Causes and implications of the low level of the risk-free interest rate

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Introduction

In most advanced economies, the risk-free interest rate – i.e. the rate applicable to assets entailing a minimal credit risk – has fallen to historically low levels over the recent period. This interest rate is particularly important because it forms the basis for determining other interest rates, and therefore influences financing conditions throughout the economy. This article focuses on long-term rates to examine the causes and implications of an economic environment with very low risk-free interest rates.

The first section looks at the current level of risk-free interest rates in a historical perspective. The second section presents an analytical framework of interest rate determinants, while the third section uses that framework to study the main factors behind the movement in risk-free interest rates in the United States and in the euro area since 1990. The fourth section discusses how an accommodative monetary policy stance contributes to macroeconomic stability – and therefore to price stability – but also examines the associated risks for financial stability. More specifically, the fifth section illustrates the challenges which persistently low interest rates present for the insurance sector and for pension funds, and the risks accompanying a sudden rise in interest rates.

1. The level of interest rates: a historical perspective

Although risk-free assets really only exist in theory, in practice the Treasury securities issued by good quality sovereigns are generally regarded as risk-free (1) because it is considered highly unlikely that those issuers will default. This is due in particular to the ability of a State – in contrast to a company – to raise taxes in order to repay its debts. Also, even though the process is nowadays widely prohibited or condemned in advanced economies, a State which borrows in a currency for which it is the issuing authority can always print money to avoid default. Long-term risk-free interest rates in the United States, the United Kingdom, Germany and France were used here because statistical data on those countries are available over a long period. The series presented comprise various interest rates – generally government rates – which have been assembled to produce a composite series of the risk-free long-term borrowing cost for each country. Thanks to the early development of markets in fixed-income instruments in the United States and the United Kingdom, series going back to the year 1800 are available for those two countries. The French and German series begin in 1901 and 1956 respectively.

1.1 Nominal interest rates

Long-term nominal interest rates remained modest and generally stable from the early 19th century until the eve of the First World War. That was particularly true in the United Kingdom, which was then the world's leading economic power and the country with the most highly developed financial markets. This was a period in which

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(1) Other interest rates which may be regarded as risk-free include guaranteed interbank market rates, for example, and long-term swap rates.

metallic currency systems largely prevailed: bimetallic, based on the convertibility of paper money into gold or silver up to the end of the 19th century, and then the gold standard. These systems offered a high degree of long-term price stability, despite wide variations in the short term, due to fluctuations in the quantity of precious metal available and variations in economic activity. In that context, devoid of any price trend, nominal interest rates largely mirrored the movement in price levels. In his *Treatise on Money*, Keynes called this the "Gibson paradox" after the statistician A.H. Gibson who published various articles in the 1920s confirming the close links between price levels and interest rates (Gardes and Lévy, 1994). The paradox is viewed today as the outcome of a contradiction between the observations and prescriptions of monetary theory concerning the nature of the variables in the interest rate/price relation: the Fisher equation in fact predicts that nominal interest rates will show a positive correlation with the expected inflation rate, and not the general price level.

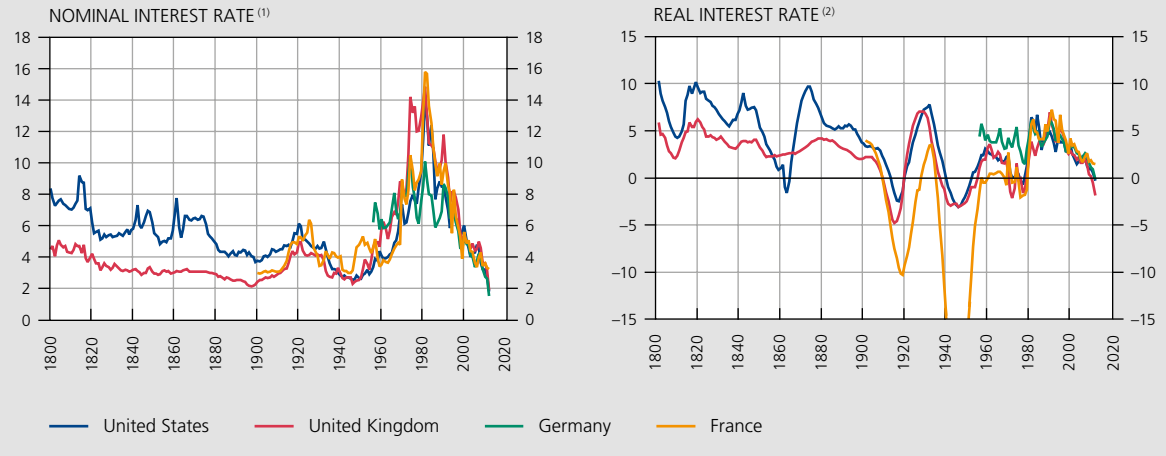
After a number of countries had abandoned the gold standard in the early 20th century, nominal interest rates fluctuated far more widely than in the preceding century, in parallel with sharper movements in the level of prices and inflation. Looking beyond the business cycles, it is possible to identify four main trends during the 20th century: an initial upward trend from 1900 to the 1920s, which was a relatively prosperous period with rising commodity prices, but also included the First World War which brought strong inflation; next came a downward trend from the 1920s to the late 1940s, a period affected by the Great Depression, deflation and the Second World War; after that came an upward trend from the late 1940s to the early 1980s, a period featuring severe supply shocks and an inflationary spiral; finally, there has been a downward trend from the early 1980s to the present day, a period of "great moderation" due in particular to the assignment to central banks of mandates geared to price stability and, more recently, the economic and financial crisis which began in 2007.

It is interesting to draw a parallel between the existing monetary system, inflation and the pattern of nominal interest rates. The bimetallic and gold standard systems featured little long-term variation in prices and stable interest rates. Conversely, the period of high inflation in the 1970s and the early 1980s brought soaring interest rates, while the adoption of a monetary policy geared to price stability lies at the root of a downward trend in interest rates over the past thirty years.

1.2 Real interest rates

Real interest rates, rather than nominal interest rates, are generally regarded as determining decisions on consumption, saving and investment; they are therefore more relevant, to some extent, than nominal rates. More specifically, the appropriate concept is the real *ex-ante* interest rate, namely the nominal rate minus inflation expectations. However, to calculate the real interest rate

CHART 1 THE LONG-TERM RISK-FREE INTEREST RATE (1800-2012)



Sources: Homer and Sylla (1991), Datastream, http://www.France-inflation.com and http://www.measuringworth.com
(1) Generally a government bond rate.
(2) Difference between the nominal rate and trend inflation measured with a Hodrick-Prescott filter.

in the absence of historical data on inflation expectations, we are obliged to use inflation trends estimated with the aid of a Hodrick-Prescott filter, which limits cyclical variations in inflation.

Historically, real interest rates have not necessarily followed the movement in nominal rates. The absence of very marked cycles in inflation, and the great stability of nominal interest rates, account for the relatively stable real interest rates in the 19th century. Conversely, the suspension of metallic currency systems, as during the American War of Independence between 1861 and 1865, and in the early 20th century, led to greater variations in long-term inflation and increased volatility in real interest rates. Generally speaking, periods of war brought a strong rise in inflation and clearly negative real interest rates. That was also true of the period of high inflation at the end of the 1970s. In contrast, in the early 1980s, the high level of real interest rates reflected the central banks' determination to restore price stability, and mirrored the compensation demanded by investors for the uncertainty surrounding the inflation outlook, following the high inflation in the 1970s. When central banks were given mandates specifically geared to price stability in the 1990s, and as the battle against inflation began to produce results, real interest rates generally subsided in parallel with the decline in nominal rates. In the recent period, real long-term interest rates in the advanced economies have dropped to historically low peacetime levels. The following sections examine in more detail the factors behind this phenomenon and its implications.

2. Analytical framework of interest rate determinants

In order to study interest rate determinants, it is useful to refer to a theoretical analytical framework. Here we shall use the model commonly devoted to the term structure of interest rates, which is based on the expectations theory and describes the relationship between interest rates of varying maturities. We shall also propose a way of considering the relationship between monetary policy and the interest rates in the economy. In the third section, we shall be able to use this information to examine the factors contributing to the current low level of interest rates in the euro area and in the United States.

2.1 The expectations theory of the term structure of interest rates

According to the expectations theory of the term structure, in the absence of uncertainty over future interest rates, the long-term yield on a security should be equivalent to the average yield expected from a sequence of shorter-term investments, otherwise there would be scope for arbitrage by investors, a situation which could not persist. However, it is unrealistic to assume that investors have perfect knowledge of future interest rates. Thus, taking account of the presence of uncertainty, the long-term yield on a security can be regarded as the sum of the average expected yield on a sequence of shorter-term investments plus a term premium. The latter offers compensation for the uncertainty surrounding future nominal interest rates for the duration of the investment, and its associated risk of capital loss.

The term premium incorporated in nominal interest rates depends on the magnitude of risk, which concerns in particular uncertainty over future real interest rates and inflation, but is also affected by the price of risk, which depends on investors' risk aversion. Since uncertainty increases, in principle, with the residual maturity of a bond, the term premium is generally seen as having a positive correlation with that residual maturity, and this factor is regularly put forward to account for the higher average yields on long-term securities in comparison with short-term yields.

Factors which may affect the term premium and which relate to the degree of risk aversion among investors include the importance of the asset liquidity criterion or explicit demand for long-term risk-free assets. In the context of the economic and financial crisis of 2008-2009 and the sovereign debt crisis which followed, the sometimes significant widening of the spread between State-guaranteed bonds, such as those issued by public investment agencies, and bonds issued directly by the Treasury – as is the case more particularly in Germany – is evidence, for example, that investors attached greater importance to the liquidity of the underlying securities[(1)] (Ejsing, Grothe and Grothe, 2012). By considerably increasing demand for long-term risk-free assets, a number of central banks also deliberately depressed term premiums. Hence, depending on the factors in operation, those premiums may be either positive or negative. In practice there are various ways of estimating them, and it is extremely tricky to identify their exact composition.

(1) In periods of severe financial tension, negative yields have even been observed on some short-term AAA bonds (e.g. three-month bonds), while the yields on Overnight Indexed Swaps of the same maturity (which reflect expectations regarding overnight rates) remained positive. That is evidence of the fact that some investors who, for example, had no access to the central bank's deposit facilities, tried to invest their liquidity in very safe assets and sometimes accepted a negative yield in order to do so.

2.2 Monetary policy and interest rates

In principle, the central bank has direct control over very short-term money market interest rates, essentially via its key interest rates and open market operations. Through the monetary policy transmission mechanism, the central bank influences economic activity, and hence inflation, by adjusting its monetary policy stance in line with its objectives. In the literature, the central bank's decision is regularly illustrated via a monetary policy rule that links the target short-term interest rate to macroeconomic variables such as inflation and output. The best known example of such a rule is the Taylor rule (Taylor, 1993), which may take the following form:

$$i_t = r_t^* + \pi^* + 1.5\,(\pi_t - \pi^*) + 0.5\,(y_t - y^*)$$

where i_t is the very short-term interest rate target, r_t^* is the equilibrium real interest rate, π^* is the inflation target defined by the central bank, π_t is actual inflation, y_t is the actual level of output and y* is the potential level of output. This rule shows that the appropriate very short-term interest rate for a central bank aiming at price stability corresponds to the sum of the equilibrium real interest rate and the inflation target adjusted for the difference between actual inflation and target inflation, on the one hand, and for the gap between actual and potential output on the other.

