

Through the decline in premia evolving in the markets that play an important part in monetary transmission, liquidity providing instruments usually also reduce the spread between the policy rate and banks' cost of funds, i.e. refinancing costs. In addition to the maturity of the given refinancing facility, this group of instruments also influences the market yield curve over the horizon on which the central bank commits itself to applying the instrument.[4] The central bank's declared commitment to restoring the functioning of the given financial market may also play an important role in stabilising markets (Bini Smaghi, 2009).

However, the final effect of the instrument that reduces the cost of funds of the financial intermediary system on the conditions of lending to the private sector depends on the behaviour of banks. Therefore, a material improvement in credit supply can only be expected if lending is basically limited by the problems discussed above, and banks are willing to lend. In such cases, central bank instruments are able to stimulate lending by mitigating the liquidity tensions of the banking system and reducing banks' cost of funds. The instruments are ineffective if bank lending is primarily limited by banks' capital positions.[5] Also, no result can be expected when the supply of credit is limited due to other reasons, such as a longer-term intention of balance sheet reduction or a significant increase in banks' risk aversion (for example, Japan between 2001 and 2006, which is described in detail in the Appendix).

Exit (the withdrawal of facilities) is the least problematic in the case of this group. Following the end of their maturity, these facilities become automatically excluded from the balance sheet of the central bank, and thus the central bank has to consider how long the given facility should be available. The basis for this decision is provided by developments in the demand for the given facility: with the recovery of the interbank market and the easing of market tensions, recourse to individual facilities may gradually decline; therefore, exit is partly automatic.

2.1.3 Central banks applying these instruments

This is the most widely applied group of measures. In the period following the Lehman Brothers' bankruptcy, almost all the developed countries and – although to a much lesser extent – many emerging countries applied liquidity easing instruments. The weight of liquidity providing instruments among the ones following the outbreak of the crisis was partly determined by the institutional features of the financial system. Within the ECB's instruments, the facilities providing liquidity to banks played the leading role. The main underlying reason is the dominance of bank financing and the insufficient development of the corporate securities market compared to Anglo-Saxon countries.

2.1.4 Basic types

Basically, a distinction is made between liquidity facilities provided in domestic currency and in foreign currencies.

2.1.4.1 Liquidity provision in domestic currency

2.1.4.1.1 Greater, often unlimited amount

In normal times, central banks typically provide a limited amount of liquidity to the financial intermediary system: only an amount that is sufficient for the adjustment of the effective market interest rate to the policy rate. However, when the financial crisis escalated it became obvious that the interbank market was unable to distribute liquidity in an efficient manner, and the total amount of liquidity was insufficient compared to the extremely increased precautionary demand.

[4] For example, if the central bank announces the application of an instrument with a half-year maturity for two years with a fixed yield, it influences the yield curve on a horizon of two and a half years.

[5] In several countries the recapitalisation and treatment of banks struggling with solvency problems took place in parallel with central bank liquidity providing measures.

Therefore, central banks eased or completely terminated the quantitative limits on their liquidity providing facilities; as a result, banks could rely on central bank funds to a much greater extent than usual. The essence of it is that the amount of liquidity provided evolves on the basis of banks' demand, and it is not determined by the central bank, which ensures greater flexibility in times of high stress.

2.1.4.1.2 Expansion of the scope of eligible collateral

For their refinancing operations, developed countries' central banks typically accept liquid assets of excellent quality as collateral. In the intensive phase of the crisis, amidst increased demand for safer assets, a shortage of eligible collateral was also an obstacle to the provision of liquidity. During the crisis, the expansion of the scope of eligible collateral to include less liquid and riskier assets as well (corporate securities with lower credit ratings, securitised corporate and household loans) became typical in order to ease banks' liquidity constraints.

In addition to the direct effect of higher liquidity provision, the eligibility of riskier assets also stimulates the market of eligible collateral in an indirect manner, resulting in a fall in their yields through the decline in liquidity and credit risk premia.

2.1.4.1.3 Extension of maturity – influencing the market yield curve

The objectives with the longer maturity are to reduce banks' longer-term cost of funds and to flatten the yield curve through the moderation of interest rate expectations and the reduction in the term premium. The central bank can thus have an impact on the yield curve on the horizon of the maturity of a given refinancing facility and the period of availability.

It is important to note that if the central bank provides financing for the financial intermediary system with a longer maturity at a fixed rate close to the policy rate, and it raises the interest rate during maturity, a loss may appear in the central bank's balance sheet, practically resulting in a dual interest rate level. Therefore, applying a fixed rate on a longer horizon is relevant if the central bank can commit itself with high probability to the low interest rate for the term of the facility, and it is unlikely that it will be compelled to raise interest rates.

2.1.4.1.4 Expansion the list of counterparties

In the period of the interbank market turbulence, financial intermediaries that were not in contact with the central bank did not have access to liquidity. Large-scale expansion of central bank counterparties was mainly typical of central banks (Fed, BoC) that were traditionally in contact with a smaller portion of the financial intermediary system (with the so-called primary dealers). (Minegishi and Cournéde, 2010). The ECB, which originally had had a wider range of counterparties, was not compelled to expand its list of counterparties.

2.1.4.1.5 Amendment to reserve rules

In the case of central banks where the policy rate declined close to zero and, as a result of unconventional instruments, the amount of central bank money was increased significantly (BoJ, BoE, Fed), liquidity expansion by reducing the reserve ratio did not make sense. In view of the considerable increase in credit institutions' account balances, these central banks started to pay interest not only on the amount of minimum reserves,[6] but also on the account balance exceeding them, i.e. on free reserves. In the case of (mainly emerging) countries with higher reserve ratios, it became possible for central banks to support banks' liquidity positions by amending their reserve maintenance rules (e.g. Hungary, Romania[7]).

[6] Within its normal instruments, the Fed did not pay interest on the minimum reserves either.

[7] In Romania, following eruption of the crisis, the minimum reserve ratio of RON funds with a remaining maturity of less than two years was reduced from 20 per cent to 15 per cent. In the case of foreign exchange funds, in March 2009 the National Bank of Romania cancelled the 40 per cent ratio for the funds with a remaining maturity of more than two years. As of June 2009, it gradually reduced the reserve ratio of foreign exchange funds with a remaining maturity of less than two years from 40 per cent to 20 per cent. The announced objective of the measures is to support banks' liquidity management with the help of interbank markets and to ensure the sustainable and undisturbed financing of the economy with the liquidity that becomes available, thus strengthening the efficiency of monetary transmission as well. The Romanian National Bank pays interest on the minimum reserves below the market rate. Accordingly, as a result of the reductions of the reserve ratio, withdrawal of income through the reserve system also declined.

Major central banks modified the width of their respective interest rate corridors as well on several occasions during the crisis. In parallel with a 0.5 per cent bank rate, the BoE widened the otherwise ±25 basis point band downwards, thus reducing the deposit rate level, i.e. the lower bound for the interbank market rates, to 0 per cent. As the policy rate was already 0.1 per cent, the BoJ was only able to facilitate participants' access to liquidity by reducing the upper bound of the corridor (at end-2008 in two steps, from 0.75 to 0.3 per cent). The situation for the ECB was different due to the higher policy rate; therefore, the objectives behind changing the interest rate corridor were also different.[8]

2.1.4.2 Provision of foreign exchange liquidity

During the crisis, central banks applied two main instruments in the foreign exchange market. Classic FX market intervention, buying or selling domestic currency in the spot market, was possible with the objective of influencing an exchange rate or with the objective to change the amount of liquidity available for the financial system, or as a combination of the two. The other instrument is FX swap market intervention, which – although it had previously been a standard liquidity providing instrument for several central banks – was put into action in the other direction during the crisis, in order to increase the supply of foreign exchange (i.e. to absorb domestic currency).

In the case of spot market intervention, central banks of economies with a more favourable risk perception or strong ability to attract capital (including Japan, Switzerland, or even Israel or China) basically intended to offset the exchange rate effect of massive capital inflows (which was unfavourable from the aspect of their exports) by actively selling their own currency in the market.[9] Several of the riskier countries (Romania, for example) kept the exchange rate of their respective currencies in a narrower band compared to the past by switching over to exchange rate fluctuation managed by active FX market intervention.

The Fed was the first to initiate the series of FX swap market interventions at end-2007, when – upon outbreak of the sub-prime crisis – it concluded swap line agreements, first with the ECB and the SNB, and then later with the central banks of several developed and emerging countries (see Table 1). As a result of these agreements, the central banks concerned provided dollar liquidity to their own partners, in exchange for their own currency. International demand for the dollar basically originated from the fact that non-US banks and investors accumulated considerable amounts of dollar assets that they could finance from shorter-term interbank dollar funds while the functioning of interbank markets was undisturbed and then only from FX swaps during the crisis. Originally, the agreements expired in February 2010, but for a smaller group they were renewed in May 2010.

Table 1
Beginning of the swap agreements of the Fed

Date	Central banks
12 Dec. 2007	ECB, SNB
18 Sep. 2008	BoJ, BoE, Bank of Canada
24 Sep. 2008	Reserve Bank of Australia, Sveriges Riksbank, Norges Bank, Danmarks Nationalbank
28 Oct. 2008	Reserve Bank of New Zealand
29 Oct. 2008	Central Bank of Brazil, Central Bank of Mexico, Bank of Korea, Monetary Authority of Singapore
09 May 2010	ECB, SNB, BoJ, BoE, Bank of Canada

Similarly to the Fed, the ECB also opened swap lines with central banks of more developed European countries, such as the SNB and the central banks of Denmark and Sweden.

[8] First, the corridor was narrowed in order to control the deviation of overnight yields, which were falling due to the liquidity expansion, from the policy rate, and then it was widened in order to stimulate the interbank market.

[9] An extreme example for intervention with an exchange-rate objective is the recent introduction of the Swiss exchange rate threshold. The result of these interventions is the strong increase in foreign exchange reserves and at the same time in the liquidity surplus of the financial system. However, because in the economies where the problem is caused by restrained lending (e.g. Japan) the main obstacle to lending was not the shortage of liquidity, so in this respect these interventions were not effective.

Situations similar to the shortage of dollar in the interbank markets of developed regions also evolved in some European markets with euro and Swiss franc lending, including Poland, the Baltic countries and Hungary. Following the signing of repurchase and swap agreements with the ECB and the SNB, during 2008 and 2009 the Polish and the Hungarian central banks announced FX swap facilities that were able to mitigate the shortage of foreign currency in the swap market. In Hungary, the deterioration in risk perceptions adversely affected the liquidity of the swap market not only because of the narrowing of the limits of the banking system, but also through the rapid selling of forint assets financed from swaps (e.g. government bonds). Of the Baltic countries, the central banks of Estonia and Latvia concluded agreements with the Swedish and Danish central banks.

2.1.5 Risks

Measures providing bank liquidity carry limited risk for the central bank, provided that the institutions financed are really not insolvent. The central bank does not take on any direct private sector credit risk; a loss may be incurred if the bank that was granted a loan goes bankrupt and the collateral loses value. If the central bank has not adequately assessed market needs, and there is no demand for the given facility, it may entail a reputational cost, but the risks do not appear in the balance sheet of the central bank. As mentioned above, interest rate risk develops in the central bank balance sheet with the application of the long-term refinancing facility, but this risk can only materialise if the central bank raises the policy rate.

According to Stone et al. (2011), central bank losses caused by liquidity providing measures applied during the recent crisis can be considered as minimal; up until August 2010 no financial loss was realised.

Nevertheless, interventions in money markets may have unintended distorting effects, such as the crowding out of the market or moral hazard for participants that do not face liquidity problems.

2.2 DIRECT INTERVENTIONS IN THE CREDIT MARKET, ASSET PURCHASES

During asset purchases, central banks buy corporate securities and mortgage bonds or – more rarely – extend loans to financial enterprises. By doing so, the central bank assumes a part of the private sector's credit risk.[10]

Asset purchases are actually possible where the economy has a developed securities market, through which securities based corporate financing is significant, and a high number and proportion of companies (covering several sectors) finance their activities by issuing bonds and commercial paper. In these economies, the ratio of CDOs (collateralised debt obligations), packaged financial products and asset-backed securities is typically high in the market.[11]

2.2.1 Primary objective

The primary objective of this group of instruments is to facilitate the functioning of credit markets, reduce risk and liquidity premia appearing in credit markets, i.e., ultimately, to improve the credit conditions of the private sector. As Bernanke (2009) put it, during the application of direct credit market intervention (credit easing), the central bank concentrates on the composition and size of the purchase of debt securities and other securities (as opposed to the amount of central bank money targeted by quantitative easing), in order to improve the credit conditions of the private sector in the given segment. As bonds are issued mostly by large companies, the intention in the purchase of corporate securities was mainly the improvement of the financing possibilities of large companies, although in Japan and South Korea as well as in a joint programme of the Fed and the US Treasury an attempt was also made to support the financing of the SME sector.

[10] The assumption of risks was mainly typical in the case of covered security purchase programmes. In the case of non-covered corporate securities and programmes that mean actual lending, based on preliminary agreement, government agencies or the treasury undertook the financing of any possible losses, or at least a part of them.

[11] Hirata and Shimizu (2004), Agarwal et al. (2010), Beirne et al. (2011).

In the case of economies with developed securities markets, direct credit market interventions were justified by securities market turbulence (drying up of the market or an unwarranted surge in premia), which threatened to trigger a freeze in lending to the private sector. Direct credit market intervention may also be motivated by the banking sector's inability or unwillingness to extend sufficient loans, and there is a reason behind this inability or unwillingness which cannot be remedied with other monetary policy instruments. Such reasons can include a lack of solvency, or deleveraging due to excessive lending. In such cases, direct credit market intervention, by-passing the banking system may be more effective than the use of measures to provide liquidity. Financing while by-passing the banking sector can be successful, if the importance of non-bank financing or the securitisation of loans is high. Credit rating agencies play a prominent role in direct credit market intervention, as – according to experience – central banks purchased assets with the best credit ratings both in the case of bonds and structured products, and provided loans to investors to buy structured products with the highest ratings. The existence of credit rating agencies facilitated the assessment of risks and reduced the extent of risk taken by the central bank.[12]

2.2.2 Impact mechanism

The effects of asset purchases may prevail through various channels. The *announcement effect* is based on central bank communication. Upon the announcement the central bank indicates to the markets that it will intervene in order to address the disorders in the functioning of the market and to restore the confidence of market participants (Eggertsson and Woodford, 2003). The essence of the *portfolio balance effect* is that the risk premium of assets declines following the announcement of the asset purchase programme. The point of the functioning of the effect is that the share of the private sector in the given asset declines as a result of the purchase from the given asset by the central bank, leading to a fall in expected returns. Finally, the effect feeds through into the yields of other assets as well, as investors fill their portfolio with other assets instead of the ones eliminated from the portfolio. The essence of the *liquidity premium effect* is that using asset purchases the central bank may be able to restore market liquidity in markets where functional disorders arose. Investors' confidence improves because they expect that there are potential buyers in the markets and they can sell their assets. The liquidity of other assets may also improve in an indirect manner as the instrument of the central bank results in an increase in asset prices. Consequently, the wealth of asset holders grows, which may add to their intention to invest. Finally, the *real economy effect* is based on the inflow of money into the economy, which may result in an increase in aggregate demand.

In the model of Gertler and Karádi (2011) as well, central bank intervention eventually facilitates the private sector's access to loans through the reduction in credit spreads. One of their important conclusions is the central bank is able to act more efficiently and with lower costs in the case of asset purchases than in the case of direct lending to the private sector, as direct funding also necessitates the continuous monitoring of debtors, and thus the efficiency cost of the central bank is stronger compared to banks.