In practice, even though no central bank mechanically follows such a rule, it nevertheless appears that the rule does offer a good description of the data (at least in the period preceding the crisis, when nominal interest rates were not constrained by a zero lower bound) and various studies show that central banks do accord it some importance (see for example Ilbas *et al.* (2013) for the United States).

An essential parameter of the above equation is r_t^*, the equilibrium real interest rate, also known as the "natural" interest rate. This is not a variable that can be observed, but a concept which is hard to define, and on which there is no consensus[(1)]. The generally accepted idea, and the one which we adopt here, sees it as the interest rate that would prevail in a context of normal production, i.e. when output corresponds to its potential level, compatible with price stability. As pointed out by Woodford (2001), and contrary to the theory put forward by Taylor (1993), the equilibrium rate is not constant over time and changes, in particular, with real factors which are, *a priori*, exogenous to monetary policy, such as the economy's productivity. Woodford (2001) stresses the need for economic policy-makers to take account of the variability of this interest rate in order to meet their targets for macroeconomic stability, and more particularly price stability. Conversely, the inflation target parameter π^* is subject to the direct control of the central bank. Together, the equilibrium real interest rate and the inflation target form the "equilibrium nominal interest rate".

The central bank only has direct control over very short-term interest rates. However, as the monetary policy stance only changes gradually, changes to its key rates are likewise reflected in longer-term interest rates, which incorporate expectations regarding the future monetary policy stance. By adjusting its key rates, the central bank can thus influence the incentives for households to save or consume, and the incentives for firms to invest. In so doing, it supports or restrains economic activity and ensures price stability. New-Keynesian macroeconomic models in fact show that it is not so much the real short-term interest rate as the entire future expected path of real short-term interest rates that influences aggregate demand and inflation (Clarida *et al.*, 1999).

However, the central bank's ability to influence longer-term rates via its monetary policy stance is limited. On the one hand, it diminishes with maturity, and the impact of the central bank's decisions on interest rates is thus largely concentrated on the short and medium term. Over the long-term, there is not in fact any reason to expect monetary policy to be particularly restrictive or accommodative, and, in principle, these rates must therefore reflect on average the sum of the expected equilibrium real rate and the expected inflation target. Also, since economic agents can always choose to hold coins and banknotes rather than invest their money in debt instruments, nominal interest rates – including the key rates – cannot fall (significantly) below zero. This natural floor (zero lower bound) restricts the scope for the central bank to compensate for negative output gaps and deflationary risks via the traditional interest rate instrument. At a certain point, a central bank wishing to continue to stimulate economic activity is therefore forced to turn to "unconventional" monetary policy measures. Prominent ones include forward guidance and securities purchase programmes. The former has a particular influence on expectations regarding monetary policy in the medium term, while the latter enable the central bank to exert direct downward pressure on the term premiums contained in long-term interest rates.

(1) For more details on this subject, see for example Woodford (2003) or Weber *et al.* (2008).

3. Empirical analysis of the determinants of low interest rates in the euro area and in the United States

In this section, we try to identify the main factors behind the movement in long-term risk-free interest rates in the United States and in the euro area since 1990. To that end, we first break down the long-term risk-free rate – in this case the ten-year interest rate – into a short-term component and a long-term component. Next, by combining these interest rate data with estimates of the equilibrium nominal interest rate for the United States and the euro area we can shed light on various factors accounting for interest rates. It should be noted that, for the pre-1999 period, developments in the euro area are illustrated on the basis of German data. For the interest rates, we use US Treasury yields and, from 1999 onwards, for the euro area, the average yields of the five main euro area countries with an AAA rating as at 30 June 2013 (1) (Germany, Austria, Finland, France and the Netherlands). That choice enables us not only to exclude the credit risk affecting the yield on certain government bonds in the euro area, but also to limit the influence of the negative liquidity premiums on sovereign instruments of countries such as Germany.

(1) On 12 July 2013, France lost its AAA rating after the rating agency Fitch downgraded it to AA+. However, the main analysis here concerns data which do not go beyond June 2013. Luxembourg was not included owing to a lack of data.

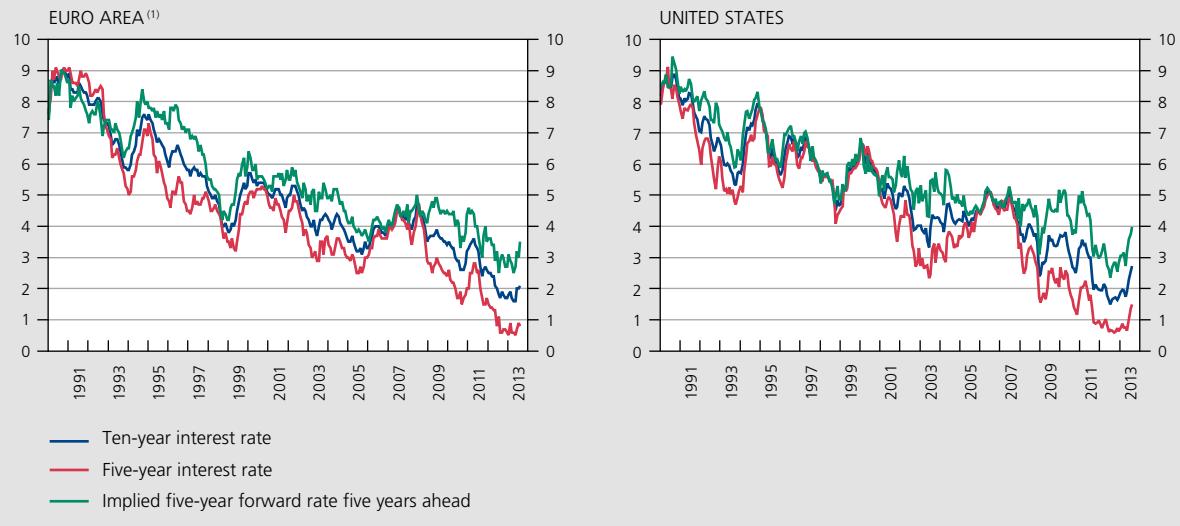
3.1 Breakdown of the ten-year interest rate

The nominal ten-year rate can be broken down into two components: a short-term component – the five-year interest rate – and a long-term component – the implied five-year forward rate five years ahead. The latter corresponds to the yield currently expected on a five-year investment made in five years' time.

Despite cyclical movements, the ten-year interest rate and each of its components tended to decline during the 1990s, both in the euro area and in the United States. The implied five-year forward rate five years ahead then remained relatively stable between 2000 and 2011, while the five-year interest rate was more volatile over the same period. During the recent crisis, the dip in the ten-year rate seems essentially to reflect a contraction in its short-term component, which is not surprising in the context of a marked easing of the monetary policy stance. However, since mid-2011, the implied five-year forward rate five years ahead has also fallen fairly sharply, whereas it had previously remained quite close to the average recorded during the pre-crisis decade.

On the basis of the analytical framework outlined above, we can break down the five-year interest rate and the implied five-year forward rate five years ahead to identify their various determinants. For that purpose we compare the nominal rates with the estimates and expectations concerning the equilibrium real rate and

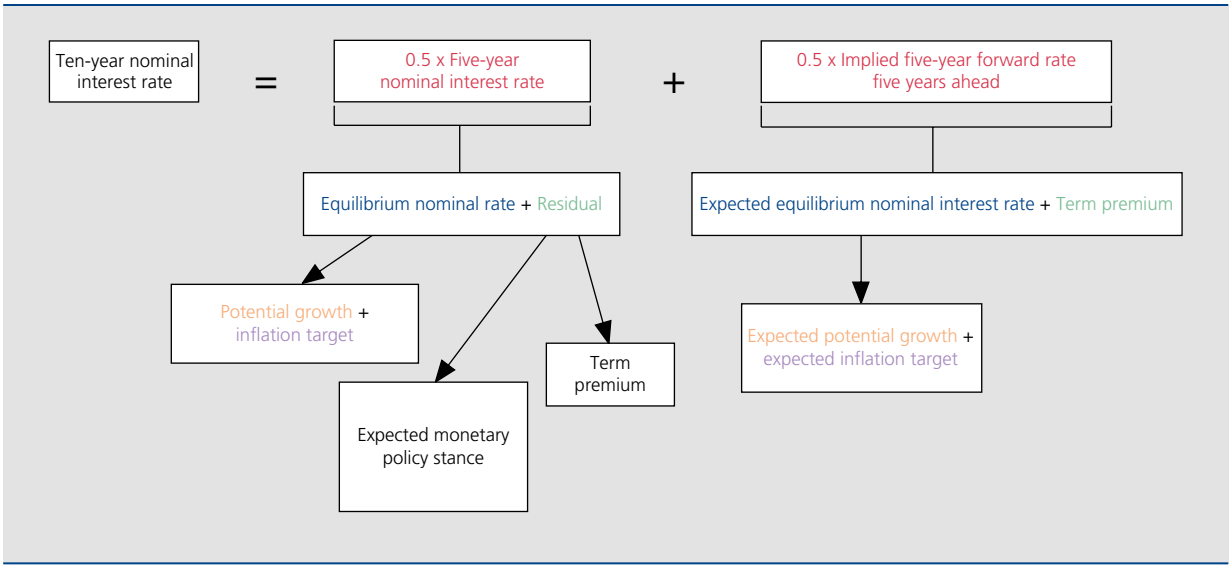
CHART 2 TEN-YEAR INTEREST RATE, FIVE-YEAR RATE AND IMPLIED FIVE-YEAR FORWARD RATE FIVE YEARS AHEAD



Sources: Thomson Reuters Datastream, NBB.

(1) German Bund yield before 1999. Average of the five main euro area countries with an AAA rating as at 30 June 2013 (Austria, Finland, France, Germany and the Netherlands) afterwards.

CHART 3 SCHEMATIC BREAKDOWN OF THE TEN-YEAR NOMINAL INTEREST RATE



the inflation targets. If we subtract from each of those nominal interest rates the corresponding equilibrium nominal rate, we obtain a residual figure which incorporates all the other factors that help to determine the interest rate.

In regard to the five-year rate, the equilibrium nominal interest rate can be approximated by the sum of the estimated potential real growth of the economy – its real component – and the central bank's inflation target – its inflation component. The residual resulting from the difference between the five-year nominal rate and the equilibrium nominal rate reflects expectations regarding the monetary policy stance over the coming five years plus a term premium. While expectations concerning the monetary policy stance depend on the current and expected macroeconomic outlook, and on the way in which the central bank should respond to these developments, the term premium depends on the uncertainty surrounding expectations regarding future interest rates, and specific factors such as investors' degree of risk aversion and the liquidity of the underlying asset.

The implied five-year forward rate five years ahead is, in principle, largely unaffected by cyclical movements in short-term rates and the monetary policy stance. The latter is in fact neutral, in principle, over a long horizon, and there is therefore no reason to expect it to be particularly accommodative or restrictive for the five-year period starting in five years' time[1]. The expected equilibrium nominal rate for that period can therefore be treated as the future short-term rate implying that the residual resulting from the difference between the implied five-year forward rate five years ahead and the equilibrium nominal rate for that period can be interpreted as the term premium.