2.2.3 Types of direct credit market intervention

Direct credit market intervention by the central bank essentially means the purchase of financial assets. The programmes covered corporate commercial papers and bonds as well as mortgage-backed and asset backed securities. In addition to asset purchases, the instruments of some central banks also included lending to institutional investors (e.g. Fed TALF), which means targeted loans to investors, specifying the financial instrument that can be purchased.

The risks and effects of purchasing different assets can vary. The purchase of mortgage bonds issued by mortgage banks – as they are backed by mortgages – carries a lower risk for the central bank than the purchase of uncovered corporate bonds. Similarly to bank liquidity providing measures, the ultimate goal of purchasing bank mortgage bonds is to stimulate mortgage lending by banks.

[12] There were cases when purchasing by the central bank was not according to specified criteria. For example, when the Fed deliberately bought the bonds of a company that was struggling with financing difficulties (AIG Insurance Corporation), because then it purchased a group of bonds that did not meet pre-determined requirements. Similar was the share purchase by the BoJ, as – contrary to a general purchase of assets – it was also not an intervention according to unambiguous quality requirements, i.e. it was not a group intervention that improves the position of the whole market segment.

As the money market crisis is coupled with recession expectations, small and medium-sized enterprises find themselves under especially significant financing pressure. Direct corporate securities purchases cannot adequately address the difficulties of the SME sector. This is possible either through asset-backed securities (ABS), which also contain SME loans, or through government agencies, which were applied by the Fed, the BoJ and the Bank of Korea.[13]

2.2.4 Central banks applying these instruments

Direct credit market intervention was applied in the economies that have the most developed financial system and the lowest sovereign risk. During the crisis, the Fed and the BoJ announced large-scale asset purchase and – occasionally – direct financing programmes, while those announced by the BoE, the Bank of Korea, the Swiss National Bank and the ECB were of a lesser extent (see Table 2). Considering that the securities market is typically less wide-spread in continental Europe,[14] it is worthy of note that, compared to the liquidity providing instruments, asset purchases by the ECB were of a much lower magnitude, and mostly contained the purchase of covered bonds backing mortgage loans.

It can be considered as a similarity that – with the exception of the ECB and the Bank of Korea – the central banks of developed countries used this instrument in parallel with a zero policy rate, although according to Klyuev et al. (2009), targeted credit market intervention aimed at correcting market turmoil can theoretically be justified even above a zero policy rate. Furthermore, the justification that stimulating the economy and supporting lending was no longer possible with the help of traditional monetary policy instruments was emphasised in communications as well. Presumably, this is partly attributable to the fact that few countries have a developed securities market available, through which the lending conditions of the private sector can effectively be influenced, by-passing the banking sector. On the other hand, the central bank's assumption of the credit risk of the private sector entails risks (see the next paragraph) that were taken only by highly credible central banks in countries where the government budget did not face hard financing constraints.

Table 2
Direct money market interventions and asset purchases by selected central banks

	Fed	ECB	BoJ	BoE	SNB
Commercial paper	x		x	x	
Corporate debt			x	x	x
Mortgage-backed securities (MBS)	x				
Agency debt	x				
Securitised products	x				
Covered bonds		x			
Equities			x		
Long-term government bonds	x	x	x	x	

Source: Minegishi and Cournéde (2010), p.13.

2.2.5 Risks

Risks may appear along several dimensions in the course of direct credit market intervention. These risks basically stem from the relationship between short-term objectives and longer-term side effects. Preliminary assessment of the size of the risk is not clear, because this instrument is typically applied in a weak economic environment and in the case of market turbulences.

The credit risk taken as a result of asset purchases may lead to a direct loss for the central bank, ultimately resulting in a fiscal cost. Regarding asset purchases, it can be generally stated that in many cases the objectives formulated in connection with the programmes may pose risks over the longer term. The reason is that due to recession expectations the primary

[13] Within the TALF programme, in an indirect manner, the Fed also facilitated lending to SMEs. Korea and Japan each applied a programme specifically to address the financial difficulties of the SME sector. While in Japan the BoJ strived to give new momentum to lending by the purchase of asset-backed securities (ABS), in Korea the central bank tried to provide funds by purchasing the bonds of a state-owned SME agency and to improve the SME sector's access to funds, by-passing the banks. Mainly due to their volumes, the programmes did not fulfil expectations.

[14] Erdős and Mérő (2010), p. 26.

objectives of asset purchase are to stimulate the economy and mitigate the downturn by reducing money market turbulences and frictions. However, stimulation is not necessarily implemented in a sustainable manner, which may be risky in several fields over the long term. A detailed discussion of the risks highlighted by Kozicki (2011) is presented below.

The declared objectives of asset purchase programmes are to reduce yields in credit markets, moderate term premia and modify the yield curve of securities in special market segments. These objectives involve the danger that it cannot be quantified what can be considered a justified and equilibrium yield level over the long term. Therefore, the intervention may overshoot its original target, which may cause money market turbulence. It can be similarly dangerous that, as a matter of course, the instruments encourage investors to take greater risks and to buy higher-yield, riskier assets. Therefore, in a worse case, new financial bubbles may develop, and the investments will be made in economies that are not in line with the original objective.[15] Another potential allocation problem is that although the application of the instrument addresses market turbulences over the short run, excess liquidity does not flow to the targeted segment of the economy over the long term, and later the turbulences may occur again more seriously, affecting several sectors. Finally, if a central bank commits itself to buying corporate bonds or corporate debt securities, there will be winners and losers in the private sector in the application of the instrument. This selection issue raise political economy type questions, which may lead not only to sectoral distortions or distortions according to company size, but it is also outside the competence of the central bank.

The risk that is the most difficult to determine is the long-term effect on the structure of the economy. Low interest rates prevailing for a long time may preserve the unhealthy economic structure and prolong the financing and the life of uncompetitive industries in the private sector, thus the necessary sectoral restructuring does not take place or it takes place much later. However, depending on the objectives it may happen that the maintenance of a less viable segment of the economy is justified due to other objectives, and its rationalisation would result in much greater welfare losses (e.g. a surge in unemployment).

Further risks may be posed by the challenges appearing as a result of the asset purchase and related to the central bank balance sheet. Asset purchases significantly alter the structure and size of the balance sheets of large central banks. Between January 2007 and March 2011, the balance sheet of the ECB doubled, that of the Fed increased by two and a half times, and the balance sheet of the BoE approximately tripled, with asset purchases also playing an important role. Central bank balance sheets raise the question of the success of the exit strategy: how is it possible to successfully manage deleveraging in line with central bank targets?

Through the purchase of risky assets, central banks take direct financing risks. Depending on the types of assets purchased, market and credit risks may result in a capital loss. As the loss incurred by the central bank ultimately burdens the budget, the issue of central bank independence and credibility may also be arise over the longer term. If losses are significant from the perspective of the operation, they may even undermine the achievement of monetary objectives, as they may de-anchor long-term inflation expectations, due to the decline in credibility and/or independence.

This additional risk justifies a preliminary agreement on managing and sharing the loss between the government and the central bank as it is also shown by the example of the BoE and the Fed.[16] In these cases, fiscal policy undertook a guarantee to reimburse potential losses – completely for the BoE and up to a pre-determined amount for the Fed. Accordingly, potential losses immediately appear as fiscal costs and not as a central bank loss.

2.3 PURCHASE OF GOVERNMENT BONDS

Government bond purchases by central banks are similar to purchases of credit market instruments in terms of risks and effects as well. However, in this case the credit risk of the sovereign state appears in the central bank balance sheet and not that of the private sector.

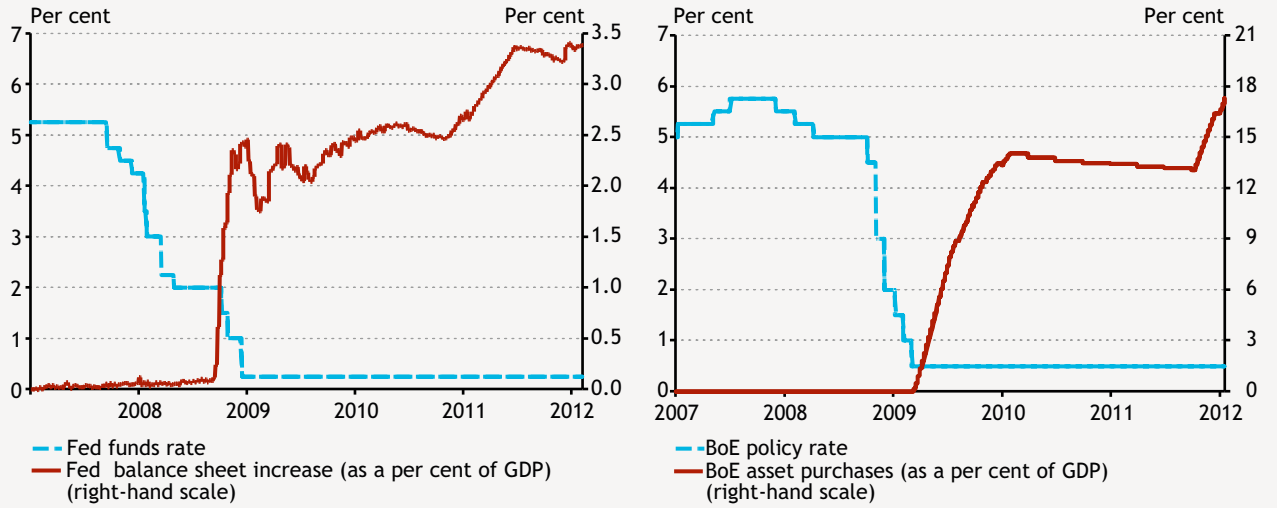
[15] For example, at the time of the crisis a considerable part of the excess liquidity flowed to emerging markets due to the greater growth potential and the thus higher money market yields.

[16] In the USA, a specific loss agreement was concluded between the Treasury and the central bank in connection with the TALF programme. Accordingly, the first USD 10 billion of the losses automatically burden the budget. The BoE received a guarantee for complete compensation from the government for the potential losses suffered on the purchase of corporate securities.

2.3.1 Primary objective

Central banks engaged in government bond purchases with various announced objectives and in different situations. These central banks can basically be classified into two main groups. The first, classical group comprises the central banks of countries that reach the lower bound of the interest rate. Their objectives with government bond purchases were expressly the further expansion of liquidity and the reduction in the longer end of the risk-free yield curve and through that – indirectly – an improvement in longer-term corporate and household credit conditions (Fed, BoJ, Bank of Israel and the BoE to some extent; Chart 4).

Chart 4
Government bond purchases and the policy rate in the case of the Fed (left panel) and the BoE (right panel)



By contrast, the ECB purchased government bonds in a completely different situation and with a completely different declared objective. Upon the outbreak of the debt crisis in 2010, the price of sovereign risks rose considerably, and the spreads between long yields of individual member states increased dramatically. In its announcement launching the programme, the ECB indicated the mitigation of functional disorders of the bond market and the restoration of monetary transmission, which was unable to function due to the market turmoil, as the objectives of the bond purchase, which was announced to be temporary. The ECB wanted to reduce the sovereign risk premium, which was considered exaggerated over the long term and unjustified by fundamentals in the countries that had high yields and were affected by the debt crisis. In addition to the improvement in monetary transmission, the declared objective of the purchases was to avoid a self-fulfilling sovereign crisis, i.e. to prevent a situation when, in parallel with high outstanding debts, strongly rising yields in their own right significantly impair the sustainability of government debt, which leads to a further increase in expected returns and becomes a self-reinforcing process. It is important to note that the ECB purchased government bonds only in cases when the preparation of the programme package ensuring the sustainability of government debt, i.e. the solution to stabilise the government bond market over the long term, was already in progress.

Within unconventional instruments, the purchase of government bonds is the instrument in relation to which the problem of consistency with the inflation target or in general with the independent central bank role that determines price stability as the primary objective mainly arises, as the borderline between liquidity or transmission objectives and monetary financing is blurred. The sale and purchase of government securities on the secondary market (open market operations) with the intention to regulate the amount of liquidity is considered to be a classical monetary policy instrument. In recent decades though, this instrument has also lost its sigfificance as modern central banks tend to influence monetary conditions by short-term interest rates instead of the money supply. However, due to bad historical experiences, direct financing of the general government, i.e. the monetisation of government debt, is considered a taboo for central banks in developed countries (see Box 2). The Maastricht Treaty forbids monetary financing by the ECB (Article 123), and independent central banks of other developed countries typically also refrain from using it. It is important to note that although formally only direct financing, i.e. primary market purchases, amounts to monetary financing, large-scale,

continuous secondary market purchases may ultimately lead to a similar result. By reducing the supply of government bonds they have a continuous mitigating effect on government bond yields.[17]

2.3.2 Impact mechanism

In the classical case, i.e. in the case of central banks that reach the lower bound of the nominal interest rate and purchase government bonds with the aim of quantitative easing, the impact mechanism is similar to that of other asset purchases. The most often mentioned channel is portfolio restructuring, as a consequence of which not only longer-term risk-free yields decline, but also yields on riskier instruments with a similar maturity that work as investments substituting for government bonds (Gagnon et al., 2010; Krishnamurthy and Vissing-Jorgensen, 2011).[18] In addition, depreciation of the currency can be expected as a result of global portfolio restructuring (BIS, 2011; Stone et al., 2011).

The downward effect of government bond purchases on longer-term yields may be strengthened by the effect of announcements on expectations: the market usually considers the actions as a permanent commitment to low interest rates and the loosest possible monetary conditions (Stone et al., 2011). In this manner, the actions may also result in an increase in inflation expectations, a decline in deflation expectations and thus in a fall in real yields exceeding nominal yields. If everything turns out well, this mitigates the real economy effects of the crisis via an increase in aggregate demand.

In the case of turbulence in the government bond market, central bank demand may reduce term premia and excessive risk premia, prevent overshooting resulting from the drying up of the market and a panic, but it has a permanent effect only if market confidence is restored. In times of sharp increases in sovereign risk premia, it often cannot be clearly determined whether the position of the general government can be characterised by solvency or liquidity problems; one of the underlying reasons is that the sustainability of the debt path also depends on the size of yields to be paid on government bonds. However, in terms of the effect on yields, it is a key issue how market participants judge fiscal policy and central bank intervention itself. If the market considers government bonds purchases as monetary financing of the debt of the insolvent, unsustainable state, the decline in yields may be temporary, and an increase in yields may even take place (Klyuev et al., 2009; Stone et al., 2011). Accordingly, a fundamental condition of the success of government bond purchases to mitigate liquidity tensions is the confidence of the market in economic policy. Otherwise, contrary to the intention, this instrument may increase the panic.

Box 2
Monetary financing and inflation

General theoretical and empirical analyses discuss in detail the relationship between the monetary financing of government debt and inflation, fiscal deficit and government debt. Sargent and Wallace (1981) describe the main correlations by presenting two baseline scenarios. In the first case, monetary policy dominates fiscal policy; therefore, central bank directs its policy independently. For example, it can independently decide on the growth rate of the monetary base, which, at the same time, also influences fiscal revenue originating from money creation, i.e. developments in seigniorage. In this case, fiscal policy functions under a compulsion to comply, as with a given seigniorage the fiscal deficit is influenced by the demand for government bonds. In this case the monetary authority is able to control inflation efficiently. In the second case, fiscal policy is dominant over monetary policy, and the fiscal authority determines the budget independently. If fiscal policy generates persistent deficits, it independently determines the amount that has to be produced through bond issue and central bank money creation together in order to finance the deficit. As demand in the bond market at a given yield is limited, the central bank has to finance the budget deficit (or a part of it) through seigniorage, and thus it will not be able to control inflation. The study emphasised that in this case the final result is an increase in inflation. The model demonstrates that over the long term inflation is a phenomenon related to fiscal policy. Consequently, the current price level may increase despite the current tightness of monetary policy, so inflation depends not only on today's money supply but also on the future money supply.

[17] At end-2010, the BoE held a considerable portion – nearly 25 per cent – of the total government securities outstanding; the Fed held 13 per cent. Similar dilemmas arose in connection with the government securities purchase programme of the ECB as well.

[18] The Bank of Japan, which concentrates expressly on bank balance sheets, emphasised the impact of government securities purchases made through bank reserves, according to which banks spend the liquidity originating from the selling of government securities on lending (Stone et al., 2011).

Empirical analyses show that the economies that have higher total debt and are less strict in reducing the general government deficit are less committed to tight monetary policy and thus to a lower rate of inflation. Kwon et al. (2006), for example, found that while in emerging countries with high total debt there is a strong correlation between government debt and inflation, this correlation is weak in other emerging countries, and is not true for developed countries in general. Several studies[19] present dynamic models for the sustainability of government debt, capturing the correlations between government debt, growth, inflation, fiscal deficit and interest rates.

The monetisation of government debt raises numerous problems. Inflation in itself does not reduce the real value of debt; it is only reduced by unexpected inflation. However, if inflation becomes included in expectations, expected returns required by investors will increase. Therefore, a reduction in the real value of debt can only be imagined with surprise inflation. In this case the monetary authority gives up its price stability objective and, as a result, it can contribute to the financing of fiscal policy at the price of a significant welfare cost.

Based on historical experiences, persistent monetisation of the fiscal deficit leads to a considerable increase in inflation. Several examples showed that in extreme situations monetary financing of debt resulted in permanently high, galloping or hyperinflation. The cases of hyperinflation are usually related to wartime periods, disasters and simultaneously to extreme fiscal shocks (Weimar Republic in 1920–1923, Greece, China and Hungary after World War II, Yugoslavia 1992–1994). In these periods, the state does not function well either; often the collection of state revenues is also problematic, and the persistently high level of budget deficit was coupled with economic downturn, aggravating the fiscal crisis.

Other cases may also serve as an example that galloping, hard-to-coordinate double-digit inflation or hyperinflation may evolve even in less extreme situations, as a consequence of a persistently weak fiscal position. Latin American examples showed that monetisation of debt can force both fiscal and monetary policies into extreme situations and put them on an unwanted path. In the 1980s, Argentina, Bolivia, Brazil, Nicaragua and Peru fell in the trap of monetisation. Prior to the debt crisis, the increase in fiscal expenditures was considerable in each of these countries. They implemented significant public investment programmes from cheap foreign funds, and irresponsible spending resulted in an excessive deficit. Before the debt crisis, cheap foreign loans allowed governments to avoid monetisation. In 1982, due to a material deterioration in the terms of trade and a significant global increase in real interest rates, they faced the growing cost of debt servicing, which was exacerbated by the stop of capital inflows. In this situation, Latin American countries resorted to the tool of monetisation, and the outcome was persistently high or hyperinflation.

Due to the historical experiences, the prohibition of monetary financing was included in the Treaty on European Union as well.[20] Upon creating the euro area, the rules were formulated with the objective to be able to discipline with the Treaty the countries in a worse fiscal and debt situation that would be beneficiaries of the adoption of the single currency, due to the credibility of the area. The so-called 'no bail-out' clause set forth in the Treaty (Article 123) is important because of the moral hazard as well, since the regulatory framework can only have any disciplinary force if in connection with a poorly performing country it can be assumed that the well-performing ones or the central bank will not save it. This was necessary to make even the countries pursuing a disciplined fiscal policy interested in the adoption of the euro.

Although the crisis partly overwrote the rules, the European Central Bank continues to refrain from the open financing of government debt. Consequently, of the earlier members of the European Union, Greece, Ireland and Portugal received their respective rescue packages under an IMF agreement.

[19] Buiter and Grafe (2003), Pasinetti (1998).

[20] Article 123 (former Article 101 of the Treaty establishing the European Community):
(1) Overdraft facilities or any other type of credit facility with the European Central Bank or with the central banks of the Member States (hereinafter referred to as ‚national central banks') in favour of Union institutions, bodies, offices or agencies, central governments, regional, local or other public authorities, other bodies governed by public law, or public undertakings of Member States shall be prohibited, as shall the purchase directly from them by the European Central Bank or national central banks of debt instruments.
(2) Paragraph (1) shall not apply to publicly owned credit institutions which, in the context of the supply of reserves by central banks, shall be given the same treatment by national central banks and the European Central Bank as private credit institutions.

2.3.3 Risks

The most important risks associated with government bond purchases are related to the problem of monetary financing. The actions may have the unfavourable fiscal consequence that – by reducing the financing costs of general government – they may delay fiscal adjustment, which might be necessary, and – by creating an illusion of sustainability – result in a build-up of debt that cannot be sustained over the longer term. In an unfavourable case, this may also undermine confidence in the fiscal authorities and in the independence of monetary policy. When there is a lack of credibility – if fear of inflationary financing becomes dominant in investors' expectations – government bond purchases may eventually result in an excessive increase in longer-term inflation expectations and thus also in a rise in yields on government bonds, which is contrary to the intentions (Stone et al., 2011).

Another risk is that longer-term government bond purchases result in a maturity mismatch, i.e. interest rate risk, in the balance sheet of the central bank. Accordingly, an increase in short-term interest rates may produce a loss for the central bank.[21] Until mid-2011, government bond purchases had not resulted in any costs for the BoE, the Fed and the ECB so far.

A more general effect, which is connected to the majority of unconventional instruments, is that the price information content of longer yields declines, and the flattening of the yield curve has an intertemporal distribution effect from savers towards debtors. This, as in the case with other asset purchases, raises the risk of inefficient resource allocation and of the flow of liquidity to unintended areas.

Let us point out that in the case of direct credit market interventions and government bond purchase, it is still not possible to comprehensively evaluate the risks associated with the use of unconventional instruments. The balance sheets of the major central banks using such instruments still contain significant quantities of government bonds and corporate instruments as well, and for the time being the method of balance sheet reduction, i.e. the exit strategy, is not clear. In the United Kingdom, for instance, there are sharp debates on the possible long-term effect of the controversial extent of the application of asset purchases on inflation expectations and on the credibility of the central bank.

2.3.4 Central banks applying these instruments

It follows from the above risks that large-scale government bond purchases were carried out by the highly credible central banks of developed countries with a track record of low inflation (first in Japan in the 2001–2006 QE programme, then by the Fed and the BoE starting from 2009 and finally by the ECB as of 2010). Of the emerging countries it was Israel, which also reached a low interest rate level, where a considerable amount of government securities was purchased, although the magnitude was still lower compared to large central banks. In addition to the above, at the time of the confidence crisis which threatened a complete freezing of the government bond market following the failure of Lehman, Hungary also bought a small amount of government bonds.

Stone et al. (2011) emphasise that government bond purchases applied with a macroeconomic stabilisation objective may only be relevant over the longer term for central banks of countries reaching the lower nominal bound and having a reserve or safe haven currency; risks are significant even in these cases. Temporary government bond purchases conducted in times of market turbulences may primarily be relevant not upon reaching the lower bound of the nominal interest rate, but the major aforementioned risks appear the same way in this case as well. Therefore, successful application requires credible monetary and fiscal policies even in this case, and intervention should really take place only in extraordinary cases.

[21] The effect of changes in the interest rate on the profit/loss of the central bank depends on the repricing of the yield curve, the exit strategy and the accounting rules. In certain cases, the central bank may even realise a loss.

3 Experiences of applying unconventional instruments

The unconventional instruments used during the financial crisis are presented below. This chapter summarises the general lessons from and results of the programmes. Detailed descriptions and evaluations of the programmes applied by individual central banks are contained in the Appendix.

It is important to emphasise that numerous methodological difficulties arise in these evaluations. It is a fundamental methodological problem that the market effects of asset purchases cannot be clearly separated from the effects of other liquidity increasing instruments, other monetary instruments or other market developments, and there is no well-established alternative scenario. Nevertheless, numerous studies and researches have attempted to quantify the effects of programmes or groups of programmes.[22]

3.1 DEVELOPED COUNTRIES

The majority of empirical analyses examined the effects on financial markets, and particularly the impact on the yields on the instruments concerned (on the term premium and risk spreads) or on quantitative elements (market turnover, credit supply). Most of the studies emphasise the success of the programmes in easing monetary and financial conditions and in improving the liquidity situation in the case of all three types of unconventional instruments. According to Klyuev et al. (2009), market panic typically declined in the market segment where the intervention took place. In line with that, financial stress indicators fell back to close to the level that had been typical prior to the Lehman's bankruptcy, and risk spreads typically declined.

Far fewer estimates were prepared on the effect on lending and aggregate demand, but – concerning the programmes of the Fed, ECB and BoE – they usually revealed a significant, positive macroeconomic effect: without use of the instruments, the fall in lending and GDP would have been greater, even though the instruments were unable to put lending and the economy on a growth path (Klyuev et al., 2009). Central banks play a limited role in contributing to the capital needs of commercial banks. Despite the fact that many banks increased their capital during the crisis, thereby managing to stabilise the banking system, a sufficient amount of capital was not available even after the increases to launch satisfactory lending and economic recovery. Accordingly, the real economy outcome can better be shown in the sense of how much stronger the downturn would have been had the programmes not been used. The Japanese example, which is the only programme that can be considered entirely completed so far, also shows that in the case of structural problems in the financial intermediary system, unconventional instruments may be able to achieve only limited results.

It is important to emphasise, however, that even if interventions can be considered successful over the short run, a comprehensive evaluation of the new instruments will become possible only after completion of the programmes. As the programmes launched during the crisis have not come to an end yet (especially with regard to asset and government bond purchases), clear conclusions are still to be drawn in many cases. (The findings of the analyses about the quantitative evaluation of the programmes of individual countries are summarised in Tables 3 and Table 4; a more detailed description of the results is contained in the case studies of the Appendix.)

[22] The instruments applied included regression, econometric models (VAR, GARCH-M, error correction model and distributed lag model), DSGE models and case studies.

Table 3
Evaluation of the money market effect of asset purchases

Authors	Programme*	Methodology	Money market effect
Gagnon et al. (2010)	Fed QE1	Regression	The term premium of ten-year government bonds may decline by 52 basis points, whereas the term premium of ten-year mortgage bonds may decline by 38 basis points on the basis of the measures.
Neely (2010)	Fed QE1	Portfolio model, case study	US Treasury Bill yields declined by 88 basis points, by 57–75 basis points in other countries; case study: 107 basis point fall in yield, US Treasury Bills.
Krishnamurthy and Vissing-Jorgensen (2011)	Fed QE1	Regression, case study	Regression: Aaa-Baa spreads declined by 4–61 basis points, case study: Treasury Bills by 107 basis points on average.
Joyce et al. (2011)	BoE QE	Portfolio model (VAR, GARCH-M)	The model showed a 30–85 basis point decline in Treasury Bill yields, whereas the case study revealed a 100 basis point fall in yield.
Beirne et al. (2011)	ECB CBPP	Regression, MEC, error correction model, distributed lag model	The yield of covered bonds declined by 12 basis points on average. It was not successful in euro area countries struggling with debt problems.
Hancock and Passmore (2011)	Fed MBS	Regression	Announcement effect: reduced mortgage market yields by 85 basis points; the asset purchase reduced the yields by a further 50 basis points through the risk premium.
Adrian et al. (2010)	Fed CPFF	Case study	Overall, it reduced the premium of commercial papers (one-month commercial paper interest rate – one-month overnight index swap rate). The premium of one-month AA-rated commercial papers fell by 150 basis points between October and December 2008, while the premium of asset-backed commercial papers (ABCP) declined by 170 basis points. At the same time the premium o low-rated (A2/P2) commercial papers continued to increase (risk aversion due to reports), and started to decline only as of early 2009.
Agarwal et al. (2010)	TALF	Case study	Reduced the premia to the pre-Lehman's bankruptcy level in the ABS classes, and allowed the issue of new ABSs.
D'Amico and King (2010)	Fed QE1	Regression	Pushed down the yield curve by 50 basis points on average, with an especially significant effect in the case of the 10–15-year maturities. The daily effect was estimated to be 3.5 basis points on the days of purchases.
Swanson (2011)	Operation Twist, Fed QE2		Reduces the yield curve by 15 basis points.
Fuster and Willen (2010)	Fed MBS		Significant dispersion in the change in yields, 0–40 basis point decline.
Hamilton and Wu (2010)	Fed QE2	Regression	According to the model, at 0 interest rate level the swapping of short-term bonds for 10-year maturity may reduce the yield of 10-year bonds by 13 basis points without an increase in short-term yields.
Stroebel and Taylor (2009)	Fed MBS		No significant effect.

** Fed QE1: the first asset purchase programme of the Fed; Fed QE2: the second asset purchase programme of the Fed; Fed MBS: the mortgage market asset (MBS) purchase programme of the Fed; Fed CPFF: Commercial Paper Funding Facility of the Fed; TALF: Term Asset-Backed Securities Loan Facility of the Fed; BoE QE: the asset purchase programme of the BoE; ECB CBPP: the covered bond purchase programme of the ECB.*

Table 4
Macroeconomic effects

Baumeister and Benati (2010)	Fed QE1, BoE QE	Regression	USA: Without the QE programme, 2009 Q1 GDP would have been 3 percentage points lower, and inflation would have been 0.2–0.3 percentage points higher in 2009. UK: Without the QE programme, 2009 Q1 GDP would have been 4 percentage points lower; inflation would have been 4 percentage points higher in 2009 Q1 and approximately 1 percentage point higher in the rest of the year.
Chung et al. (2011)	Fed QE1, Fed QE2	GARCH-M	USA: Without the QE1 programme, real GDP would have been approximately 2 percentage points lower, unemployment would have been 1 percentage point higher until 2012, and inflation would have been 0.7 percentage points lower until 2011. The QE2 programme resulted in a further 1 percentage point weaker fall in GDP (compared to QE1) and in a further 0.5 percentage point improvement in unemployment. Inflation increased by a further 0.3 percentage points as a result of the QE2 programme.
Lenza et al. (2010)	ECB liquidity expansion	B-VAR model	As a result of the programme, private sector credit growth was some 1.5 percentage points higher and unemployment 0.5 percentage points lower than in the scenario without the measures.
Fahr et al. (2010)	ECB liquidity expansion	DSGE model	Without the instruments, the euro area would have been characterised by a more than one percentage point lower GDP growth and deflation until 2010 H1.
Kapetanios et al. (2011)	BoE QE	Time series models	According to the model estimates, government bond yields would have been 100 basis points higher, while GDP would have been 1.5 per cent and inflation by 1.25 per cent lower without the QE programme.
Deutsche Bank (2010)	Fed QE2		USA: The level of real GDP is 0.3 percentage points higher in the year following the programme. Unemployment is 0.2 percentage points lower one year after launch of the programme, and may be 0.5 percentage points lower two years after the start of the programme. Inflation may be 0.1–0.2 percentage points higher for two years.