To provide an empirical illustration of this breakdown (summarised in chart 3), we combine the nominal interest rates with the estimated equilibrium nominal rates for the United States and the euro area. The estimated potential real growth rates come from the OECD's Economic Outlook published in June 2013, while the inflation targets are the official or informal targets adopted by central banks[2]. There is no estimate of real potential growth for the five-year period starting in five years' time, but it can be reasonably approximated by means of long-term real GDP growth expectations such as those derived from the twice-yearly Consensus Economics surveys, which specifically relate to a five-year period starting in five years' time. Similarly, the inflation target expected in the long term can be estimated via long-term inflation expectations, likewise taken from the twice-yearly Consensus Economics surveys.

(1) On this subject, it is interesting to note the long-term projections produced every three months by the members of the FOMC, the Federal Reserve's decision-making body. According to the FOMC, these can be interpreted as the rates of GDP growth, inflation and unemployment expected for a horizon of more than five or six years, in the absence of shocks and given an appropriate monetary policy.

(2) In 1984, the Bundesbank considered that the norm for the rise in price levels should be 2 % up to 1997, the year in which it changed its norm to a range of 1.5-2 % (Mishkin, 2001). In 1998, the ECB Governing Council defined price stability as a "year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2 %", stipulating that "price stability must be maintained in the medium term". In May 2003, it confirmed that definition, clarifying that "in the pursuit of price stability, it aims to maintain inflation rates below, but close to 2 % over the medium term" (ECB, 2003). The Federal Reserve did not officially adopt a long-term inflation target of 2 % until 25 January 2012, but the inflation figures suggest an implied target of 2 % during the preceding 20 years (Rosengren, 2013). Taking account of this information, and for simplicity, for the purposes of this article we shall take the inflation objective as 2 % for the euro area and the United States since 1990.

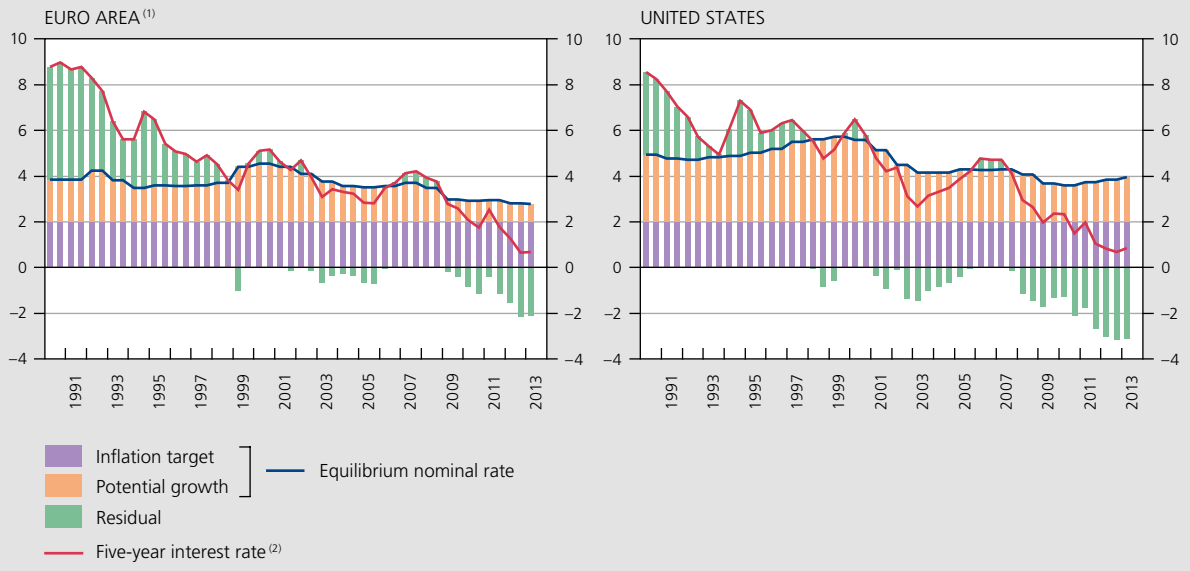
3.2 Five-year interest rate

In the beginning of the crisis, the equilibrium nominal rate dropped in both the euro area and the United States. However, that decline is part of a fundamental trend dating back to the early 2000s. It reflects the weakening of the potential growth rate, which had risen in the second half of the 1990s, while the inflation targets remained unchanged. The trend fall in the equilibrium real interest rate indicates that, even if central banks maintained a monetary policy stance which was neutral, i.e. neither accommodative nor restrictive, the current short-term interest rate would be lower than in the early 2000s. It also means that, to a greater extent than before, central banks need to reduce the key interest rates in order to stimulate economic activity.

In accordance with the Taylor rule prescriptions for the determination of the interest rate target, the five-year interest rate hovers around the equilibrium nominal rate, reflecting the more or less accommodative monetary policy stance and expectations on how it will change during successive macroeconomic cycles. Because the deviations from the equilibrium rate diminish with the maturity, they will be more marked in the case of a shorter-term rate since the five-year rate already partly takes account of the prospect of a return to equilibrium interest rates. The high level of short-term interest rates compared to the neutral rate in the early 1990s reflects the deliberately restrictive nature of the monetary policy stance, aimed at ensuring price stability after the years of high inflation and, in Germany, intended at eliminating the inflationary pressure resulting from the reunification. It also reflects the continuing high level of risk premiums demanded by investors to protect themselves against inflation, while central bank credibility was still not fully established.

Since 2007, the five-year rate has fallen by a total of almost 400 basis points in the United States and in the euro area, in the wake of the key interest rate cuts by the Federal Reserve and the ECB. The interest rate reduction took place mainly in two stages, the first extending from 2007-2008 to mid-2010, and the second from mid-2011 to the recent period. The decline in five-year interest rates is essentially due to a downward revision in expectations regarding the monetary policy stance over the horizon in question; those expectations are affected by such factors as the outlook for economic activity and inflation, but are also influenced by certain monetary policy measures such as forward guidance. Thus, during the crisis, the Federal Reserve regularly announced its longer-term monetary policy stance, while the ECB Governing Council issued statements declaring that the monetary policy stance would remain accommodative

CHART 4 FIVE-YEAR NOMINAL RATE



Sources: ECB, Federal Reserve, Mishkin (2001), OECD, Rosengren (2013), Thomson Reuters Datastream.
(1) Pre-1999 data for Germany. The interest rate data from 1999 onwards correspond to the average of the five main euro area countries with an AAA rating as at 30 June 2013.
(2) Average over six months for June and December. Latest data: June 2013.

for "as long as necessary". In July 2013, it also offered more explicit information on its future policy stance (see box 2). Other factors which probably lowered the five-year rates, and more specifically the term premiums which they incorporate, include the rise in demand for risk-free assets, as is also the case for the implied five-year forward rate five years ahead.

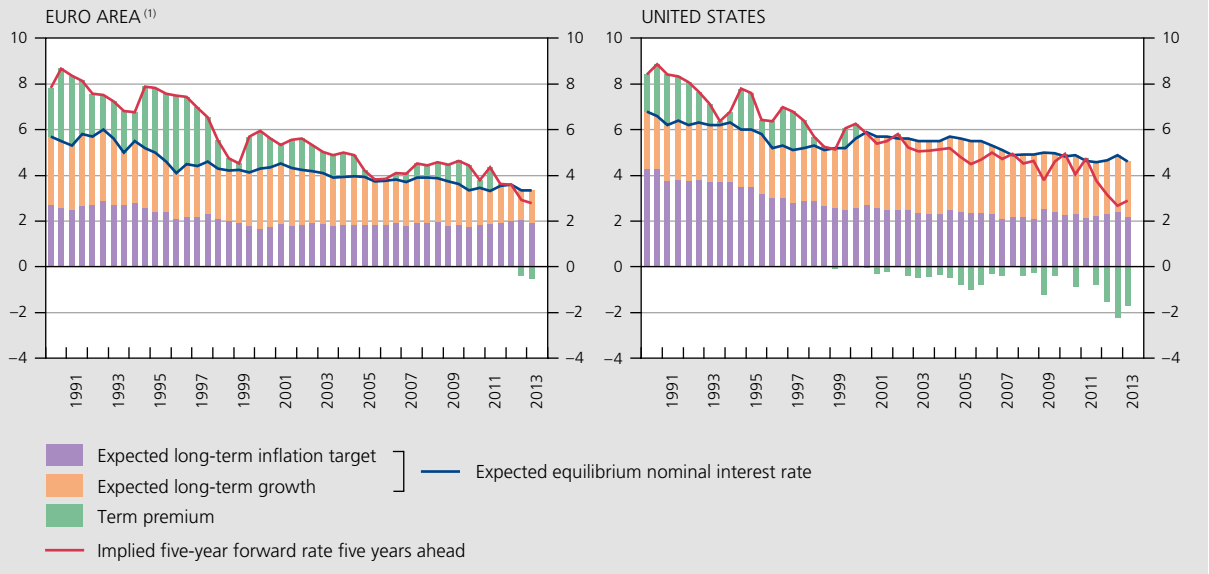
3.3 Implied five-year forward rate five years ahead

After having fallen in the 1990s in the wake of the downward revision of long-term inflation expectations, the expected equilibrium nominal rate continued to decline in the 2000s and during the crisis, in parallel with the downward revision of the long-term growth forecasts. Although expectations remained higher in the United States, the trend was largely similar for each of the economic blocs. Long-term inflation expectations remained moderate and stable overall from the year 2000 onwards, essentially reflecting the central banks' price stability mandates and the associated credibility. The firm anchoring of inflation expectations was also a key factor enabling the central banks to influence real interest rates in order to stimulate economic activity and attenuate the deflationary pressure at the height of the crisis.

The term premium included in the implied five-year forward rate five years ahead, which we estimate here on the basis of the residual resulting from the difference between the actual nominal rate and the equilibrium nominal rate [1], followed a definite downward trend during the 1990s, dragging the nominal rate down with it. In contrast, during the pre-crisis period the implied five-year forward rate five years ahead remained relatively stable, close to the expected equilibrium nominal rate. However, it is worth noting that around the year 2005 the gap between these two rates was negative in the United States; in other words, the term premium was negative. The decline in the long-term rate despite a rise in the short-term rate over the preceding months had prompted the former Chairman of the Federal Reserve, Alan Greenspan, to talk about a "conundrum" [2]. In the euro area too, the long-term rate was particularly low during that period.

(1) We adopt an intuitive, yet robust, method of estimating term premiums. Macroeconomic models can be used to infer these premiums, but they are generally complicate to handle, especially when interest rates are close to their zero lower bound, implying non-linearities (see Christensen and Rudebusch, 2013, or Kim and Singleton, 2012).
(2) Greenspan (2005).

CHART 5 IMPLIED FIVE-YEAR FORWARD RATE FIVE YEARS AHEAD



Sources: Thomson Reuters Datastream, Consensus Economics.
(1) Pre-1999 data for Germany. The interest rate data from 1999 onwards correspond to the average for the five main euro area countries with an AAA rating as at 30 June 2013. Between 1999 and 2003, expectations concerning the long-term inflation target and long-term growth correspond to the GDP-weighted average for France, Germany, Italy, the Netherlands and Spain.
(2) Six-month average for April and October. Latest data: April 2013.