3.2 EMERGING COUNTRIES

Following the Lehman bankruptcy, central banks in emerging countries widely – although to a lesser extent than the central banks of developed countries – used instruments designed to reduce liquidity tensions, mainly consisting of foreign currency liquidity instruments. However, large-scale and systematic liquidity increasing instruments, direct credit market interventions and government bond purchases were used only sporadically and only in emerging countries that can rather be considered – in many respects – as developed countries (Ishi et al., 2009; Stone et al., 2011; Moreno, 2011).

In 2009, corporate bonds and government securities were purchased by the Korean and Israeli central banks, respectively. Both countries have low policy rates, much more favourable credit ratings than what is typical of emerging countries, better inflation performance and developed capital markets. Overall, they are much less vulnerable.

The fact that emerging countries applied unconventional central bank instruments less frequently is attributable to two basic reasons. First, macroeconomic pressure was typically lower, as the central banks concerned were much more rarely close to the ZLB. Following the outbreak of the crisis, as a first reaction, interest rates were raised in many emerging countries. As a result, the average policy rate was above 5 per cent in 2009 as well. In many cases, the extent of the real economy shock to the economy and the financial market turbulence was smaller, and generally there was no danger of deflation that made further monetary policy easing necessary in the developed countries (Ishi et al., 2009).

However, due to their vulnerability, in many emerging countries, for example in the CEE region, there is much less room for manoeuvre to apply unconventional instruments than in developed countries. Due to the lower average credit rating, higher country risk premium and high external debt, extensive and systematic liquidity expansion carries risks, as it may result in a capital flight and undesired exchange rate depreciation, instead of an upturn in real economy demand (Ishi et

al., 2009). This is particularly true if the credibility of monetary policy is low, and the market tends to consider the actions as delegating fiscal tasks to the central bank, hiding fiscal burdens or monetary financing.

Evaluated within the framework of the model of Gertler and Karádi (2011), limited room for fiscal policy means that the state – contrary to the assumptions of the model – is unable to obtain unlimited amounts of funds from the market without incurring additional costs. It can do so only with a further increase in the risk premium, which impairs the sustainability of government debt. Accordingly, with an increase in the already high sovereign risk premium, which is sensitive to a further growth in expenditures, the liability side advantage of the state is much smaller than in the Gertler–Karádi model, which emphasises the balance sheet constraints of the private sector, thereby questioning the effectiveness of intervention.

These risks are confirmed by the analysis of Jacome et al. (2011), in which the authors reviewed the financial crises of 16 Latin American countries between 1995 and 2007 and examined the effect on financial markets and the macroeconomy of the central bank liquidity provided during the crises. They found that central bank schemes that intended to improve the liquidity position of the banking sector typically tended to add to instability. Against the background of limited economic policy credibility, monetary policy was unable to restore confidence in financial markets. Withdrawn from weaker financial banks, the funds and subsidiess provided to the financial system landed at stronger banks or abroad as capital outflow, thus weakening the exchange rate and the position of troubled banks. Yields continued to grow as depreciation and inflation expectations strengthened, resulting in a further increase in stability strains. Overall, active monetary policy in many cases was not only unable to prevent the development of exchange rate and bank crises, but also contributed to these crises with the excessive amount of liquidity provided to the financial system. Due to the high foreign currency debts, the 'monetisation' of bank crises usually had a negative impact on economic growth as well.

According to the study, significant liquidity provision by the central bank also damaged the independence of the central bank in many cases. With bankruptcies of banks and losses in the value of collateral, the programmes sometimes resulted in significant costs. In many cases the government was unwilling to reimburse the loss and increase the capital of the central bank, thereby jeopardising the efficient functioning of the central bank and the achievement of its objectives.

4 Applicability of unconventional central bank instruments in Hungary

This chapter provides an overview of how Hungary was affected by the crisis, what reasons the economic downturn and the problems of the financial system are attributable to and what options the MNB may have in applying the unconventional central bank instruments described above.

The process of indebtedness that occurred in the Hungarian economy in the past decade resulted in excessive imbalances in certain sectors and a significant increase in the country's external debt. This became particularly obvious with the outbreak of the global crisis, as the debts that had been considered manageable earlier became risky in terms of sustainability with the deterioration in growth prospects, the surge in the country risk premium and the depreciation of the forint (especially against the Swiss franc).

The challenge for monetary policy (and for economic policy in a wider sense) in a situation like this is to support the reduction in imbalances that also threaten the stability of the financial system, but to do so in a way that avoids any greater-than-necessary compulsion to deleverage or adjust balance sheets. Part of this is the prevention of an excessive fall in demand entailing price and wage deflation, as asymmetrical nominal rigidities would result in considerable adjustment costs. However, some slowdown and decline in the demand of indebted sectors is unavoidable.

The MNB's 2010 *Convergence Report* revealed that excessive indebtedness mainly occurred in the general government sector. The picture is less clear in the case of households: a credit boom was observed especially in 2007 and 2008, but net financial savings of the sector as a whole cannot be considered low in international comparison; it is primarily the currency composition of outstanding loans which poses a risk. Nevertheless, the permanent stagnation of consumption may also indicate that there is heterogeneity within the sector, and balance sheet adjustment may be a protracted process.[23] Corporate sector debt cannot be considered excessive, although in the years preceding the outbreak of the crisis an increase in foreign exchange loans was observed in the SME sector as well, which typically does not have any export revenue and thus any natural hedge. Overall, while fiscal adjustment and – to a certain extent – the reduction in households' foreign currency debt are desirable and constitute a process that restrains domestic demand in a natural manner, a fall in corporate lending may result in a considerable welfare loss.

The high country risk premium due to external indebtedness, unanchored inflation expectations due to the heritage of the past and domestic economic agents' long open forint positions did not allow the MNB to stimulate demand by reducing the interest rate level to the minimum, as it was done by the central banks of other, less indebted countries. Due to the foreign currency debts of domestic agents, the exchange rate channel does not work the usual way: with the weakening of the exchange rate, the portfolio quality of the banking system worsens and therefore, banks' ability to take risks declines, resulting in an increase in credit spreads and/or credit rationing.[24, 25] Consequently, the effectiveness of traditional monetary easing weakens, and above and beyond a certain point it may be expressly harmful, as in parallel with reducing the cost of speculation against the forint, it may add to the credit spread of riskier players (households, corporations, state).

[23] Of course, the strengthening of the Swiss franc also plays a role in households' consumption-savings decisions, and it is difficult to identify whether the original amount of outstanding debt or its revaluation forces the households that do not have significant savings to restrain their consumption.

[24] It is important to emphasise that banks' risk aversion may have an unfavourable effect on every sector, irrespective of whether the vulnerability of the given sector has played a role in the underlying reasons.

[25] The change in the exchange rate channel is discussed in detail by Krekó and Endrész (2010).

Accordingly, in the case of Hungary it is not the zero lower bound of the nominal interest rate that causes the problem of monetary policy. Therefore, the adaptation of instruments that aim at reducing the yield curve (driving down interest rate expectations or quantitative easing implemented through government bond purchases) cannot be justified in the domestic environment. Moreover, it carries risks.

Government bond market interventions may have two further motives, in addition to the reduction in the yield curve: avoidance of market overshootings and drying up, ensuring liquidity in the government bond market or easing the financing of the budget. Although their intentions are different, these two objectives cannot always be separated in practice, as secondary market turbulences are usually coupled with the failure of auctions; therefore, bond purchases in the secondary market may stimulate auction demand as well. This correlation represents the greatest risk of the intervention. Secondary market intervention in the case of temporary market tensions may be justified if the turbulences can be reduced and liquidity can be restored using it. By contrast, supporting the financeability of the budget by government bond purchases is extremely risky, because it immediately erodes the credibility of the central bank and may result in inflation and depreciation expectations, causing a further increase in yields, and in the worst, but not at all implausible case it may lead to a sudden flight of capital. Accordingly, intervention aiming at the mitigation of government securities market turbulences can only make sense if it can be communicated in a credible manner that the intervention aims to address a temporary market liquidity problem, market participants trust in the commitment of fiscal policy, and the risk of monetary financing does not arise. However, considering increased perceptions of the risks associated with domestic assets, it is highly probable that government bond purchases would entail negative market effects.

While the lower bound for the nominal interest rate – and thus quantitative easing – is not relevant for Hungary, theoretically the strong credit supply constraints raise the justifiability of the application of unconventional central bank instruments.

Instead of influencing of the government bond yield curve which involves significant risks, theoretically, it is also possible to improve the conditions of lending to the private sector by reducing the premia evolving above the sovereign yield curve.[26] Due to the underdevelopment of securitisation and direct capital market financing, this can basically be carried out by stimulating bank lending. Within that, corporate lending may be the primary target, as the lending surveys and Sóvágó's (2011) estimate also confirm that the tightness of banks' credit supply in the corporate segment hinders economic growth. The tightness of credit supply is mostly explained by domestic banks' low willingness to lend and, to a lesser extent, by their weakening lending capacity.

Fábián et al. (2011) come to the conclusion that it is presumably not possible to significantly stimulate lending by liquidity expanding interventions that do not entail considerable risk-taking by the central bank, because the Hungarian banking system is characterised by excess liquidity. However, in the case of banks' excessive risk aversion there may be an effective possibility of intervention if risk sharing is achieved between the banks and the state in respect of the credit risk of the client. Adequate forms of this can be guarantee undertaking schemes and lending by the state.

However, following the quick recovery after 2008, banks' lending capacity started to weaken again as of end-2011, due to an increase in foreign exchange liquidity tensions as well as a deterioration in portfolio quality and a decline in the capital buffer as a result of early repayments. Due to high FX swap holdings and increased foreign exchange rate volatility, in the recent period it has become more likely that lending, which will probably pick up if willingness to lend strengthens, may be limited in turbulent periods by the tightness of liquidity through lending capacity. All in all, the weak lending activity continues to be primarily explained by the insufficient willingness to lend.

It is important to emphasise that banks' low willingness to lend in itself does not necessarily mean that there is market imperfection, friction or failure that would require intervention and risk-taking by the state. It is not clear to what extent banks' low willingness to take risks is attributable to excessive risk aversion that cannot be supported by the fundamentals and to what extent it reflects actually high risks. As a result of the financial crisis, a drastic decline in banks' willingness to take risks was observed throughout the world. However, the developments in lending in Hungary, which are less

[26] During the crisis, the MNB intervened in the mortgage bond market, which is of key importance in terms of long-term savings, but due to the lack of market participants' cooperation it stopped its programme (see Box 3).

favourable than in the region, indicate that country-specific factors – an increase in profitability risks due to higher uncertainty about the macro and regulatory environment – are also contributing significantly to low credit supply. The question is what opportunities the various types of unconventional central bank interventions may have in this situation.

Several risks can be highlighted in connection with the effectiveness of the instruments that stimulate corporate lending. At present, we think that, against the background of the deteriorating profitability of domestic banks and the weakening capital position of parent banks in relation to the euro crisis, it cannot be ruled out any longer that banks are striving to restore their capital adequacy in part by reducing their loan portfolios. In this case, the instruments that improve the liquidity position and financing conditions of the banking sector may only have limited effect. The success of interventions may also be questioned, if in the medium term banks plan to reduce their balance sheets due to the deteriorating outlook for profitability. The failure of the first programme of the Bank of Japan as well as the limited efficiency of the MNB's instruments introduced in 2009 to stimulate lending also highlight this risk (Box 3). In this case, willingness to lend cannot be increased by the central bank's indirect instruments that have their effect through the banking system. Therefore, only an intervention that completely by-passes the banking system could be effective, which would mean taking a significant credit risk. However it is impeded also by underdevelopment of direct capital market financing. Finally, if domestic economic agents – due to their excessive indebtedness and the unfavourable potential growth prospects – carry out a sustained balance sheet adjustment, intention to invest, and thus the demand for loans, may remain low in an interest rate insensitive manner, against which direct instruments to stimulate lending may also prove to be inefficient.

Box 3
New central bank instruments introduced in Hungary during the crisis

The instruments introduced by the MNB during the crisis can be classified into three main groups: FX swap facilities aiming at mitigating money and FX market tensions and providing foreign exchange liquidity, facilities designed to increase forint liquidity and instruments supporting the functioning of securities markets.

A. Provision of foreign exchange liquidity

In October 2008, market turbulence first appeared in the FX swap market.As domestic banks' access to foreign currency funding was significantly constrained, their dependency on the swap market increased suddenly. The decline in the liquidity of the swap market jeopardised the access of domestic banks to foreign currency liquidity, and at the same time entailed a fall in prices and forint implied yields. This posed a financial stability risk and – due to the damage to interest rate transmission – a monetary policy risk as well; the MNB introduced several instruments to manage them.

As of 13 October 2008, the two-way overnight EUR/HUF FX swap was the first facility with which the MNB stood between market participants, thus – without using the foreign exchange reserves – it mitigated the tension by connecting demand and supply. Three days later, following the conclusion of a repurchase agreement with the ECB, the overnight EUR/HUF FX swap standing facility financed from central bank reserves was introduced, which meant a simpler and more efficient intervention in the market. The two overnight facilities succeeded in achieving that banks were able to finance their acute foreign exchange liquidity needs, and overnight implied forint yields gradually returned to the lower bound of the interest rate corridor. This latter development was important in preventing a build-up of speculative positions against the forint, as this is how the effectiveness of the base rate can be ensured.

The MNB introduced the next group of swap facilities in 2009. First, in early February, the one-week CHF/EUR swap to provide Swiss francs, then, as of March, the three and six-month EUR/HUF swaps were launched. The objective with their introduction was to further reduce swap market tensions by providing longer-term foreign exchange liquidity, and by means of its specific conditions the six-month swap aimed to prevent a decline in corporate lending.

In 2011, due to the unfavourable swap market developments, which – following the closing of positions at the end of the year – were more serious and more protracted than what was experienced in previous years, the MNB announced a one-off EUR/HUF FX swap facility with a maturity of one week. By doing so the MNB simultaneously supported domestic credit institutions' foreign currency

liquidity management and the fluctuation of the forint interest rate level around the central bank base rate in the FX swap market as well.

The swap facilities were basically successful in mitigating short-term swap market tensions, but were unable to arrest the decline in corporate lending; the list of counterparties to the six-month swap narrowed gradually, as banks were unable or unwilling to fulfil their undertakings. At present, the MNB is maintaining the overnight standing facility and the three-month swap. Of the other two facilities, the withdrawal of the two-way FX swap was made possible by the ceasing of its use and the increase in foreign exchange reserves, whereas the MNB did not reintroduce the six-month swap because of the passive lending behaviour of banks.

B. Provision of forint liquidity

In October 2008, the forint liquidity needs of the banking system increased suddenly due to uncertainty in the interbank market as well as increasing foreign currency borrowing in the swap market. Similarly to developed regions, domestic banks also strived to accumulate immediate liquidity reserves; thus they increased their central bank overnight deposit holdings as much as they could, and they limited their lending in the interbank market. The MNB's instruments facilitated this cautious liquidity management from the outset, as there was a liquidity surplus in the banking system, i.e. banks could use their surplus liquidity to purchase two-week MNB bills. Accordingly, as opposed to the practice of the ECB, where the banks had access to liquidity only with quantitative limits and competing with one another, in the Hungarian case they could freely determine how much liquidity to pledge and how much to leave in overnight deposits to roll over.

At the same time, immediately available liquidity was limited for numerous banks, and the swap holdings that were increasing due to the further depreciation of the forint continued to add to demand for liquidity. In this situation, the MNB increased the liquidity surplus and liquidity potential of the banking system in several steps:

– As of October 2008, it expanded the scope of eligible collateral for central bank loans in several steps: first by the mortgage bonds of affiliated enterprises, then by local government bonds, and finally by reducing the minimum rating requirement of collateral to 'BBB minus'.

– As of October 2008, it introduced two-week and six-month credit facilities.

– As of December 2008, it reduced the reserve ratio from 5 per cent to 2 per cent.[27]

In addition to these measures, which were effective over the short term, borrowing from the EU/IMF added to the liquidity surplus of the banking system in an even more spectacular manner by increasing the foreign exchange reserves. Overall, from the around HUF 1,700 billion liquidity level in October 2008, the liquidity surplus of the banking system went up to HUF 3,000 billion by the spring of 2009, then permanently to above HUF 4,000 billion from 2010.

C. Instruments supporting the functioning of securities markets

From mid-October 2008 until end-2008, the MNB purchased government bonds in a total value of HUF 250 billion in the secondary market within the framework of the agreement concluded with banks acting as primary dealers. This intervention, which was coordinated with market participants, was necessary because the liquidity of the market deteriorated sharply and market makers' market making activity became impossible, although at the same time this process did not seem to be grounded fundamentally. Second, banks were partners to the intervention; under the agreement, they increased their government bond holdings considerably, to a total exceeding the MNB's purchases. Third, the government bond purchase added to the banking sector's liquidity surplus, which was still tight in the autumn of 2008.

[27] In the autumn of 2010 the MNB introduced a minimum reserve system with optional reserve ratio: credit institutions may choose from reserve ratios between 2–5 per cent. The optional reserve ratio increases the efficiency of the minimum reserve system, thus supporting the liquidity management of domestic credit institutions and the stability of the interbank forint market.

However, the effect of government bond purchases was not definitely positive. It was unable to restore the liquidity of the market in the short run, even if the deterioration of the liquidity position stopped in the case of some indicators, despite the strong pressure from non-resident sellers. Of the partial indices calculated by the MNB to measure market liquidity, the price-type indicators (bid-ask spread and price effect indicator) were below their long-term average.[28] The total liquidity index reached its historical low in early November, and afterwards the total index and the two partial indices were able to improve only slightly. However, the EU/IMF loan agreement concluded in the meantime may also have played a significant role in this.

The MNB announced its mortgage bond programme in 2010, in order to increase the liquidity of the market through secondary market purchases and direct purchases in the case of primary issuances satisfying conditions that ensure more favourable liquidity. The programme was closed at end-2010, and because mortgage banks were rather passive (only one series was issued) and the expected recovery in forint lending failed to take place, the MNB did not renew the programme again in 2011. As a result of the programme, market premia declined somewhat in early 2010, but no material or permanent improvement was achieved in the secondary market.

Regarding most forms of interventions that directly stimulate corporate lending, it must be emphasised that ultimately they can generate fiscal costs, even if such costs may first appear in the balance sheet of the central bank. Therefore, the intervention can only be successful if the stimulatory effect on private sector demand dominates over the negative macroeconomic effect of the additional adjustment need stemming from the resulting fiscal costs, i.e. if the fiscal multiplier is greater than one. The intervention can be effective if it succeeds in reducing credit risk premia in a targeted manner, for sectors and participants that use it to increase their demand for real goods (investment, stockbuilding). If targeting cannot be ensured, the intervention may create an opportunity for arbitrage or – in a worse case – it may entail a depreciation of the exchange rate and a flight of capital. And if high risk premia are caused by high risks and not by some market imperfection (asymmetrical information, coordination problem, etc.), state intervention almost certainly results in sunk fiscal costs.

Finally, it is important to highlight two risk factors that are related to the credibility and predictability of Hungarian economic policy and may arise in connection with a possible unconventional central bank measure.

Considering that the Hungarian sovereign risk premium is among the highest in the world, there is a risk that every measure that potentially results in fiscal costs adds to market concerns related to the sustainability of government debt, and increases the financing costs of the state. Therefore, the key to successful intervention is that market participants should trust in the efficiency of the intervention, which, in general, requires a credible economic policy, which currently cannot be considered as given.

In connection with the fiscal costs that are associated with many of the unconventional central bank instruments, their appearance in the central bank's balance sheet poses an additional important risk. Blurring the dividing line between monetary and fiscal policies can weaken confidence in central bank independence and the credibility of the central bank, which reduces the efficiency of traditional monetary policy, makes it difficult to meet the price stability objective, and may lead to an increase long-term yields. This is the basic underlying reason why interventions that involve risk-taking have mostly been applied by countries with credible central banks and often with central budget guarantees.

[28] For more details on the liquidity indices of the MNB see: Páles and Varga (2008).

5 References

Adrian, T., K. J. Kimbrough and D. Marchioni (2010), "The Federal Reserve's Commercial Paper Funding Facility", *FRB of New York Staff Report,* No. 423.

Agarwal, S., J. Barrett, C. Cun and M. de Nardi (2010), "The asset-backed securities market, the crisis, and TALF. Economic Perspectives", *FRB of Chicago Working Paper,* Vol. 34 No. 4.

Baumeister, C. and L. Benati (2010), "Unconventional Monetary Policy and the Great Recession", *European Central Bank Working Paper,* No. 1258.

Beirne, J., L. Dalitz, J. Ejsing, M. Gothe, S. Manganelli, F. Monar, B. Sahel, M. Susec, J. Tapking and T. Vong (2011), "The Impact of the Eurosystem's Covered Bond Purchase Programme on th Primary and Secondary Markets", *ECB Occasional Paper Series,* No. 122, January.

Berkmen, S. Pelin (2012), "Bank of Japan's Quantitative and Credit Easing: are they now more effective?", *IMF Working Paper,* Vol. 12 No. 2.

Bernanke, B. S. (2009), *The Crisis and the Policy Response. Speech At the Stamp Lecture,* London, London School of Economics.

Bernanke, B. S., V. R. Reinhart and B. P. Sack (2004), "Monetary policy alternatives at the zero bound: an empirical assessment", *Finance and Economics Discussion Series,* No. 48, Board of Governors of the Federal Reserve System (U. S.).

Bini Smaghi, L. (2009), "Conventional and unconventional monetary policy", *Keynote lecture at the International Center for Monetary and Banking Studies (ICMB),* Geneva, 28 April 2009.

Blinder, A. S. (2010), "Quantitative Easing: Entrance and Exit Strategies", *Federal Reserve Bank of St. Louis Review,* Vol. 92 No.6 November–December, pp. 465–479.

Borio, C. and P. Disyatat (2009), "Unconventional Monetary Policies. An Appraisal", *BIS Working Paper,* No. 292, November.

Borio, C. and I. Shim (2007), "What can (macro-)prudenial policy do to support monetary policy?", *BIS Working Papers,* No. 242.

Buiter, W. H. and C. Grafe (2003), "Patching up the Pact; Suggestions for enhancing fiscal sustainability and macroeconomic stability in an enlarged European Union", *Economics of Transition,* Vol. 12 No. 1.

Christensen, J., J. Lopez and G. Rudebusch (2009), "Do central bank liquidity operations affect interbank lending rates?", *FRB San Francisco Working Paper,* Vol. 9 No. 13.

Chung, H., J. P. Laforte, D. Reifschneider and J. Williams (2011), "Have We Underestimated the Likelihood and Severity of Zero Lower Bound Events?", *Federal Reserve Bank of San Francisco Working Paper,* No. 1.

CIEPR (2011), *Rethinking Central Banking, Committee on International Policy and Reform,* September.

CURDIA, V.–M. WOODFORD (2010a), "Conventional and Unconventional Monetary Policy", *Federal Reserve Bank of St. Louis Review,* July–August, 92 (4), pp. 229–64.

CURDIA, V.–M. WOODFORD (2010b), "The Central-Bank Balance Sheet as an Instrument of Monetary Policy", *NBER Working Papers,* No. 16208.

D'AMICO, S. AND T. B. KING (2010), "Flow and stock effects of large-scale Treasury purchases", *Finance and Economics Discussion Series,* No. 52, Board of Governors of the Federal Reserve System (U. S.).

DEUTSCHE BANK (2010), "Benefits and Costs of QE2", *Global Economic Perspectives,* 29 September.

EGGERTSSON, G. B. AND M. WOODFORD (2003), "Optimal Monetary Policy in a Liquidity Trap", *NBER Working Papers,* No. 9968, National Bureau of Economic Research.

ECB (2010), "The ECB's monetary policy stance during the financial crisis", *Monthly Bulletin,* January, pp. 63–72.

ERDŐS M. AND MÉRŐ K. (2010), *Pénzügyi közvetítő intézmények,* [Financial intermediary institutions], Budapest, Akadémia Kiadó.

FÁBIÁN, G., FÁYKISS P. AND SZIGEL G. (2011), "A vállalati hitelezés ösztönzésének eszközei", [Means of encouraging corporate lending], *MNB-tanulmányok,* No. 95.

FAHR, S., R. MOTTO, M. ROSTAGNO, F. SMETS AND O. TRISTANI (2010), *Lessons for monetary policy strategy from the recent past.*

FUSTER, A. AND P. S. WILLEN (2010), "$1.25 Trillion is still real money: some facts about the effects of the Federal Reserve's mortgage market investments", *Public Policy Discussion Paper,* Federal Reserve Bank of Boston, Vol. 10 No. 4.

GAGNON, J., M. RASKIN, J. REMACHE AND B. SACK (2010), "Large-Scale Asste Purchases by the Federal Reserve: Did They Work?", *Fed Staff Report,* No. 441.

GERTLER, M. AND P. KARADI (2011), "A model of unconventional monetary policy", *Journal of Monetary Economics,* No. 58, pp. 17–34.

GIANNONE, D., M. LENZA, H. PILL AND L. REICHLIN (2011), "Non-standard monetary policy measures and monetary developments", *ECB Working Paper,* No. 1290.

GOODFRIEND, M. (2009), *Central banking in the credit turmoil: An assessment of Federal Reserve practice, paper presented at Bank of Japan conference,* May.

HAMILTON, J. D. AND J. WU (2010), "The effectiveness of Alternative Montetary Policy Tools in a Zero Lower Bound Environment", *Working Paper,* San Diego, University of California.

HANCOCK, D. AND W. PASSMORE (2011), "Did the Federal Reserve's MBS purchase program lower mortgage rates?", *Finance and Economics Discussion Series,* No. 1, Board of Governors of the Federal Reserve System (U. S.).

HIRATA, H. AND T. SHIMIZU (2004), "Purchase of SME-related ABS by the bank of Japan: Monetary Policy and SME financing in Japan", *Bank of Japan Working Paper,* No. 04-E-1.

ISHI, K., M. STONE AND E. B. YEHOUE (2009), "Unconventional Central Bank Measures for Emerging Economies", *IMF Working Paper,* No. 09/226.

IMF (2011), "Japan", *IMF Country Report,* No. 11/182, 28 June.

JACOME H., T. SAADI-SEDIK AND S. TOWNSEND (2011), "Can Emerging Market Central Banks Bail Out Banks? A Cautionary Tale from Latin America", *IMF Working Paper,* No. 11/258.

JOYCE, M., A. LASAOSA, I. STEVENS AND M. TONG (2011), "The financial market impact of quantitative easing in the United Kingdom", *International Journal of Central Banking*, Vol. 7 No. 3, pp. 113–61.

KAPETANIOS, G., H. MUMTAZ, I. STEVENS AND K. THEODORIDIS (2011), "Assessing the economy-wide effects of quantitative easing", *BoE Working Paper*, manuscript.

KLYUEV, V., P. DE IMUS AND K. SRINIVASAN (2009), "Unconventional Choices for Unconventional Times: Credit and Quantitative Easing in Advanced Economies", *IMF Staff Position Note,* No. SPN/09/27, November.

KOZICKI, S. (2011), "Unconventional Monetary Policy: The International Experience with Central Bank Asset Purchases", *Bank of Canada Review,* Spring.

KREKÓ J. AND ENDRÉSZ M. (2010), "The role of foreign currency lending in the impact of the exchange rate on the real economy", *MNB Bulletin,* March.

KRISHNAMURTHY, A. AND A. VISSING-JORGENSEN (2011), "The Effects of Quantitative Easing on Interest Rates: Channels and Implications for Policy", *NBER Working Paper,* No. 17555.

KWON, G., L. MCFARLANE AND W. ROBINSON (2006), "Public Debt, Money Supply, and Inflation: A Cross-Country Study and Its Application to Jamaica", *IMF Working Paper,* No. 06/121.

LAM (2011), "Bank of Japan's Monetary Easing Measures: Are They Powerful and Comprehensive?", *IMF Woking Paper,* No. 11/264.

LENZA, M., H. PILL AND L. REICHLIN (2010), "Monetary Policy in Exceptional Times", *ECB Working Paper Series,* No. 1253.

MAEDA, E., B. FUJIWARA, A. MINESHIMA AND K. TANIGUCHI (2005), "Japan's Open Market Operations under the Quantitative Easing Policy", *Bank of Japan Working Paper,* No. 05-E-23.

MCANDREWS, J., A. SARKAR AND Z. WANG (2008), "The effects of the Term Auction Facility on the London Inter-bank Offered Rate", *FRB New York staff report,* No. 355.

MINEGISHI, M. AND B. COURNEDE (2010), "Monetary Policy Reponses to the Crisis and Exit Strategies", *OECD Working Papers,* No. 753.

MNB (2010), *Analysis of the Convergence Process,* Magyar Nemzeti Bank.

MORENO, R. (2010), "Central bank instruments to deal with the effects of the crisis on emerging market economies. The global crisis and financial intermediation in emerging market economies", *BIS Paper,* No. 54.

MOUTOT, P. (2011), "Economic impact of the ECB's non-standard measures: preliminary views", *Workshop on the macroeconomic impact of non-standard monetary policy measures Frankfurt*, 24 March.

NEELY, C. (2010), "The Large-Scale Asset Purchases Had Large International Effects", *FRB of St. Louis Working Paper*.

PÁLES, J. AND VARGA, L. (2008), "Trends in the liquidity of Hungarian financial markets – What does the MNB's new liquidity index show?", *MNB Bulletin,* April.

PASINETTI, L. L. (1998), "Public Debt in the European Union Countries: two ways of facing the problem", in J. KRISHNAKUMAR–E. RONCHETTI (eds.) (2000), *Panel Data Econometrics. Papers in honour of Pietro Balestra,* Amsterdam, Elsevier Science, pp. 317–328.

SARGENT, T. J. AND N. WALLACE (1981), "Some Unpleasant Monetarist Arithmetic", *Quaterly Review,* Federal Reserve Bank of Minneapolis, pp. 1–17.

SHIRAKAWA, M. (2009), *Unconventional Monetary Policy – Central Banks: Facing the Challenges and Learning the Lesson. Speech at the Conference co-hosted by the People's Bank of China and the Bank for International Settlements in Shanghai,* 8 August.

SHIRAKAWA, M. (2012), "Deleveraging and growth – is the developed world following Japan's long and winding road?", *Lecture at the London School of Economics,* 10 January.

SÓVÁGÓ, S. (2011), "Identifying supply and demand in the Hungarian corporate loan market", *MNB Occasional Papers,* No. 94, September.

STARK, J. (2011), *Welcome address. Workshop on the macroeconomic impact of non-standard monetary policy measures,* Frankfurt, 24 March.

STONE, M., K. FUJITA AND K. ISHI (2011), "Should Unconventional Balance Sheet Policies be Added to the Central Bank Toolkit? A Review of the Experience So Far", *IMF Working Paper,* No. 11/145.