Unlike the five-year rate, the implied five-year forward rate five years ahead varied little in the beginning of the crisis, and did not really start to fall until around mid-2011, in the wake of clear concern about the revival of activity worldwide. Since then, it has fallen sharply, dropping to a historic low in both the United States and the euro area during the recent period. Despite a lowering of long-term growth expectations, most of the decline in the implied five-year forward rate five years ahead since 2011 reflects a reduction in the term premium, particularly marked in the United States.

3.4 Factors behind the decline in term premiums

The factors influencing the term premiums incorporated in long-term rates are many and varied. To identify them more clearly, it is helpful to distinguish between more structural factors relating to trends which transcend the economic cycles, and more cyclical factors due essentially to the more recent context of the crisis.

Regarding structural factors, we might mention the aforesaid great moderation and the global savings glut. The great moderation refers to a period of great macroeconomic stability extending from the late 1980s to 2006, with declining inflation, positive and relatively stable economic growth, and the belief that economic cycles were more under control. It is generally attributed to structural changes in the economy, the adoption of better macroeconomic policies, and "good luck" in the form of less severe shocks. On the monetary policy front, the assignment to central banks of mandates geared to price stability, and the increased transparency and credibility of central banks, helped to stabilise inflation at a low level, to anchor inflation expectations and thus to reduce inflation premiums during the 1990s. In general, the increased macroeconomic stability attenuated the uncertainty over future movements in short-term interest rates, therefore reducing the term premiums. The global savings glut originated from the Asia crisis of 1997-1998, and to a lesser extent from the rise in oil prices (Bernanke, 2005). It is due to the persistent current account surpluses and the accumulation of large foreign exchange reserves in many emerging countries – particularly in Asia – and among oil exporters endeavouring, among other things, to reduce the risks associated with a possible capital flight, prevent any appreciation of their currency and invest their assets in a secure place. It is probably also connected with the changing age structure of the global population, with a rise in the population of working age in some of those countries, leading to a higher propensity to save. The accumulation of savings and foreign exchange reserves boosted global demand for risk-free assets, primarily long-term government bonds issued by advanced economies and, more specifically, US Treasury securities. Population ageing in the advanced economies since the 2000s could likewise have boosted demand for savings, especially risk-free long-term assets. The strengthening of demand for risk-free assets naturally triggered a fall in the premiums incorporated in the yields.

As regards the cyclical factors behind the fall in term premiums, we might first mention certain unconventional monetary policy measures. The securities purchase programmes implemented by various central banks in order to exert direct downward pressure on long-term interest rates and further ease financing conditions in the economy played a very particular role here. These purchase programmes were adopted after short-term interest rates had dropped to their lower bound and it was therefore no longer possible to stimulate activity by using traditional monetary policy instruments. In this connection, it is worth noting the very sharp fall in term premiums in the United States compared to the euro area. That bears witness to the proactive approach of the Federal Reserve in purchasing long-term securities to drive down interest rates (see box 1), while the Eurosystem confined itself to purchasing securities in order to safeguard the transmission of its monetary policy. Its purchases under the Securities Markets Programme (SMP) were confined to the bonds of countries at the heart of the sovereign debt crisis, and bore no comparison with the quantitative easing programmes conducted by the world's other leading central banks. The programme of Outright Monetary Transactions (OMT), adopted by the Eurosystem in the summer of 2012 to replace the SMP but not so far activated, provides for the possibility of purchasing public debt securities on the secondary market, but again solely for the purpose of preserving the transmission of monetary policy in the euro area. The "forward guidance" offered by central banks on the future conduct of their monetary policy probably also affected term premiums by reducing the uncertainty over future interest rates and encouraging investors to invest at longer maturities[1]. In addition, the non-standard monetary policy measures likely had some global repercussions as a result of arbitrage by investors seeking to maximise returns for a given amount of risk. The measures taken by the world's leading central banks therefore had an impact well beyond their own borders (IMF, 2013c).

Another factor which could explain the fall in term premiums is the greater risk aversion among certain investors in the context of the crisis. This led to a flight into safe havens such as US Treasury securities and the German

(1) See for example Hanson and Stein (2012), who identify an effect of the US monetary policy stance on the term premium.

Bund. The increased demand for these assets regarded as risk-free and highly liquid, in an environment where the supply was tending to contract following rating downgrades[1], naturally depressed interest rates. Finally, one last factor which may have influenced demand for risk-free assets and therefore compressed the premiums incorporated in the rates is the stricter financial regulation, encouraging financial institutions to hold more high-quality securities (Turner, 2011).

(1) According to the IMF, the deterioration in the fiscal situation in advanced economies – by implying rating downgrades – could lead to a substantial fall in the supply of risk-free assets in future years (IMF, 2012).

Box 1 – The Federal Reserve's large-scale securities purchase programmes since 2008

After the very short-term money market target rate had fallen to a low of between 0 and 0.25 % in the autumn of 2008, the Federal Reserve turned to "unconventional" monetary policy instruments to continue stimulating the economy. In particular, it issued "forward guidance" on its main policy rate, and embarked on a quantitative easing strategy which led it to purchase large quantities of debt securities issued by Government-Sponsored Enterprises (GSEs)[1], mortgage-backed securities (MBS) and US Federal State Treasury securities. In total, four securities purchase programmes were adopted. Here we describe their general features, the main transmission channels and discuss their effectiveness.

LSAP1, LSAP2, MEP and LSAP3[2]

The first programme, the Large-Scale Asset Purchase Program 1 (LSAP1), was announced on 25 November 2008. It initially foresaw purchases amounting to $ 500 billion of MBS and $ 100 billion of GSE debt. After having been extended in March 2009, the purchases ultimately totalled $ 1 750 billion, including 300 billion in long-term Treasury securities. The decision by the Federal Reserve to purchase securities partly reflects the financing structure of the US economy, where the bond markets are of relatively great importance, and bank intermediation plays a more limited role. Although this first programme aimed to support the economy as a whole, the Federal Reserve's decision to purchase MBS and GSE debt was due in particular to its desire to give priority to the mortgage loan market, severely affected by the collapse of US property prices between 2006 and 2008.

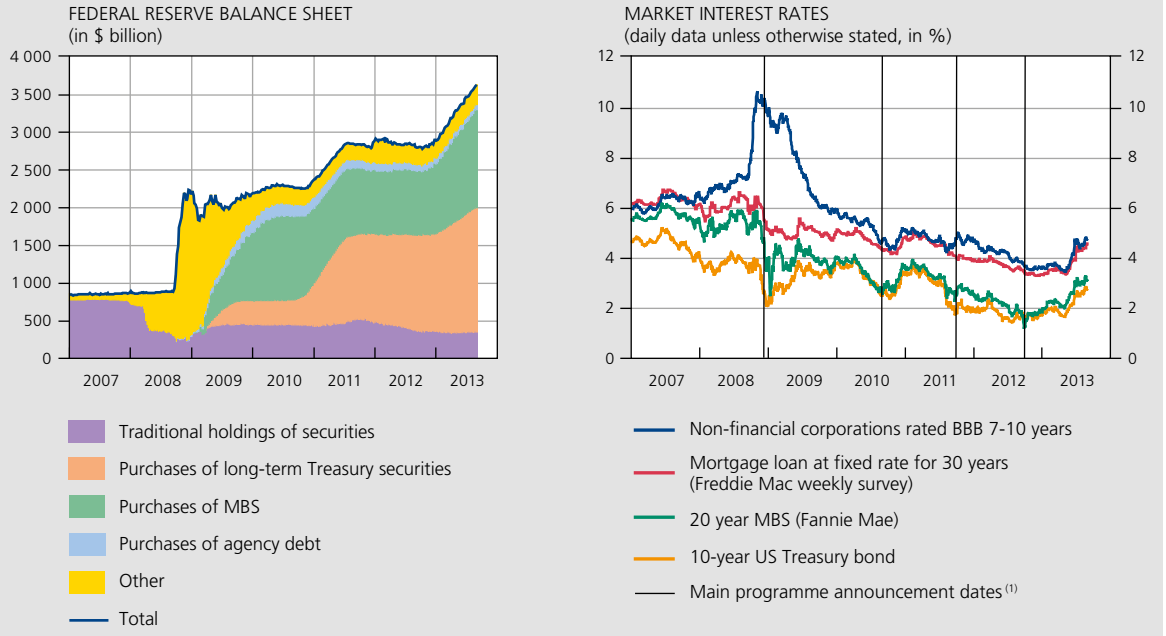
At the time of the second purchase programme (LSAP2), financial conditions had eased, but economic activity was sluggish and there were risks of deflation. After having announced in August 2010 that it was going to reinvest the principal repayments under the first programme in Treasury securities, the Federal Reserve officially launched its second purchase programme on 3 November 2010. This provided for purchases of $ 600 billion of long-term Treasury securities in order to "promote a stronger pace of economic recovery and ensure that inflation is at levels consistent with its mandate".

On 21 September 2011, the Federal Reserve announced that the principal repayments of MBS and GSE debt would in the future be reinvested in MBS and not in Treasury securities anymore. It also announced its intention to purchase Treasury securities with remaining maturities of more than six years for a total of $ 400 billion and to finance these purchases by selling an equivalent amount of Treasury securities with a remaining maturity of less than three years. This programme aimed to flatten the yield curve by reducing long-term interest rates in comparison with short-term rates. In contrast to previous programmes, it did not imply any increase in the Federal Reserve balance sheet, but only an extension of its maturity. It was thus known as Operation Twist or Maturity Extension Program (MEP). On 20 June 2012, this programme was extended to the end of 2012 for an additional $ 267 billion.

(1) Such as Freddie Mac or Fannie Mae.
(2) See for example Fawley and Neely (2013) for a more detailed description.

Finally, the fourth purchase programme was announced on 13 September 2012. In contrast to previous programmes, the Federal Reserve did not commit itself to a total amount. Instead it would purchase MBS at a pace of $ 40 billion per month. It announced that if the situation on the labour market did not improve substantially in a context of price stability, it would continue and increase its purchases and make use of its other instruments for as long as necessary. On that basis, on 12 December 2012 it stated that, from January 2013, it would also purchase long-term Treasury securities each month for a total of $ 45 billion, without sterilising those purchases through sales of short-term securities.

FEDERAL RESERVE BALANCE SHEET AND MARKET INTEREST RATES



Sources: Thomson Reuters Datastream, Federal Reserve Bank of Cleveland.
(1) 25 November 2008 for LSAP1, 10 August 2010 for LSAP2, 21 September 2011 for MEP and 13 September 2012 for LSAP3.