STROEBEL, J. C. AND J-B. TAYLOR (2009), "Estimated Impact of the Fed's Mortgage-Backed Securities Purchase program", *NBER Working Paper,* No. 15626.

SWANSON, E. T. (2011), "Let's Twist Again: A High-Frequency Event-study Analysis of Operation Twist and Its Implications for QE2", *Brookings Papers on Economic Activity, Economic Studies Program,* The Brookings Institution, Vol. 42 (1), pp. 151–207.

TAYLOR, J. AND J. WILLIAMS (2009), "A black swan in the money market", *American Economic Journal: Macroeconomics,* No. 1 (1), pp. 58–83.

TRICHET, JEAN-CLAUDE (2009), *Introductory Statement with Q&A, Press conference,* 7 May.

WIELAND, V. (2009), "Quantitative easing. A Rationale and Some Evidence From Japan", *NBER Working Paper,* No. 15565.

Worldbank Data, *Financial Sector Indicators.*

WU, T. (2008), "On the effectiveness of the Federal Reserve's new liquidity facilities", *FRB Dallas Working Paper,* Vol. 8 No. 8.

6 Appendix: Case studies

6.1 MAIN MACROECONOMIC DATA

Table 5
Credit rating, government debt and inflation of the countries in the case studies

Country	Indicators						
	Credit rating 2007*	Credit rating 2011	Government debt/GDP (2007)	Government debt/GDP (2010)	Policy rate 2007/I	Policy rate 2009/I	Inflation, average (2002–2007)
USA	AAA	AAA	62.3	94.4	5.25	0.25	2.7
Israel	A–	A	78.1	77.4	4.5	0.5	1.7
Japan	AA	AA	187.7	220.0	0.4	0.3	–0.2
Korea	A+	A+	28.2	23.7	4.5	2.0	2.9
United Kingdom	AAA	AAA	44.4	79.9	5.3	0.5	1.8
Euro area (17)**	AAA	AAA	66.2	85.4	3.5	2.0	2.2

** Fitch's sovereign ratings; ** ECB.*

Table 6
Credit rating, debt ratio and inflation of euro-area countries

Country	Indicators					
	Credit rating 2007*	Credit rating 2011*	Government debt/GDP (2007)	Government debt/GDP (2010)	Inflation 2007	Inflation, average (2002–2007)
Greece	A	CCC	107.4	144.9	2.9	2.9
Ireland	AAA	BBB+	24.9	94.9	4.9	4.9
Germany	AAA	AAA	65.2	83.2	2.3	2.3
Italy	AA–	A+	103.1	118.4	1.8	1.8
Portugal	AA	BBB–	68.3	92.9	2.5	2.5
Spain	AA+	AA–	36.1	60.1	2.8	2.8

** Fitch's sovereign ratings.*

Table 7
Bank loans to the private sector and capital market capitalisation as a percentage of GDP

	Bank loans to the private sector as a percentage of GDP				Capital market capitalisation as a percentage of GDP			
	2000	2007	2008	2009	2000	2007	2008	2009
Austria	125.7	127.8	130.7	141.1	15.7	61.4	17.4	14.1
Germany	145.4	124.5	126.3	131.8	66.8	63.2	30.5	39.0
Hungary	53.6	74.7	80.3	80	25.1	34.6	12.0	22.0
Australia	93.0	135.9	143.7	143.6	89.4	151.5	65.0	136.1
United Kingdom	130.1	187.6	211.7	229.0	174.4	137.3	69.7	128.7
Canada	113.7	154.2	178.1	n. a.	116.1	153.5	66.9	125.8
USA	198.4	243.8	220.8	231.6	152.6	142.5	82.1	107.4
Japan	308.9	297.2	299.6	328.4	67.6	101.7	66.0	67.1
South Korea	74.7	98.4	109.4	109.4	32.2	107.1	53.1	100.3
Israel	76.6	87.3	90.1	85.7	51.4	141.5	66.5	93.2

Source: World Bank.

Table 7 shows the differences between the basic types of the financial intermediary system. While in the case of the continental European financial model the private sector is typically financed by bank loans, capital market financing (and thus the securitisation of the economy) is much more significant in the case of the Anglo-Saxon market models. It should be noted that the two emerging market examples (Israel and South Korea) presented in the Appendix are also closer to the Anglo-Saxon market models, whereas in Japan the banking sector plays an enormous role, but the development of the financial sector is shown by the fact that capital market capitalisation is also greater than that of the economies with a bank-dominatedfinancial intermediary system.

6.2 THE ECB

6.2.1 Changing the standard instruments

With the deepening of the crisis, following the bankruptcy of Lehman Brothers in September 2008, mistrust between banks increased. In this situation, the ECB was confronted with the drying-up of interbank markets and an increase in interbank yields. Demand for central bank liquidity grew considerably in this environment. The ECB adapted to this situation by fine-tuning its instruments.

As a first step, on 8 October 2008 the Governing Council decided on the unlimited availability of the one-week MRO tenders[29] at the key interest rate. These measures made the necessary liquidity available for credit institutions, thereby contributing to the stabilisation of the banking system. In parallel with that, the width of the interest rate corridor was reduced from 200 basis points to 100 basis points, with the intention to prevent market O/N rates from departing from the policy rate.

As a result of the measures, in the initial period recourse to the MRO tenders and the size of the deposit facility increased by some EUR 150 billion and more than EUR 200 billion, respectively. In parallel with that, the average turnover of the overnight unsecured interbank market declined by nearly 40 per cent, and the EONIA (euro overnight index average) approached the bottom of the interest rate corridor. Perceiving this, the ECB widened the interest rate corridor to 200 basis points again in January 2009, which, however, did not result in a significant increase in overnight interbank turnover, and the EONIA also remained at the bottom of the widened interest rate corridor.

[29] MRO (Main Refinancing Operation): the ECB's main refinancing operation, in which the ECB provides liquidity in the form of a repo transaction to credit institutions of the euro area with a weekly frequency; its maturity is usually one week.

On 15 October 2008, the ECB eased the acceptance criteria of its eligible collateral, reducing the credit rating threshold from 'A minus' to 'BBB minus' (with the exception of ABSs). At this same time, the decision was also taken on the full allotment – at fixed interest rates – of the three-month loan tenders (LTROs), which had already been applied prior to the crisis as well, the six-month ones introduced in April 2008 and the one-month ones applied as of September 2008. The ECB announced on 7 May 2009 that it would hold one-year LTRO tenders on three occasions between June 2009 and December 2009. The first two tenders were allocated at the MRO rate, thus fixing the one-year point of the yield curve, whereas the last one was allocated at the average MRO rate of the period. On 6 October 2011, the ECB announced that it would hold one-year LTRO tenders on 26 October and 21 December, again with full allotment. In December, in parallel with the announcement of several liquidity providing instruments, the maturity of LTRO tender of 21 December was changed to 3 years. The ECB's goal with these instruments is to provide longer-term refinancing.

Complemented with the covered bond purchase programme described in the next chapter and the FX swap tenders, the ECB called the above measures 'enhanced credit support'. The ECB's balance sheet increased considerably as a result of the programme, and the amount of liquidity available for euro-area credit institutions grew in the period when the drying-up of interbank markets jeopardised the stability of the banking system.

Lenza et al. (2010) and Fahr et al. (2010) evaluated the liquidity providing instruments of the ECB in a way that using various assumptions they set up an alternative scenario without unconventional instruments. In their simulation, Lenza et al. (2010) first tried to determine the decline caused in the spread of the interbank rate at various maturities.[30] Subsequently, they captured the impact of the decline in premium caused by the measures using simulations conducted with a B-VAR model estimated for the pre-crisis period. It was found that the instruments of the ECB played a significant role in the stabilisation of the economy in the period after the Lehman Brothers' bankruptcy: as a result of the programme, private sector credit growth was some 1.5 percentage points higher and unemployment was 0.5 percentage points lower than in the scenario without the measures. Fahr et al. (2010) determined the alternative scenario using a DSGE model that contained the banking system as well. They found that without the instruments the euro area would have been characterised by a more than one percentage point lower GDP growth and deflation until 2010 H1.

6.2.2 Covered Bond Purchase Programme (CBPP)

At its meeting on 7 May 2009, the Governing Council of the ECB decreased the interest rate on the main refinancing operations to 1 per cent. At the same meeting it decided to launch the CBPP. The CBPP focused on an identifiable market, the market of covered bonds,[31] which – in the opinion of the Governing Council – was more seriously affected by the crisis than other segments of the securities market (Trichet, 2009). The objectives of the programme were to mitigate strains in the covered bond market, reduce risk premium, increase liquidity and through that to encourage primary issuances. In a targeted manner, the ECB wanted to support the reactivation of market transactions and the improvement of the liquidity of the CB market by purchases at the primary and secondary markets. In addition, the ECB intended to ease the financing conditions of credit institutions and corporations, and wanted to encourage credit institutions to maintain and – if possible – to expand their lending activity, and also wanted to reduce money market yields.

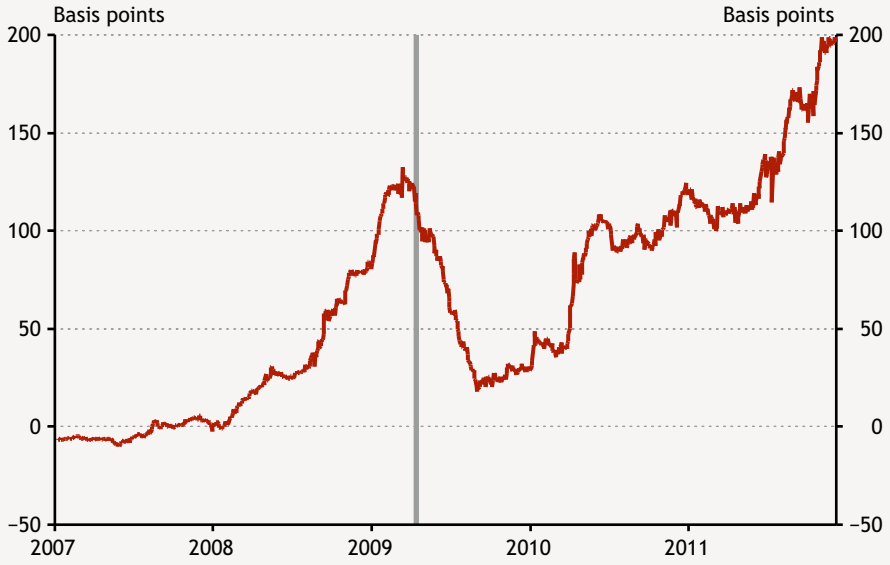
Between July 2009 and June 2010, within the framework of the CBPP, the ECB purchased covered bonds (CB) with a total value of EUR 60 billion; it did not sterilise them, so the instrument increased the euro liquidity of the banking system directly as well. During the programme, the ECB primarily focused on the longer end of the yield curve. The maturities of the securities purchased varied mainly between 3 and 7 years, with an average of 4.12 years. The covered bond purchases of the CBPP did not result in any major distortion in the market structure; the ECB obtained a mere 5 per cent share of total holdings and a 10 per cent share of jumbo issues.

CB spreads started to tighten immediately as a result of the announcement of the programme, issuing activity increased, and the liquidity of the market approached pre-crisis levels. However, by now the spreads are again mostly above the

[30] For example, without the intervention the EURIBOR-OIS spread would have stayed at the October 2008 level for a protracted period of time.

[31] A great advantage of covered bonds is that in the case of non-performance the cover is behind the bond, so a complete loss in value is inconceivable. Consequently, they are much less risky than packaged or repackaged US debt securities. Therefore, during the crisis it was an important objective to enable this market to expand in Europe.

Chart 5
Premia on euro covered bonds above five-year IRS



Note: The vertical line indicates the date of the announcement of the CBPP.
Source: Datastream.

levels that were typical before the announcement of the programme, although issuing activity continues to be at a high level.

Based on the research conducted by Beirne et al. (2011), the covered bond purchase programme of the ECB can be considered successful. The yield spread of covered bonds declined, money market yields fell, and there was an upturn in bond markets at all maturity horizons. The average decline in yields in the covered bond market was around 12 basis points. The programme successfully stimulated the issuance of covered bonds in the primary market, thereby improving banks' financing conditions and boosting bank lending. The main deficiency of the covered bond purchase is that no feed-through effect evolved, i.e. it did not have a perceptible effect in the market of normal bonds. In addition, an important experience for Hungary as well is that in euro-area countries struggling with the sustainability of government debt the programme was not able to improve yields in the covered bond market either; it was completely ineffective.

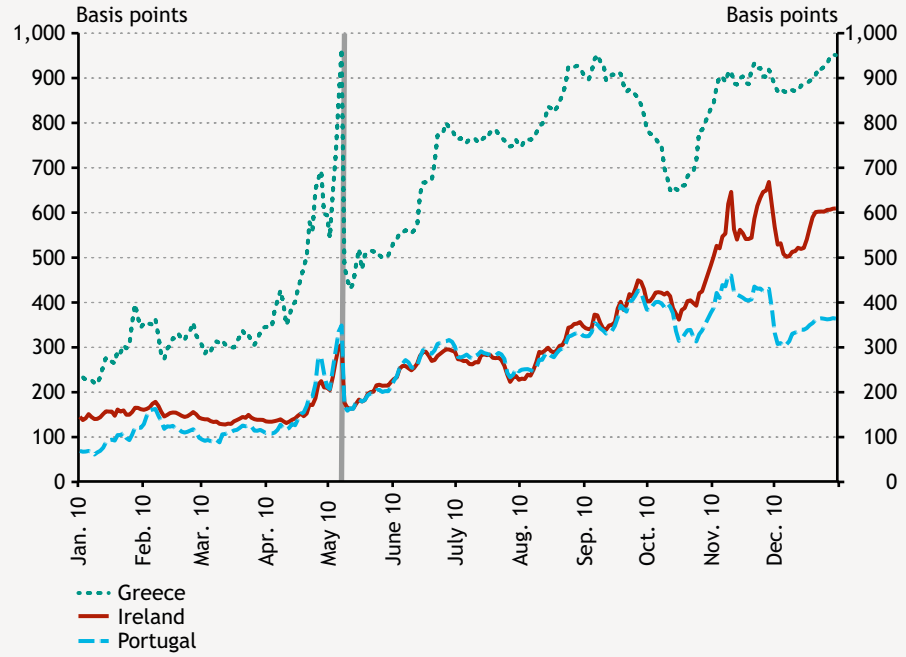
On 6 October 2011, the ECB announced the launch of CBPP2, within the framework of which the ECB plans to purchase covered bonds with a value of EUR 40 billion between November 2011 and October 2012, with objectives and conditions similar to those of the first programme.

6.2.3 Securities Markets Programme (SMP)

The ECB announced its Securities Markets Programme (SMP) on 10 May 2010, following a significant increase (around one and a half times at ten-year maturity) in the premia of longer-term government bonds in euro-area periphery countries during the first week of May 2010. Officially, the objective of the programme is the treatment of the inappropriate functioning of securities markets and the restoration of the monetary transmission mechanism without changing the elements of the standard instruments. The ECB is striving to offset the liquidity increasing effect of the SMP with one-week deposit tenders.

Until February 2011, the ECB purchased government bond and other bonds with a value of EUR 219 billion within the programme. The ECB does not disclose exactly what securities it purchases; therefore, no official data are available on what ratios of the government bonds of individual Member States it purchased. At the same time, according to market gossip it may have happened that on certain days the ECB was the only buyer of certain securities in the market. Some market participants believe that in the case of Greece, Ireland and Portugal, the ECB became the largest lender to these states as a result of the SMP.