Transmission channels

Overall, the large-scale securities purchase programmes reflect the Federal Reserve's desire to stimulate the economy once the target rate had reached its lower bound, by exerting direct pressure on long-term interest rates. There are at least three transmission channels that may explain the effects of the purchases on those rates. The first is the portfolio balance channel, which is based on the "preferred habitat" theory whereby markets are subject to a degree of segmentation. By reducing the availability of long-term securities for private investors, the Federal Reserve thus lowers the interest rate risk present in the investors' portfolio, reducing the risk premium which investors demand for holding the targeted securities (Bauer, 2012). The specific demand for Treasury securities because of their risk-free, highly liquid status tends to reinforce the purchases' impact on the latter's yields, and some authors refer to a "demand for safety channel" in this connection (Krishnamurthy and Vissing-Jorgensen, 2011). More generally, the effects of the purchases are then transmitted to other interest rates in the economy via portfolio adjustments made by investors who have sold securities to the central bank. A second channel is the

signalling channel, whereby the central bank, in announcing its purchases of securities, informs agents of its desire to maintain its accommodative monetary policy, prompting them to expect policy rates to remain at their lower bound for a longer period (Bauer and Rudebusch, 2011). Insofar the central bank pays attention to the losses that it makes, the asset purchases reinforce its commitment to maintaining interest rates at a low level (Krishnamurthy and Vissing-Jorgensen, 2011). Finally, a third potential channel is the market functioning channel whereby, via its purchase programmes, the central bank makes investors understand that a major player is ready to support the market. By reducing investors' fears when financial conditions deteriorate, the purchases support not only the value of the targeted assets but, more generally, that of the other securities on the market, and therefore indirectly the financing conditions for the whole economy.

Effectiveness

The effects of securities purchase programmes on the yields of the securities acquired are not easy to assess. Moreover, it is even harder to judge their impact on the financing conditions of the economy as a whole and on the macroeconomic situation in general. Two separate approaches are commonly used to study the influence of securities purchase programmes on interest rates. The first is based on "events" and consists in studying the cumulative effect on interest rates of communications concerning purchase transactions. This method is not perfect in that it disregards, in particular, any effects occurring other than on the announcement days, while not adjusting for other information available on those dates. Nonetheless, it does offer a valid, initial approximation of the impact, and is commonly used in the literature (Bauer, 2012). The second approach is based on macroeconometric models using statistical methods which, though sophisticated, are limited by the lack of data owing to the exceptional nature of central bank securities purchase programmes. The available studies tend to suggest effects similar to those identified on the basis of event studies, although generally weaker.

Studies focusing on the impact of the programmes conducted by the Federal Reserve usually consider that the purchases have had a beneficial effect on financing costs. However, the programmes appear to produce diminishing returns to scale; in other words, the lower the level of interest rates, the more difficult it is to drive them down further. On the basis of an econometric analysis of the Treasury securities purchases under LSAP1, d'Amico and King (2010) showed, for example, that each purchase transaction generated, on average, a fall of around 3.5 basis points in the interest rate on the date of the purchases, and that the programme as a whole had led to a lasting fall in the yield curve of around 50 basis points. Gagnon, Raskin, Remache and Sack (2011) considered that LSAP1 had reduced the term premiums in the case of ten-year rates by between 30 and 100 basis points. They suggest that while the effects of the purchases were particularly evident on the mortgage loan market, they were widespread and extended to Treasury securities, private sector bonds and interest rate swaps. On the basis of the study by Gagnon *et al.* (2011), Krishnamurthy and Vissing-Jorgenssen (2011) noted that LSAP1 and LSAP2 brought a considerable reduction in the nominal interest rates on Treasury securities, agency debt instruments, private sector bonds and MBS, though the scale of the reduction varies across securities, maturities and programmes. Bauer (2012) concluded that the key LSAP1 announcements had a cumulative effect on interest rates of around 100 basis points, and that applied to Treasury securities as well as private sector bonds or MBS. In the case of LSAP2, he identified a cumulative effect on the same securities of almost 15 basis points, and between 3 and 25 basis points for the MEP. In the case of the second and third programmes, leaving aside their smaller scale, factors accounting for their weaker impact include the improved market functioning in those periods (see market functioning channel) compared to LSAP1, and the impact of forward guidance in the lowering of interest rates. There are very few studies concerning LSAP3 because of the recentness of the programme which is still running today.

Paradoxically, another indication of the ability of asset purchase programmes to influence interest rates comes from the financial market volatility and the rise in interest rates which, in the spring of 2013, were triggered by statements by members of the FOMC regarding the future of LSAP3 and, in particular, the possibility of starting to slow the pace of purchases in the near future. In the face of the rising interest rates, Federal Reserve Chairman,

Ben Bernanke, gave reassurance in July, stressing that the programme would continue to depend on economic and financial developments (see for example Bernanke, 2013b). Apart from the impact of such programmes, these events illustrate the challenges – particularly concerning communication – entailed in terminating them.

Regarding the general macroeconomic situation, research in general finds that the purchase programmes limited the scale of the recession caused by the financial crisis. For instance, Chung *et al.* (2011) conclude that the additional stimulus from the purchases of securities curbed the deterioration in the labour market and probably prevented the economy from sinking into a deflationary situation, while Baumeister and Benati (2013) also argue that the reduction in long-term interest rates provided significant support for growth and averted the threat of deflation.

3.5 Summary of the determinants of the current low level of interest rates

To sum up, the current low level of interest rates is due to a range of varying factors. First, the equilibrium interest rate has displayed a downward trend since the early 2000s, and that trend was accentuated slightly during the crisis. This largely reflects the slackening pace of potential growth and the downward revision of long-term growth expectations, while inflation expectations have remained fairly stable overall, after having declined during the 1990s. The reduction in the real component of interest rates is largely unconnected with monetary policy. Next, the conduct of monetary policy does play some role. While the increased transparency and credibility of central banks since the second half of the 1990s has brought a reduction in the inflation component of the term premium, the crisis conditions and very sluggish economic activity caused central banks to adopt a particularly accommodative monetary policy stance. Expectations concerning short-term rates are also affected by the forward guidance of central banks, which likewise tends to lower term premiums. Moreover, the latter are reduced by securities purchase programmes, the effects of which extend beyond national borders. Finally, leaving aside monetary policy, some other factors such as the global savings glut, increased risk aversion in the context of the crisis, and financial regulation boosted demand for risk-free assets, while supply was subject to a downward trend, leading to a fall in interest rates.

4. Low interest rates and macroeconomic and financial stability

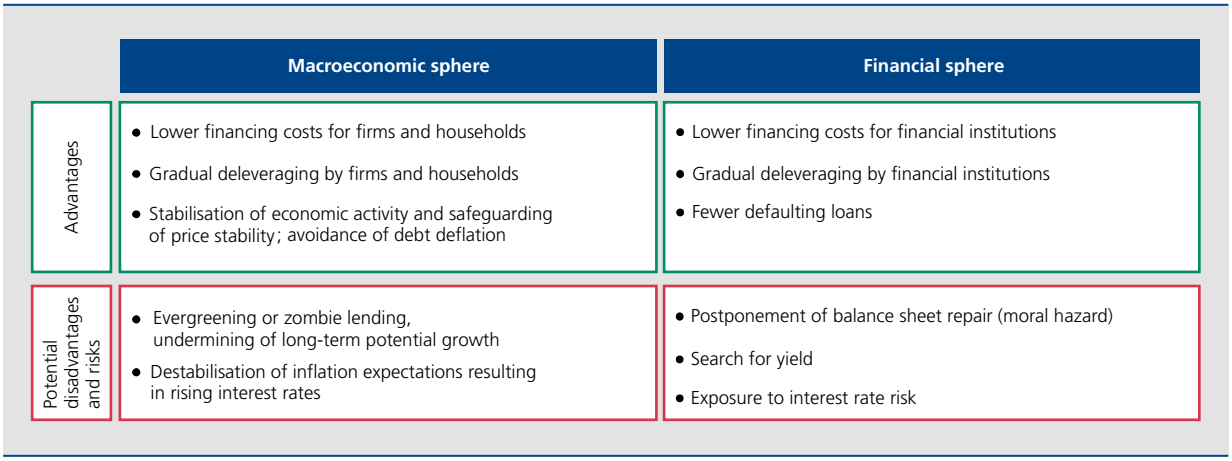
As stated above, central banks throughout the world have been pursuing a highly accommodative monetary policy for more than five years now, with extremely low real interest rates. Although this policy has prevented an even sharper downturn in economic activity, there is a danger that the low interest rates may also have an adverse effect on financial stability and hence, in the longer term, on macroeconomic stability. The authorities could then face a trade-off [(1)], given the complicated economic implications of low interest rates in the context of a recession accompanied by a reduction in excessive debt levels.

The low level of short-term interest rates first leads to a fall in financing costs for credit institutions. As the gap widens between the cost of raising finance and the return on their assets – generally longer term –, their interest or intermediation margin increases. An improvement ensues in the financial health of credit institutions, so that they can grant new loans more easily. They will also pass on part of the reduction in financing costs to their customers. Households and firms can thus obtain funding more readily, and that will stimulate economic activity. This is an important transmission channel whereby short-term interest rates influence macroeconomic and financial stability.

A low interest rate environment also makes it easier for households and firms to reduce their accumulated debts. The progressive deleveraging of the non-financial sectors is crucial to the deleveraging of the financial sector, as well as being vital for lasting financial stability. The very modest level of interest rates should reduce the number of households and firms struggling to make repayments, thus increasing the profitability of credit institutions and enabling them to strengthen their capital. That situation in turn benefits macroeconomic stability, as credit institutions play a key role in financing households and firms.

(1) For a detailed discussion of the way in which unwelcome effects of an accommodative monetary policy may create a trade-off, see White (2012).

CHART 6 CONSEQUENCES OF LOW INTEREST RATES (OVER A PROTRACTED PERIOD)



One can therefore have the impression that, by this process, the low level of interest rates leads to a redistribution between savers and borrowers. However, it must be borne in mind that if the interest rates were higher, there would be a considerably larger number of defaulting loans. In addition, more borrowers would be forced to liquidate their assets, leading to fire sales and further reductions in the value of assets which may have been used as collateral. In the end, in a context of higher interest rates, there is always the possibility that savers might incur even heavier losses.

In revitalising economic activity, an accommodative monetary policy also helps to prevent a deflation scenario which would imply a decline in the general level of prices. Since debt is generally expressed in nominal terms, deflation increases the outstanding debt in real terms. It then becomes harder for borrowers to reduce their debt, leading to further adverse influence on economic activity and inflation, a phenomenon known as debt deflation (Fisher, 1933). Naturally, this is also detrimental to financial stability. The experience of the Great Depression of the 1930s and the Japanese crisis of the 1990s shows how difficult it is to reduce debt levels when the economy slows down in nominal terms. Overall, it must therefore be said that the positive macroeconomic and financial consequences of moderate interest rates are mutually reinforcing. Stimulating economic activity strengthens financial stability, which in turn encourages the revival of economic activity.

That said, a low interest rate environment still has its drawbacks or potential risks. At macroeconomic level, one of the major hazards of the low level of interest rates is that it ultimately hampers productivity growth. Persistently low interest rates enable credit institutions in a fragile capital position to renew their loans to insolvent firms at a minimal debit rate; this is known as zombie lending or evergreening. Weak credit institutions can thus prevent a firm's bankruptcy from leading to the recognition of losses on the loans granted, which would hit their own capital. They therefore continue to fund unproductive projects by insolvent firms instead of financing new productive projects by solvent firms, thereby undermining productivity growth. This situation is all the more likely in a context of nominal policy rates close to zero, where banks can obtain abundant liquidity from the central bank. There are serious indications (Peek and Rosengren, 2005; Caballero *et al.*, 2008) that this type of perverse mechanism was a factor in the Lost Decade in Japan, which refers to the stagnation of Japanese productivity growth in the 1990s. Anaemic economic growth ultimately also damages the profitability of the financial sector, which in turn further harms financial stability.