Chart 6
Yield spreads of 10-year Greek, Irish and Portuguese government bonds compared with German bonds



Note: The vertical line indicates the date of the announcement of the SMP.
Source: Bloomberg.

Right after the announcement on 10 May 2010, spreads declined considerably, but already on the next day they started to increase again, and in some months they were above the level observed before the May announcement. Over the short run, the programme had a significant impact on the government bond yields of periphery countries, but over a time horizon of several months its success is already questionable. It is difficult to separate its longer-term effect from that of other market developments.

No comprehensive evaluation of the Securities Markets Programme of the ECB has been prepared to date. According to Fahr et al. (2010), the programme was temporarily successful in mitigating risks and the contagion. However, the current developments in the yields of government bond markets of periphery countries and the further deepening of the crisis clearly show that these types of purchases are only suitable 'to buy time' at best. If within a short time the given government is unable to produce a programme that is considered to be sustainable over the longer term, government bond purchases by the central bank in itself are not able to restore market confidence.

6.2.4 Comprehensive evaluation of the ECB programmes

The estimates regarding the effectiveness of the ECB's unconventional instruments (enhanced credit support), most of which were prepared by the ECB, basically came to the conclusion that the unconventional instruments considerably and positively influenced the functioning of financial markets and the performance of the economy: although they were unable to prevent the significant downturn, without the programme the extent of the decline in GDP would have been much greater and unemployment would have been much higher.

Giannone et al. (2011) evaluated the effectiveness of all unconventional instruments. The essence of their method is that with a VAR model estimated for the pre-crisis period they ran simulations regarding the crisis period to examine whether any material change can be perceived in the transmission of monetary policy. There was no significant difference between the developments in actual macro variables and the simulated ones that presume pre-crisis transmission. As the authors evaluate, this proves that the programme of the ECB was efficient in the maintenance of transmission, so unconventional instruments contributed to the fact that a collapse similar to the Great Depression could be avoided.

6.3 BANK OF ENGLAND

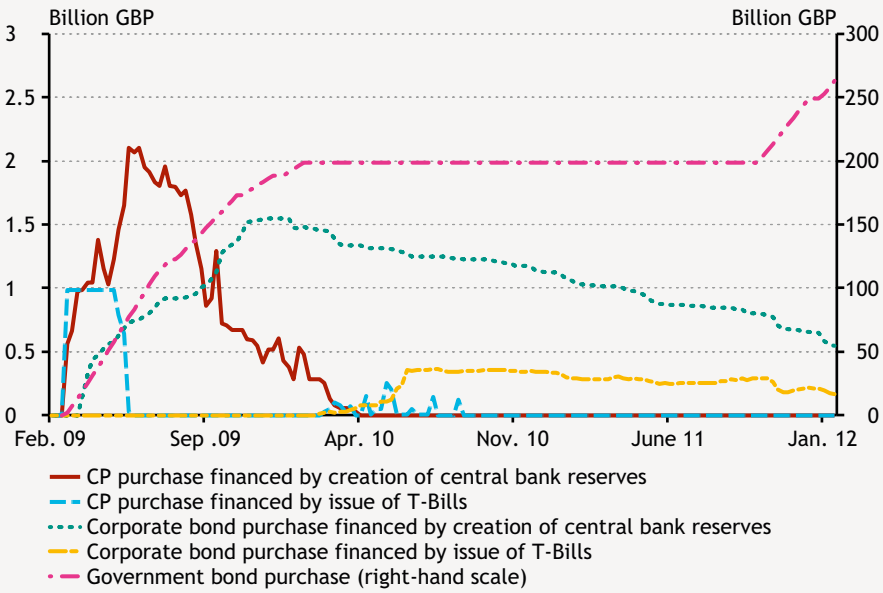
6.3.1 The programmes of the BoE

The unconventional measures of the Bank of England were primarily necessitated by its reduction in the base rate to 0.5 per cent at its meeting in March 2009 (the lowest rate in the 300-year history of the Bank), as no more room remained for a further interest rate cut. Therefore, it launched a classical quantitative easing programme in order to stimulate the economy. The ultimate goal of this unconventional instrument was identical to the conventional monetary policy objective, i.e. keeping inflation close to 2 per cent. The Bank wanted to achieve this objective by a large-scale increase in money supply via the purchase of government bonds, and – in order to improve market liquidity – it purchased corporate securities as well. With these programmes, in an indirect manner, the Bank wanted to achieve an increase in money supply, lower government bond yields, an improvement in the functioning of the corporate bond market, higher corporate bond and share prices, more capital market issuance and more spending by households.

In consideration of the increase in central bank money holdings as a result of the liquidity expanding measures, as of March 2009 the BoE terminated its optional-amount minimum reserve system, and announced that it would remunerate all reserves at the policy rate. The lower part of the interest rate corridor, which is ±25 basis points wide in normal times, was also widened: at a base rate of 0.5 per cent or lower, the interest rate of the deposit facility was fixed at 0 per cent,[32] whereas the interest rate on overnight loans remained at base rate+25 basis points.

Most of the government bond purchases took place between March 2009 and January 2010, in a value of approximately GBP 200 billion, which accounted for 30 per cent of the outstanding stock and amounted to 14 per cent of GDP, and tripled the central bank balance sheet as a proportion of GDP compared to the pre-crisis level (see Chart 7). The Bank of England preferred to purchase long-term bonds with the consideration to make institutional investors that primarily hold them purchase other, riskier instruments instead of the government bonds bought from them ('portfolio rebalancing channel'). Namely, in their opinion the failure of the earlier quantitative easing in Japan was also attributable to the fact that they

Chart 7
Asset purchases by the Bank of England



Source: BoE.

[32] The interest rate level of the deposit facility is of lower importance if the base rate is paid on the total account balance (all reserves), because in that case credit institutions do not need to place their free reserves in overnight deposits. Nevertheless, the lower bound of the interest rate corridor has a role in terms of determining the lower limit of interbank rates because of the players that do not have to keep reserves but have access to the overnight instruments.

purchased the bonds mainly from banks, which used the incoming money for balance sheet reduction ('deleveraging'). Initially, the BoE announced the programme for 5–25-year securities, then upon its expansion the segment was also widened, and the short end was modified to three years.

Currently, the Bank is holding corporate securities with a total value of GBP 0.7 billion.[33] This amount seems to be insignificant compared to that of government securities purchased (GBP 268 billion), but comparison does not make sense because of the different objectives of the two programmes. Namely, while the purchases of government bonds were intended to succeed in stimulating the economy via a large-scale increase in money supply, with the targeted securities purchase the central bank wanted to improve the functioning of expressly this segment, to make corporate financing easier.[34] It is worth noting in connection with corporate securities that the size of this market in the United Kingdom is not really large, although overseas, compared to Europe, capital market financing is much more important than bank lending. In 2006, corporate bonds and CP (commercial paper[35]) amounted to GBP 70 billion and GBP 5 billion, respectively, compared to banks' corporate loans outstanding amounting to GBP 437 billion. Nevertheless, both segments can be considered important (the latter in terms of corporate liquidity management), and spreads surged in both markets, which justified the intervention.[36]

Prior to the purchases, a programme ('Special Liquidity Scheme') was introduced in April 2008, under which the Bank exchanged various securities (with at least AA minus rating for G10 government bonds and AAA rating in the case of other issuers) for 9-month treasury bills. Although the drawing period was closed at end-January 2009 (then the securities taken over by the Bank amounted to nearly GBP 300 billion), the programme lasts until 2012 (max. 3 years); the securities must be returned and exchanged no later than that.

The Asset Purchase Facility was introduced thereafter and implemented by the Bank in its capacity as 'market maker of last resort', in a transparent manner, within the framework of auctions, by asset groups, with the following parameters:

- CP: in primary market as well, maximum three-month maturity, investment category (the purchased highest amount was GBP 2.4 billion in April 2009, i.e. 1/3 of the market);

- corporate bonds: only in the secondary market, in small amounts (because the problem was with the functioning and not with the lack of demand), then as of early 2010 the central bank stood on the seller side as well with a market-building objective);

- asset-backed CP (this segment is important for smaller and lower-rated companies);

- the market of ABSs (asset-backed securities) and syndicated loans was examined, and central bank intervention was not found to be justified.

6.3.2 Evaluation of the programmes

Joyce et al. (2011) examined the effects of the programmes of the BoE on the basis of several market indicators. They tried to point out a correlation between the news value of announcements and the market effect using a regression model, with the help of the programme size expected according to the Reuters analyst survey. According to the findings of their analysis, each announcement of 1 billion caused an 0.62 basis point decline in government bond yields, and the distribution of the 125 basis point decline in yields following from the full 200 billion programme was that 45 basis points resulted from

[33] Approximately two thirds of it increased the amount of central bank money in the system, whereas one third was purchased against government securities (between January and March 2009).

[34] Under normal circumstances the BoE only wants to have an impact on risk-free yields, and strives to refrain from distorting the premia compared to them.

[35] CPs (commercial papers) are typically corporate debt securities with a maturity of 1–270 days, serving the purpose of short-term financing of financial and non-financial corporations. In the case of their non-covered version no underlying product is available, so this type of security can only be evaluated on the basis of the credit rating of the issuing company. Collateralised corporate securities are backed by some kind of asset; therefore, they can be considered a safer form of financing compared to the non-covered type.

[36] Although due to the surge in spreads the central bank considered it justified to intervene, Paul Fisher, one of the senior officials of the bank and a member of the MPC at the same time, called the stimulation of the private sector a clearly fiscal task in one of his presentations in 2010.

the signalling concerning the low base rate (as it also appeared in the OIS market as well), and 80 basis points were exclusively reflected in the decline in bond market spreads (as a result of portfolio restructuring). The impact on other instruments is difficult to assess, partly because of the different developments over time through the individual channels. In any case, the immediate effect on corporate bonds is clearly visible. As a result of the announcements, the yield on investment grade corporate bonds declined by 70 basis points (the spread relative to government bond remained unchanged), whereas the fall in the premium of lower-rated securities was 150 basis points, half of which resulted from the decline in the premium relative to government bond yields. In this period, a lesser decline in similar yields was observed in other countries, which confirms that it is a country-specific phenomenon. With their multiple time series model, Kapetanios et al. (2011) came to the conclusion that government bond yields would have been 100 basis points higher without the QE programme, whereas GDP and the CPI would have been 1.5 and 1.25 per cent lower, respectively.

6.4 BANK OF JAPAN 2001–2006

6.4.1 Unconventional instruments in Japan before the crisis

The historically low inflation experienced in the 1990s, the financial crisis in Asia and the permanent deflation from 1998 on prompted the Bank of Japan to apply a zero rate policy from 1999 on, as long as deflation expectations persist. Monetary easing proved to be completely unsuccessful, as core inflation increased above 0 per cent (year-on-year) for only one month, in August 2000. The dot-com crisis and fears of a global recession perceived in 2001 resulted in a further strengthening of deflation expectations. For this reason, the BoJ wanted to use additional instruments to stimulate the economy, so that the Japanese economy could break out of deflation. Consequently, between 2001 and 2006 it started to apply the policy of quantitative easing in order to strengthen the zero-rate policy. In March 2001, the Bank of Japan announced that it would change its earlier operational objective, i.e. influencing the overnight rate, to targeting the level of reserves deposited with the central bank (current account balances). An explicit objective of the quantitative easing was that first the reserves deposited with the Bank of Japan[37] were increased to JPY 5,000 billion (1 per cent of 2001 GDP), then in the continuation of the programme, step by step, to JPY 35,000 billion (7 per cent of 2001 GDP). In order to achieve the goal, long-term securities were purchased from commercial banks, in an attempt to provide additional liquidity for the financial sector and, in an indirect manner, for the economy. Regarding the application of the new targets it was laid down that the liquidity surplus would be maintained until the year-on-year consumer price index reached the positive interval and remained there. In line with that, target figures for long-term government bond purchases were raised, and significant quantitative easing started as of 2001.

Due to the taxonomy introduced later by Bernanke, this intervention can only partly be called quantitative easing; some of its programmes can be classified as direct financing.

Among non-financial corporations, SMEs play a major role in the Japanese economy;[38] therefore, their financing was of key importance in breaking out of the deflationary spiral. However, as the SME sector is not rated by credit rating agencies, the companies in this sector have less collateral,[39] and due to their various activities lenders can only take decisions on the basis of a smaller amount of reliable information, as a result of the risk aversion of the financial sector, the financing situation of the SME sector deteriorated considerably as of the early 1990s. Even the easing launched in 2001 was not able to change this situation.[40] Therefore, the BoJ decided to apply another financing technique. Shortly after launching the 2001 quantitative easing, it announced that it would purchase asset-backed securities[41] that are 'closely related to the activity of the SME sector'. According to the intention of the BoJ, the application of this instrument improves monetary transmission, and there may be an upswing in lending during deleveraging as well, since the diversification of credit risk improves the position of the financial sector.

[37] Reserves of domestic and foreign banks as well as other financial organisations deposited with the central bank.

[38] In 2001, 97 per cent of enterprises were SMEs, having an equity capital of less than JPY 1 billion (HUF 2.36 billion at the 2001 exchange rate). These companies employed 80 per cent of all employees.

[39] According to a survey conducted by the Tokyo Chamber of Commerce and Industry, 70 per cent of SMEs submitted loan applications without cover or guarantee, based on future cash-flow (Hirata – Shimizu, 2004).

[40] Hirata and Shimizu (2004).

[41] In the programme, the term 'asset-backed securities' refers to ABSs and short-term asset-backed commercial papers.

Chart 8
Quarterly new corporate lending in Japan
(2001 Q2 = 100)

Source: BoJ.

The securitisation of loans speeded up in Japan starting from 1997, and the volume of ABSs and ABCPs increased to some USD 220 billion by 2002, with Japan falling behind the money markets of both Western Europe and the United States. The essence of the process is that the financial institutions that lend to SMEs sell the loans to so-called SPVs (special purchase vehicles), which package the purchased corporate loans, other bonds and shares into securities of various risk levels. Then, these newly created securities are sold to investors, and the income is spent on buying further loan transactions. As a result, the original lender may lend further amounts to SMEs, and an overall improvement may take place in financing conditions through an increase in capital gearing. In spite of the fact that the process of securitisation had started, and then speeded up by the late 1990s, lending to non-financial enterprises, and within that to SMEs, did not pick up in Japan.

The BoJ first intervened in the ABS market in October 1999, when it announced that it would accept ABSs as collateral from commercial banks. From February 2002, ABCPs (asset-backed commercial papers) and mortgage backed ABSs were also accepted as collateral. Starting from July 2003, the BoJ then started to purchase ABSs and ABCPs and capped the value limit of asset purchases at JPY 1,000 billion. The BoJ announced that the asset purchase programme would last until March 2006, and it did not buy ABSs (securities with a high proportion of shares) classified in the riskiest category.[42] In spite of the fact that the BoJ tried to gradually stimulate operation of the ABS market and thus corporate financing, and took significant risks, it failed to significantly encourage corporate financing with the 2001–2006 programme (see Chart 8).