An environment in which potential growth has to be regularly revised downwards also generates a risk that monetary policy may fail to recognise in time that the economy has been stimulated beyond its potential. In real time it is very hard to distinguish between a decrease in potential growth and a cyclical growth slowdown. Consequently, if it is wrongly assumed that the decline in growth is due mainly to cyclical factors, monetary policy may cut interest rates too far, thus jeopardising price stability. Such a scenario occurred in the 1970s, leading to spiralling inflation and soaring interest rates (Orphanides, 2002). Even if low interest rates contribute to a gradual reduction in debt, there is still the risk that governments, motivated by low rates, may pay insufficient attention to debt reduction. Rightly or wrongly, one could expect that governments might ultimately put pressure on the central bank to solve the public debt problem by cutting interest rates and fuelling inflation (Leeper, 1991; Sims,

1994). That is what happened in the United States after the Second World War. In the end, the mere expectation of such a scenario can trigger volatile, runaway inflation, damaging macroeconomic and financial stability.

While low interest rates reduce the incentives for governments to implement policies of fiscal consolidation, they may also discourage financial institutions from reducing their debts and consolidating their balance sheets. It is even possible that the low level of interest rates may tempt financial institutions to take excessive financial risks: this is called "search for yield" (Rajan, 2005). Financial institutions may in fact try to boost their profits in the short term or simply try to fulfil their previous commitments on yields to customers. In this way, search for yield may cause even bigger problems for financial and macroeconomic stability.

It is also necessary to ensure that persistently low interest rates do not cause financial institutions to underestimate upward interest rate risk. Interest rates are likely to start rising abruptly if, for example, economic activity suddenly improves and thus fuels inflation sooner than expected. That type of scenario is probably fairly harmless for financial stability, in that the revival of economic activity has a beneficial effect on the health of financial institutions. But inflation may also shoot up without any expansion in economic activity, for example in the event of a supply shock or on account of concerns over the central bank's credibility. The risk premiums included in long-term interest rates – premiums which are probably negative at present, as illustrated above – may also suddenly increase.

It is therefore necessary to weigh up the advantages and disadvantages – and the potential risks – of an accommodative monetary policy and a low interest rate environment in both the macroeconomic and the financial sphere. However, it should also be pointed out that maintaining interest rates low today creates the best conditions for an increase in rates tomorrow. For instance, Bernanke (2013a), among others, argues that lowering interest rates today is precisely what enables the economy to recover and ensures that interest rates can subsequently revert to the equilibrium rate. That in fact prevents deflationary pressure and its corollary: low interest rates. Moreover, it is only the cyclical element of the decline in interest rates that can be attributed to the accommodative monetary policy stance. In the end, part of the fall in risk-free interest rates is due to less favourable prospects for potential growth, over which monetary policy has no control (Apel and Claussen, 2012). It is difficult or even impossible for a tightening of monetary policy to compensate for this fall in the equilibrium rate – which is exogenous to it – without creating excessive risks for macroeconomic stability.

However, the effectiveness of the accommodative monetary policy also depends largely on the willingness of other agents to reduce their excess debt and help to ensure that the low interest rates do not lead to excessive risk-taking. The main aim of monetary policy in depressing interest rates is to gain time to allow the adjustments to take place gradually. If both the financial and the non-financial sectors fail to take advantage of this breathing space to effect the necessary deleveraging, the disadvantages of an accommodative monetary policy will most likely outweigh the benefits. An appropriate fiscal and prudential policy geared to gradual debt reduction and the prevention of excessive new financial risks is therefore crucial. In addition, appropriate structural policies can help to boost the long-term growth potential, ultimately allowing the part of risk-free interest rates that monetary policy cannot control, to begin rising again.

In the next section, we take a closer look at two specific risks which may arise in an environment where nominal risk-free interest rates are very low. We highlight the challenges that minimum guaranteed returns present for insurers and pension funds, and we try to identify the risks of a sudden, early rise in interest rates.

5. Two specific risks relating to low interest rates

5.1 Persistently low interest rates facing insurers and pension funds

In an economy, a decline in interest rates has a very different impact on savers as opposed to borrowers. While borrowers benefit from a reduction in their repayment costs, for savers the fall in interest rates means a reduction in their (future) interest income, which depends on the maturity of their assets. This is particularly evident in the challenges that life insurance companies and pension funds have to address, especially when they have promised their customers a minimum guaranteed return (Antolin *et al.*, 2011).

In economic terms[1], a fall in interest rates means an increase in the value of both the liabilities and the assets of life insurers and pension funds (Bank of England, 2012). If the return is guaranteed, the value of the liabilities – typically very long-term for these institutions – increases

(1) In accounting terms, this does not necessarily affect the valuation of certain balance sheet items for life insurers and pension funds. For example, under Solvency I, the effect of an interest rate decline on the present value of the liabilities is disregarded for the purpose of calculating the solvency margin. Solvency II is meant to rectify this defect (see also NBB, 2013).

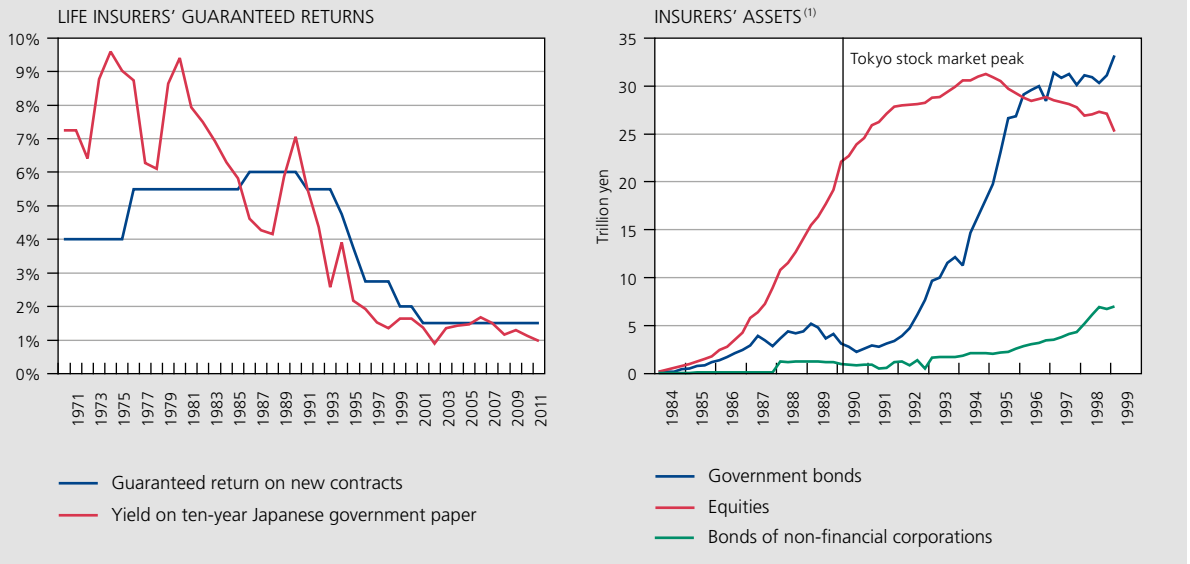
with the decline in the discount rate used to discount the future liabilities. A steep fall in interest rates causes a surge in the current value of future liabilities, especially if they cannot fall below a pre-determined minimum. At the same time, the current value – and hence the price – of the assets which the institutions hold increases. This applies both to fixed-income assets such as bonds, and to shares. Moreover, the value of the latter increases also due to the prospect of an increase in future dividends, fuelled by the favourable impact of moderate interest rates on economic activity. Consequently, low interest rates do not necessarily pose a threat to the financial stability of life insurers and pension funds, at least so long as the average maturity of the assets matches that of the liabilities.

In practice, however, it seems that these institutions generally invest in assets with a shorter maturity than their liabilities, particularly as financial markets do not necessarily offer sufficient long-term assets. If the assets are all invested in fixed-income securities, and if interest rates fall, an institution with a shorter maturity on the asset side will see the value of its liabilities exceed the value of its assets. In other words, if low interest rates persist, when its debt instruments reach maturity the institution will be forced to reinvest the funds at a lower interest rate (NBB (2013) illustrates the scale of this phenomenon in Belgium). This stronger increase in the liabilities inevitably erodes the institution's capital. If the guaranteed returns are to be respected, that is likely to impair solvency and financial stability. Of course, this simplified presentation is incomplete since it disregards numerous complexities inherent in this sector. For instance, insurers and pension funds may also cover their interest rate risk by using derivatives; in addition, adjustments to the product range – such as a reduction in the supply of guaranteed return products – may likewise help them to mitigate the impact of a decline in interest rates.

In the face of falling risk-free interest rates and relatively high guaranteed returns, life insurers and pension funds may turn to assets offering higher returns. For instance, they might invest in riskier instruments (BIS, 2011). The experience of Japanese life insurers in the 1990s shows that there is a real temptation for them to respond to the fall in risk-free interest rates by embarking on a search for yield. Before the Tokyo stock market bubble burst, Japanese life insurers granted their policy-holders fairly high guaranteed returns, despite the decline in long-term interest rates on government bonds, compared to the early 1980s.

During the expansion period of the late 1980s, life insurers in Japan naturally bought mainly equities, which yielded high returns for them so long as the stock market was rising. After the stock market bubble had burst, they changed their investment strategy and began investing

CHART 7 JAPANESE INSURERS IN THE 1990s



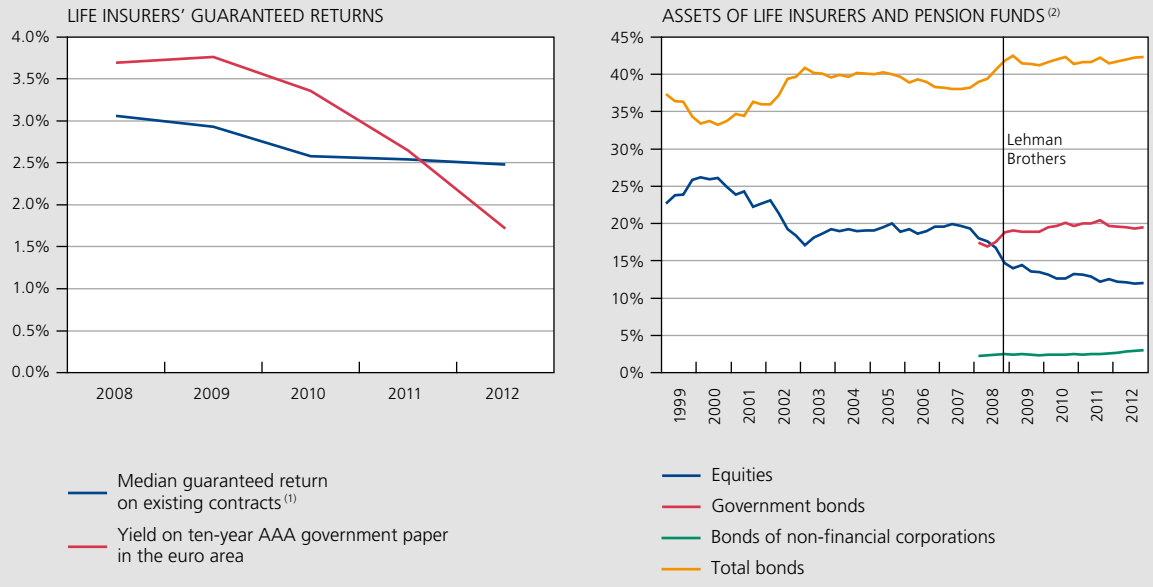
Sources: Bank of Japan, Federal Reserve Bank of Saint-Louis, Swiss Re.
(1) Cumulated transactions on a quarterly basis.

increasingly in Japanese government bonds, viewed as secure assets. However, that strategy ultimately proved untenable. Owing to the persistent slowdown in growth and the accommodative monetary policy, interest rates on longer-term government bonds dropped below the level of the guaranteed returns on new contracts. Those returns were only very gradually revised downwards. In addition, the law limited the scope for reducing the guaranteed returns on existing contracts (BIS, 2011).

Chart 7 shows that, as risk-free interest rates declined, life insurers in Japan began investing to a limited but increasing extent in corporate bonds which generally offered a higher yield but entailed greater risks, whereas they had previously shunned that asset class. But this type of strategy is not necessarily conducive to financial stability. Asset classes offering higher returns but entailing also higher credit risk can cause serious losses in the event of default, thus endangering the financial stability of life insurers. Untenable guaranteed returns and inadequate asset/liability management were the main reasons why a whole series of Japanese life insurers were driven into insolvency in the late 1990s and the early 2000s (BIS, 2011).

The question is therefore to what extent similar risks exist today in other advanced economies where interest rates have likewise fallen sharply in recent years. In Europe, despite a decline since 2008, the median guaranteed return on current life insurance contracts in a number of European countries (including Switzerland) has recently slightly exceeded the risk-free interest rate. In regard to the investment strategy adopted by this sector in the euro area lately, a number of parallels can be drawn with the situation in Japan in the 1990s. As on the Japanese market, the value of equity investments plummeted, in this case following the collapse of Lehman Brothers, and more assets are being invested in bonds offering a fixed return. Since the end of 2008, there has been a constant rise in the share of both government bonds and bonds of non-financial corporations. As in Japan, the proportion of typically riskier bonds of non-financial corporations in the investment portfolio of insurers and pension funds has meanwhile edged upwards. Although non-financial corporate bonds still represent only a modest proportion of the portfolio, their share has increased since early 2011 with the decline in risk-free interest rates. It should also be noted that the indirect exposure to the various investment products through investment funds, which likewise represent a large proportion of the assets of insurers and pension funds, is not taken into account here. It is estimated that the indirect exposure to bonds via these instruments amounts to some 11 % of the total assets (ECB, 2010).

CHART 8 LIFE INSURERS AND PENSION FUNDS IN EUROPE



Sources: ECB, EIOPA.
(1) Data relating to a sample of insurers in the EU and Switzerland.
(2) In % of total assets. The contributions represented are also influenced by valuation effects and not only by financial transactions.

Generally speaking, on the basis of the financial accounts it is not always easy to state the degree to which the low interest rate environment presents challenges for life insurers and pension funds. That said, other information is available which suggests that a search for yield is observable in this sector. For example, the IMF (2013b) considers that the risk tolerance of American pension funds and insurers is increasing while their financial soundness is declining. Antolin *et al.* (2011) state that pension funds are investing an ever larger percentage of their assets in emerging economies, hedge funds and private equity. The current level of risk-free interest rates therefore presents challenges for life insurers and pension funds which could prompt them to turn to riskier investments in order to secure higher returns. However, since that strategy is not without risks for financial stability in the short and medium term, it has prompted the supervisory authorities to be vigilant and to call on the sector to be prudent (EIOPA, 2013 ; NBB, 2013).

5.2 A sudden surge in interest rates

While financial and macroeconomic stability can be threatened by persistently low interest rates, it is equally vulnerable to a situation in which interest rates suddenly rise. It is therefore useful to consider the impact of a steep rise in interest rates on financial institutions. We then focus on a historical episode of soaring interest rates, namely the surge in bond yields in many advanced economies following the tightening of US monetary policy at the beginning of 1994, and the lessons from that episode that can improve our understanding of the current situation.

On the asset side of the balance sheet, an increase in interest rates boosts the interest income on new loans. Conversely, it reduces the value of fixed-income assets, the effect being greater the longer their maturity. Admittedly, this loss of value is only realised if the assets are sold at the reduced price. So long as the assets are held to maturity, no losses will be recorded. On the liability side of the balance sheet, the main effect of higher interest rates is to increase the cost of funding. Of course, that effect becomes apparent all the sooner if financing is raised at variable interest rates or in the shorter term.

The total impact of a rapid rise in interest rates on a financial institution is due to the combination of several factors. One of the key factors is the relative maturity of the assets compared to the liabilities. In contrast to the life insurers and pension funds mentioned above, banks generally have liabilities with a shorter maturity than their assets. Therefore, if interest rates rise, the discounted value of the assets – at least if they are marked-to-market – will fall more sharply than the value of the liabilities, thus threatening profitability. Moreover, the impact of an interest rate rise also depends on the relative increase in short-term rates as opposed to long-term rates. Since banks engage in maturity transformation, their profits will be smaller the more short-term rates outpace the rise in long-term rates.

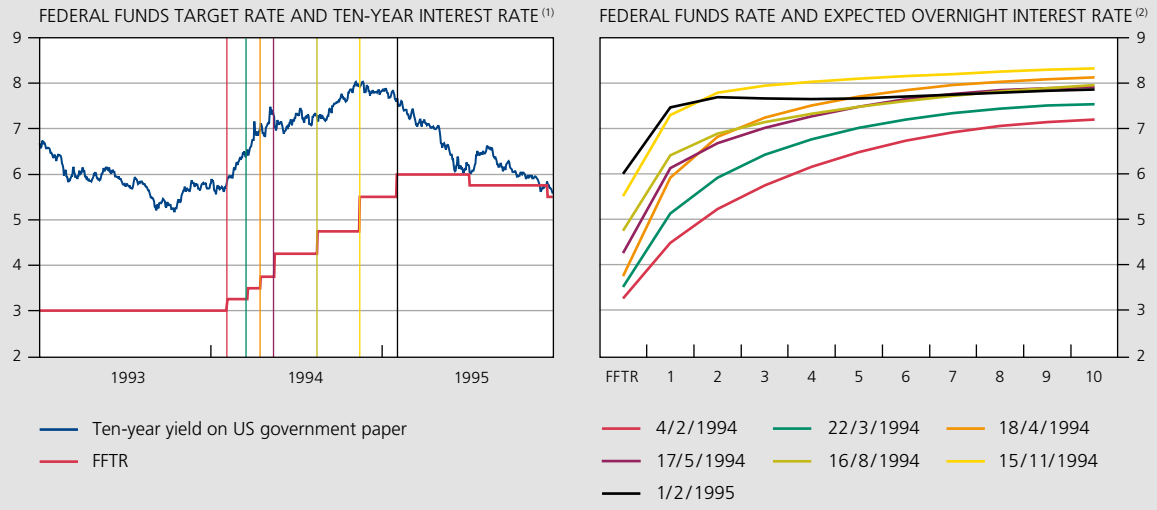
Furthermore, in regard to the ultimate effect of higher interest rates on the profitability of financial institutions, it is probably also the reason behind the interest rate rise that matters. In the case of a tightening of monetary policy motivated by an increase in aggregate demand, that will not necessarily dent the banks' profitability, as strengthening demand will enable the banks to grant more new loans, and the adverse effect of the higher interest rates on the repayment burden of borrowers will not necessarily drive up the percentage of defaulting loans (IMF, 2013b). In fact, borrowers' income will rise in parallel with the expansion in economic activity. In the opposite case, a rise in interest rates caused by a negative supply shock that increases inflation and inflation expectations but restrains economic activity is indeed likely to depress the banks' profitability, as the slowdown in economic activity will discourage new lending and heighten the risk of default on existing loans.

The bond market turbulence in 1994 and monetary policy

Against the backdrop of bond market volatility in the first half of 2013, the question is to what extent there is now a risk of a steep rise in interest rates. The current situation often evokes memories of the episode of soaring interest rates in the United States in 1994 following the sharp tightening of US monetary policy. The rise in risk-free US interest rates then rapidly spread to other advanced economies as well, causing a worldwide bond market sell-off. It is therefore worth comparing the current monetary policy and the current macroeconomic context with the events of 1994.

Between February 1994 and February 1995, the Federal Open Market Committee (FOMC), the Federal Reserve's decision-making body for monetary policy, increased the policy rate from 3 to 6 %. At the same time, the interest rate on ten-year US government bonds increased from around 5.7 to over 8 % in the autumn of 1994. It then subsided to 6 % in the autumn of 1995. Chart 9 shows, for each day of interest rate increases over the period considered, the policy rate in force at the time and the expected level of risk-free interest rates for an infinitely brief period during the ensuing ten years as derived from the yields on US government bonds. That reveals the

CHART 9 INTEREST RATE SURGE IN THE UNITED STATES IN 1994



Sources: Thomson Reuters Datastream, Gürkaynak and al. (2006).

(1) The chart shows the Federal Funds Target Rate (FFTR). The vertical lines indicate the dates for which a forward curve is represented in the right-hand chart.

(2) For each date mentioned, the chart shows the FFTR in force on that date and the implied overnight interest rate, derived from the yield curve relating to US government debt, from one to ten years after the date mentioned.

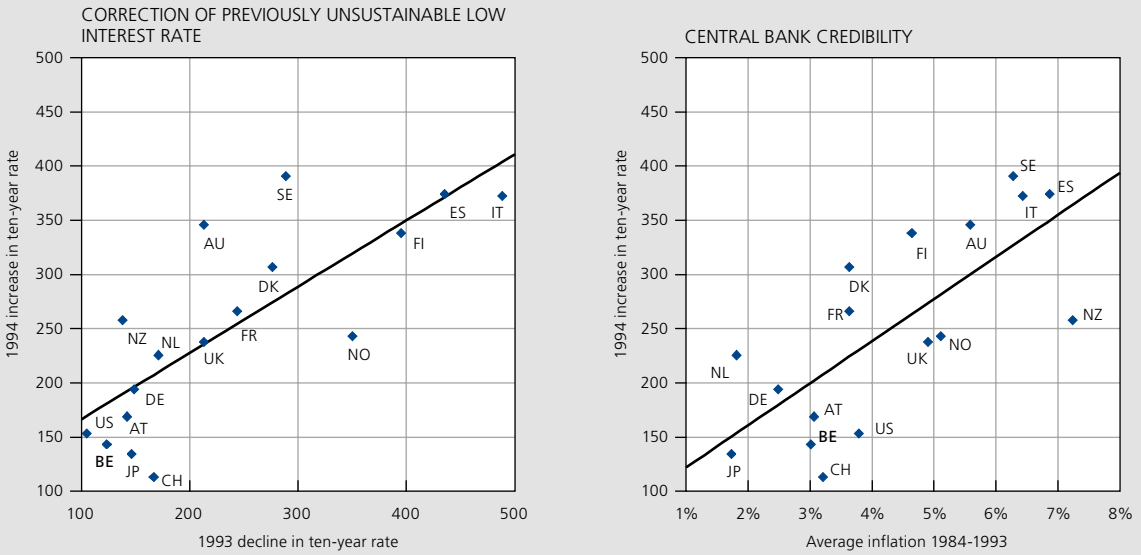
expected path of overnight interest rates for the ten years ahead (Gürkaynak *et al.*, 2006). It is evident that the successive increases in the policy rate by the FOMC caused financial markets to revise upwards the expected path of interest rates more or less in parallel, resulting in a higher ten-year interest rate. At the end of the upward interest rate cycle, long-term interest rates declined following the downward revision of the interest rate path. Leaving aside the rapid rise in long-term interest rates, this tightening episode had relatively little impact on financial markets, as share prices initially dipped before climbing back from the summer of 1994, while both unemployment and inflation continued to fall (Goldman Sachs, 2013).