6.4.2 Evaluation of the programmes

The evaluation of the Japanese programme divides experts. In spite of the fact that Bernanke et al. (2004) as well as Shirakawa (2009, 2012) emphasised certain successes of the programme (the yield curve was pushed downwards successfully), it must be noted that the most important objective, i.e. the stimulation of the economy and breaking out of deflation, was not achieved.[43]

The failure of the programme was mentioned by Bini Smaghi (2009) as well. In his opinion, although the reserve objectives were achieved, the multiplier effect had weakened, because banks had not increased their lending to corporations due to

[42] Composition of an asset-backed security in terms of securitisation: senior part (AAA-rated security, usually bond), mezzanine/medium-risk part (BB-rated security, bond), share part (not rated group of assets containing shares). In terms of the composition, the senior part is always the largest (65–85 per cent), the mezzanine part has a smaller weight (15–35 per cent), and finally the class of shares typically accounts for 5 per cent of the total ABS.
[43] Klyuev et al. (2009)

their poor capital structures. Accordingly, the programme failed to significantly stimulate corporate lending. Moreover, it was also unable to stop the strongly declining trend of loans to the SME sector that had started in 1995 There was a consensus in the studies that the unhealthy structure and bad loan portfolio were the main problems of the Japanese financial sector, which resulted in the reduction in the bad loan portfolio on the assets side in commercial banks' balance sheets. In addition, the process of the corporate sector itself aiming at deleveraging also played a role; as result, credit demand also remained weak (Berkmen, 2012).

However, the evaluation of the Japanese monetary easing is refined by several aspects. Although the achievement of low positive inflation was an explicit objective of the easing, it is to be noted that the emergence of deflation was the consequence of flexible wage adjustment, with which – according to Shirakawa (2012) – it was possible to keep unemployment low in spite of the crisis. Emphasising the stagnation related to the easing and typical in the 2000s is misleading, as it took place simultaneously with demographic developments that were unprecedented in the developed world. Japanese society is affected by the strongest ageing in the developed world, which led to a dramatic fall in the active population. Therefore, Shirakawa (2012) underlined that if we examine GDP per one active-age person instead of the growth in real GDP, of the developed countries Japan reached the highest economic growth in the 2000s.

The Japanese example, which can be considered the only programme entirely completed so far, shows that unconventional instruments are able to achieve only partial successes due to the structural problems of the banking system and for lack of solutions to them. The Japanese example is also interesting because although it was applied with the policy of zero interest rate level, it can be compared to the case of Hungary in terms of the banking sector's efforts to reduce balance sheets and weak growth prospects. The Japanese banking sector did not cut back bad loans until the 1990s and therefore, bank lending slowed down, resulting in permanent stagnation. The Japanese example shows that deleveraging cannot be significantly decelerated by monetary easing.

6.5 BANK OF JAPAN 2008–2011

6.5.1 Unconventional instruments in Japan during the crisis

Before the outbreak of the crisis, the policy rate in Japan had already been at 0.75 per cent since February 2007. Therefore, following the fall of Lehman Brothers, the Japanese central bank had only very limited scope for action to reduce the rate. In addition to cutting the policy rate to 0.3 per cent in two steps by December 2008, the BoJ applied other, unconventional instruments in order to avoid the danger of deflation and to dampen the downturn in the economy.

After October 2008, the Bank of Japan took a number of unconventional measures, which can be divided into two groups. The first group of instruments comprises the measures taken in the interest of the stability of financial markets and the financial system. They include the expansion of securities lending transactions, the expansion of the scope of government securities eligible in repo transactions, the introduction of interest payment on credit institutions' excess reserves, the increasing of the annual volume of Japanese government bond purchases from JPY 14.4 billion to JPY 21.6 billion (5 per cent of Japanese GDP), the expansion of the scope of eligible collateral and share purchases.

The other group of instruments applied contains the measures aiming at stimulating corporate lending. This group includes increasing the frequency and size of short-term corporate debt securities repurchase agreements, reducing the quality criterion regarding the inclusion of corporate bonds and corporate loans in the scope of eligible collateral (from 'A' to 'BBB'), purchasing short-term commercial papers (CP) (up to a maximum limit amount of JPY 2,100 billion), purchasing corporate bond (up to a maximum limit amount of JPY 2,900 billion) as well as providing an unlimited amount of liquidity with eligible corporate loans as collateral at a rate corresponding to the O/N unsecured interbank interest rate target (0.1 per cent as of 19 December 2008).

6.5.2 Evaluation of the programmes

Several factors need to be jointly taken into account in assessing the effectiveness of the measures. In spite of the considerable magnitude of the unconventional instruments applied by the BoJ [through the asset purchases alone liquidity was expanded by a net JPY 55 trillion (10.2 per cent of GDP) until October 2011], they failed to control deflation,

and the price level declined in the country both in 2009 and 2010. At the same time, as it is highlighted by the IMF (2011) as well, the new instruments of the BoJ contributed to the decline in long-term yields, and supported the growth of the economy.

According to Berkmen's (2012) analysis, in terms of the growth effect the current Japanese programme is somewhat more successful than the quantitative easing of 2001–2006, which is mainly attributable to the fact that, as a result of the sounder balance sheets of the past decade, neither the banking sector nor the corporate sector are forced to carry out protracted balance sheet adjustments. According to Lam's (2011) evaluation, the positive financial market effect of the programme is reflected in the decline in long-term yields and risk spreads, but no significant effect can be proven concerning inflation expectations.

6.6 THE FED

6.6.1 Programmes during the crisis

In its management of the financial crisis, the Fed strived to mitigate the serious turmoil in the financial system and the economic downturn partly attributable to this turmoil not only with conventional monetary policy instruments,[44] but with the use of several unconventional ones as well.

In order to distinguish its programme from the quantitative easing used in Japan with an intention to increase money supply, the Fed called its programme 'credit easing', as it wanted to put the main emphasis on the composition of the assets purchased by the central bank (e.g Bernanke 2009). Accordingly, the objective of the purchases was to reduce the risk premia that evolved in the market of the targeted segments and to address liquidity problems, thereby improving the conditions of the private sector's access to loans. As Bernanke (2009) stressed, the reason for this shift in emphasis was that the unconventional instruments of the Fed were needed not only because of the ZLB, but also due to the dysfunctional operation of certain credit markets.

Of the instruments applied, the TAF (Term Auction Facility), the TALF (Term Asset-Backed Securities Loan Facility), the CPFF (Commercial Paper Funding Facility) and Large-Scale Asset Purchases belong to this group. TAF was a programme temporarily applied by the Fed and introduced already before the Lehman Brothers' bankruptcy with the intention to maintain short-term financing and liquidity. In the case of the TAF programme, 28- and 84-day loans were extended (against collateral) to depository institutions, if they had adequate financial conditions. The Fed launched the TAF programme in December 2007 to handle mortgage market turbulences, and the last auction was organised in March 2010. As of March 2008, when Bear Stearns, an investment bank was struggling with serious financing difficulties and was bought up by JP Morgan, the Fed introduced a permanent lending facility for the most important financial institutions as a supplement to the TAF programme. They also strived to improve the same participants' liquidity by allowing them to exchange their asset-backed securities included in their respective balance sheets as collateral for more liquid government securities with the Fed.

The Fed announced the TALF programme on 25 November 2008 in order to support the further issuing of asset-backed securities. Originally, the New York Fed announced the programme with a USD 200 billion volume.[45] The point in the functional mechanism is that the TALF financed, without right of recourse, those investors who purchased AAA, i.e. the highest-rated covered securities. The Fed gave three arguments for the necessity of the programme:

- Following the Lehman bankruptcy, the issuance of asset-backed securities (ABSs) (produced as a result of securitisation) fell sharply, and then stopped completely as of October.

- Premia of AAA-rated asset-backed securities that were already on the market reached heights that were even more extreme than historical fluctuations.

[44] In the case of the conventional policies it tried to improve financing conditions by extending the maturity of the policy rate and of the traditional short-term financing (Lenza et al., 2010).

[45] The Treasury supported the TALF with funds amounting to USD 20 billion, from which a total USD 200 billion could have been lent through the leverage.

– The ABS market plays a prominent role in the financing of small and medium-sized enterprises as well as consumer loans; therefore, the functional disorder of the market affected the economic activity of the USA as a whole.

The amount was not directly received by consumers or the SME sector, but by the issuers of ABS bonds. The Fed did not purchase the ABSs, only accepted them as collateral for the sake of further lending. All in all, the Fed lent a mere USD 48 billion to banks and various investment funds through the TALF, because the state of the targeted markets improved significantly as a result of the announcement. It should be noted that the aforementioned programme was also strengthened by the measures announced by the US Treasury. One such treasury programme was the PPIP (Public-Private Investment Programme), which bought up the problematic assets of companies dealing with mortgage market financing that got into trouble. A similar one is the TARP (Troubled Asset Relief Programme) introduced after the Lehman bankruptcy in October 2008; its objective was to buy up bad assets of the financial sector (by the Treasury).

The third relevant instrument applied by the Fed was the CPFF programme (Commercial Paper Funding Facility) that aimed at the purchase of short-term corporate debt securities (CP, commercial paper). For this purpose, the Bank set up a fund, which was announced on 7 October 2008. It started its operation already on 27 October. Although within the programme the Fed purchased three-month CP directly from the issuers, its primary objective was the stimulation of issuances and purchases in the market of longer-term CP. Namely, the idea was that the backstop created by the instrument would ease anxieties that issuers would not be able to find the money necessary for repaying their maturing securities through the issuance of further CP, and thus demand for longer-term securities as well as issuances could pick up again. The CPFF functioned as the last buyer of corporate securities until February 2010. The programme was made necessary by the fact that following the Lehman bankruptcy investors invested in funds containing government securities, instead of funds where the weight of the private sector was higher. All of this resulted in such serious turbulences in the market that only overnight financing functioned, and the issuance of longer-term corporate securities stopped due to lack of demand. Accordingly, the objective of the Fed was to restore confidence and functioning in the CP market with a maturity of up to one year. Up to end-2008, issuers used the financing facilities of the fund in a value of USD 333 billion. As for the breakdown by types of securities, until February 2009 the ratio of non-covered corporate securities to covered securities was two to one in the portfolio of the fund. As of February, both the share of non-covered securities and the total assets of the fund fell considerably.

The fourth unconventional Fed instrument was the AMLF (Asset Backed Commercial Paper Money Market Mutual Fund Liquidity Facility), which was launched on 22 September 2008. All financial institutions that were handling deposits could borrow in this programme. They were allowed to spend the loan on purchasing good-quality, short-term asset-backed commercial paper (ABCP). The programme strived to stabilise the corporate bond market, and wanted to restore the demand of institutions dealing in asset-backed securities, preventing the market from collapsing.

Finally, large-scale asset purchases represented the last type of the instruments of the Fed that aimed at the improving of credit markets in the first round; this instrument was first announced on 25 November 2008. Within the programme, between December 2008 and March 2010 the Fed purchased – mostly mortgage-backed – agency securities in a value of around USD 1,400 billion and government bonds amounting to USD 300 billion.

As weaker-than-expected economic prospects justified further monetary easing, another round of large-scale asset purchases also took place, basically covering government bonds and aiming at the reduction of long-term government bond yields. The second programme is called QE2 both in literature and by financial players. Within this programme, between November 2010 and June 2011 government bonds with a value of USD 600 billion were purchased, and the money received from earlier-purchased, maturing mortgage bonds is also spent on purchasing government bonds, thus maintaining the level of the central bank balance sheet.

6.6.2 Evaluation of the programmes

In connection with the comprehensive evaluation of the programmes of the Fed, Gagnon et al. (2010) emphasised their success in the reduction in the term premium (by 30–100 basis points on average) and long-term interest rates. The study considered the mortgage market crisis management as the most effective one, as here the targeted instruments were able

to prevent the complete collapse of the market. In addition, the analysis points out that the harmonised programmes triggered a perceptible positive effect in the market of government bonds and corporate bonds as well.

It can be concluded in general that the asset purchase programmes of the Fed (QE1 and QE2, CPFF, MBS) added to market liquidity, reduced spreads and increased securities issues. In several cases the announcement itself already mitigated market tension and panic, and then the asset purchases resulted in a further decline in yields. Communication was very important in terms of effectiveness, as the announcement effect influenced market expectations almost immediately. Further impacts of the programmes depended on the nature of the given market segments, risk aversion and the magnitude (or possible expansion) of the programme. Several studies attempt to give quantitative estimates of the effects of the LSAP programmes. Overall, based on the findings of the studies, the programmes had a significant positive effect on financial markets. Based on the evaluation of the programmes, strong consensus evolved in the literature about the first phase of the LSAP (Large Scale Asset Purchase) Programme of the Fed, which reduced the yields of the 10-year treasury bills and corporate bonds with a good credit rating by some 50 basis points.[46]

In terms of the macroeconomic effects, the conclusions of the studies are very diverse. At the same time, the studies point out that without the programmes the fall in GDP would have been much more significant. Baumeister and Benati (2010) estimate 4 percentage point lower real GDP growth both in the USA and in the United Kingdom in the first quarter of 2009 as a result of the asset purchase programmes. Analysing the programmes of the Fed, Chung et al. (2011) came to the conclusion that term premia declined by an average 50 basis points and by a further 20 basis points as a result of the QE1 and QE2 programmes, respectively. Regarding the impact on economic growth they came to the conclusion that without the QE1 programme the US GDP would be 2 percentage points lower until 2012, and it would have declined by a further 1 percentage point without the QE2 programme.

6.7 EMERGING COUNTRIES

6.7.1 South Korea

The Korean central bank started to purchase corporate securities for the companies entering the Bond Market Stability Fund in 2009. The reason for applying an unconventional instrument was that in spite of the financial crisis the policy rate, which had stood at 5.25 per cent in August 2008, was reduced by continuous easing to 2 per cent by February 2009. Then, instead of using conventional instruments (in order to avoid further cuts in the base rate) the central bank turned to unconventional instruments.

In Korea, the asset purchase affected not only the large corporations but also the SME sector, as the state-owned non-profit corporation, the Small & Medium Business Corporation, which supports SMEs (both financially and with business advice), also entered the stability fund programme. Total assets of the fund amounted to USD 3.3 billion (approx. HUF 760 billion at the exchange rate of that time; equivalent to 0.34 per cent of Korean GDP). Improvement in corporate financing was indicated as the objective of the instrument. As illustrated by Table 7 as well, the ratio of loans to the Korean private sector did not decline during the crisis (not even in 2010). Moreover, even capital market capitalisation as a proportion of GDP jumped back to approximately the 2007 level.

6.7.2 Israel

The Bank of Israel can be considered another emerging market example. It applied quantitative easing between February and August 2009. At that time, the policy rate was 0.5 per cent (which was raised to 0.75 per cent by the third quarter), so the monetary policy situation was similar to what was being experienced in the developed economies.

During the use of the instrument, government bonds were purchased in a daily value of ILS 200 million. A reduction of interest rates and the prevention of an increase in long-term interest rates were the main objectives of the intervention (i.e. a reduction of the gap between long-term rates and the Israeli policy rate). The bond purchase programme achieved

[46] Adrian et al. (2010), Agarwal et al. (2010), Gagnon et al. (2010), Hamilton and Wu (2010), Hancock and Passmore (2011), Joyce et al. (2011). (For a quantified summary of the findings see Table 3.)

its target by August (the real yield of 30-year bonds fell to 3.7 per cent by July and stabilised, whereas the nominal yield of 20-year government bonds declined to 6.2 per cent by August and then to 6.1 per cent by September), so the Bank of Israel stopped the programme.

In connection with the Israeli example, it is important to emphasise that Israel was one of the countries where inflows of foreign capital were significant in the period of the global financial crisis as well, so one of the objectives of the easing was exactly to mitigate the appreciation pressure on the exchange rate. In the period under review, the shekel strengthened against the dollar while the Bank of Israel doubled its dollar reserve through continuous FX market interventions.

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