To gain a better understanding of the aggressive interest rate hikes by the FOMC, it is useful to analyse the economic background to this episode. From September 1992 the policy rate had stood at 3 %, which was quite low for the time, whereas long-term interest rates were tending to fall, having dropped from around 8.5 % at the end of the 1980s to 5.5 % in 1993. In the context of an economic recovery, the FOMC thus feared that inflation expectations might be driven higher – following the disinflation policy of the 1980s – and that prompted it to increase interest rates (Goodfriend, 2010). The strong rise in long-term interest rates during the upward cycle was therefore interpreted by some FOMC members as a consequence of increasing inflation expectations, requiring a further increase in interest rates. That is why this episode is sometimes described as an inflation scare. Moreover, the minutes of the FOMC meetings mention that by means of aggressive, unexpected interest rate hikes the FOMC members intended to curb the sharp fall in interest rates recorded in preceding years. They considered that this fall in interest rates had been caused in particular by speculative investments. The element of surprise accompanying the interest rate hikes and the rise in long-term interest rates was therefore actually desirable. The FOMC members were not wrong: many investors financed by short-term debt were active on the Treasuries market. They were forced to unwind their positions rapidly, thus driving down prices and giving a strong impetus to long-term interest rates (Turner, 2013).

The volatility of the US market also increased the volatility on markets in government securities of other advanced economies (Borio and McCauley, 1995; BIS, 1995). The rise in long-term interest rates in a number of countries is largely attributable to a correction of the 1993 decline in interest rates and to the degree of credibility which monetary policy had established. The 1994 increase in interest rates was all the more significant where the decline in rates had been substantial in 1993. There are in fact indications that the bond markets of certain countries were overvalued at the end of 1993 (BIS, 1995). It also appears that, in countries which had performed better up

CHART 10 EXPLANATIONS FOR THE GLOBAL RISE IN LONG-TERM INTEREST RATES IN 1994

(basis points, unless otherwise stated)



Source: Thomson Reuters Datastream.

to then in terms of price stability, the increase in long-term interest rates had been far less marked. That indicates that the monetary policy of those countries was more credible, and that long-term inflation expectations were more firmly anchored there, so that they were better able to avoid fears of inflation.

In recent months, risk-free long-term interest rates have bounced back to a significant degree in some countries, in the wake of the improvement in the macroeconomic outlook, especially in the US, and the announcement by certain Federal Reserve officials of plans to slow the pace of purchases of US government securities. However, when this article went to press, the increases were still small compared to those of 1994. Could a 1994-type scenario happen today? The first point is that the advanced economies are currently seeing very moderate inflation and are operating at below capacity, which makes any sudden, severe tightening of monetary policy in the near future rather unlikely. In addition, in regard to long-term interest rates there are substantial differences between the way in which monetary policy was conducted in the United States in 1994 and the current *modus operandi* of central banks in advanced economies.

In regard to the shorter term segment of the yield curve, i.e. according to the terminology of the first section of this article, a horizon of around five years, central banks have made fundamental changes to their communication strategy in recent decades. A point worth noting here is that it was after the February 1994 meeting that the FOMC for the first time commented on its decision. Previously, financial markets had to infer the monetary policy stance from the central bank's open market operations. Today, central banks use a wide range of information channels (press releases, minutes of meetings, etc.) which help financial markets to understand the central bank's intentions. Moreover, not only does the central bank comment on the current monetary policy stance, it also offers a more or less explicit indication of its future stance. Some central banks (such as the Swedish central bank and the Bank of Norway) have for some time now opted to publish their interest rate projections. Others, such as the Federal Reserve and more recently the ECB and the Bank of England, have preferred to state – without giving an exact interest rate path – that they expect the policy rate to remain at a rather low level for a protracted period. With its policy of forward guidance based on macroeconomic indicators (unemployment and inflation expectations), the FOMC now explicitly exerts pressure on the short-term segment of the yield curve. That is in stark contrast to the almost total absence of any communication on the monetary policy stance in the mid-1990s. Box 2 explains in more detail the context of the ECB's forward guidance policy, which has in particular helped it to limit the impact of the rise in US interest rates on its own monetary policy stance.

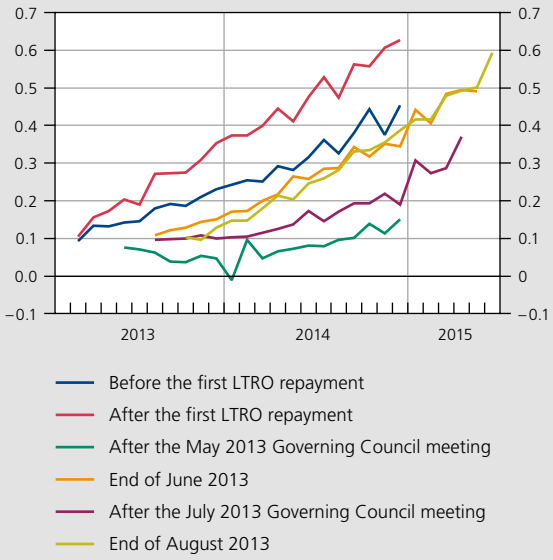
Box 2 – Forward guidance and the ECB

The financial crisis prompted central banks worldwide to adopt an extremely accommodative monetary policy. For that purpose, they did not only resort to the conventional instrument of cutting key interest rates, but also implemented a range of unconventional measures, such as forward guidance. Before the financial crisis, some central banks had already been making more or less specific announcements about their intentions concerning the future path of key interest rates, but during the crisis some of them decided to issue forward guidance in order to influence interest rate expectations. This applied, for instance, to the Federal Reserve and, from August 2013, the Bank of England.

Since July 2013, the ECB has also opted for more explicit announcements of its intentions regarding interest rates. Since the start of EMU, the ECB President has held a press conference at the end of each Governing Council meeting. For some time now the Eurosystem has also been publishing the quarterly macroeconomic projections produced by its staff. That allows observers to form an idea of the ECB's future course of monetary policy on the basis of the economic outlook. However, after the Governing Council meeting at the beginning of July 2013, President Draghi explicitly announced for the first time that the Governing Council expected the ECB's key interest rates to remain at their present, or lower, levels for an extended period of time. That expectation was based on the overall subdued inflation outlook, extending into the medium term, given the broad-based weakness in the real economy and subdued monetary dynamics.

EXPECTATIONS REGARDING THE PATH OF OVERNIGHT INTEREST RATES

(forward Eonia swaps, three-day average)



Source: Bloomberg.

While it had never previously been so explicit, the communication of future monetary policy is nevertheless not entirely new for the ECB Governing Council. At the end of January 2013, the first – larger than expected – repayments under the three-year long-term refinancing operations drove up the expected path of the Eonia

overnight rate, as the expectation was that a new wave of substantial repayments would reduce the still very considerable liquidity surplus and thus drive overnight rates higher. At the beginning of February, President Draghi therefore stated that an increase in the overnight rates was not necessarily in line with the ECB's policy geared towards price stability. That amounted to saying that money market conditions and their impact on the monetary policy stance would be closely monitored, and that this policy was likely to remain accommodative. That message was to be reiterated in the ensuing months.

In May 2013, the ECB Governing Council considered that, in view of the economic outlook, it was appropriate to ease monetary policy further. The Governing Council therefore cut the rate on the main refinancing operations by 25 basis points to 0.5 %, and reduced the rate on the marginal lending facility by 50 basis points to 1 %, the deposit facility rate being left unchanged at 0 %. However, in the light of the communication on the subject, market participants did not rule out the possibility that the deposit facility might subsequently move into negative territory; that led to a significant decline in expectations regarding the overnight interest rate.

Nevertheless, owing to a new contraction in the liquidity surplus, and partly also because of the rise in US government bond yields, expectations regarding the overnight interest rate began climbing again in June. The Governing Council therefore made an explicit announcement in July 2013 concerning its intentions on key interest rates, making it clear that it intended to keep them at their current or lower levels for an extended period of time. That wording implied in particular that the ECB did not rule out the possibility of a further cut in the key interest rates, and that the lower bound had therefore not necessarily been reached. Unsurprisingly, expectations regarding the overnight rate dropped in response to this announcement. Although they have gone back up since then, following the publication of better than expected macroeconomic data, they would most likely have been higher without the forward guidance.

This change in the communication strategy is aimed mainly at clarifying the central bank's reaction function. An increase in the overnight interest rate driven by liquidity repayments by counterparties is not necessarily compatible with a monetary policy geared to price stability, as the improvement in the banks' financing conditions does not always go together with an improvement in the outlook for price stability. Forward guidance helps the ECB Governing Council to steer expectations regarding interest rates in the future, in order to align the monetary policy stance with the outlook for price stability in the euro area.

For the long segment of the yield curve, beyond a horizon of about five years according to the terminology in this article, anchoring inflation expectations makes a substantial difference. In 1994, the period of rampant inflation followed by a painful disinflation was still a vivid memory. In addition, most central banks did not have a quantitative inflation target. As a result, the FOMC had to establish its credibility by adopting draconian measures. Today, inflation expectations seem to be more firmly anchored in the advanced economies, particularly thanks to a quantitative inflation target (Beechey *et al.*, 2011; Gürkaynak *et al.*, 2010). That should make the long segment of the yield curve more stable, reducing the upside risks to interest rates fuelled by rising long-term inflation expectations.

Several central banks are currently significant players on the market in long-term assets, owing to the large scale purchases that they make. We have therefore come a long way from the 1990s, when central banks never intended to exert any active influence over long-term rates. In principle, it is hard to say whether or not this active central bank role aggravates the risk of long-term interest rate fluctuations. On the one hand, these purchases moderate the risk premiums incorporated in long-term rates, so that if the central bank stops making purchases, that could drive interest rates higher. Moreover, that is what happened in May 2013 when the Federal Reserve indicated that it might gradually end its purchases of securities as the economic outlook improved. However, on the other hand the central bank may try to prevent the adverse impact on rates by actively modulating its purchases, as pointed out recently by Ben Bernanke (see Bernanke, 2013b). That aspect was also highlighted in July 2013 when the Federal Reserve clarified its concern over the recent bond market volatility. Nonetheless, these two findings suggest that abandoning the unconventional

measures presents a challenge for central banks, in particular if they have meanwhile become key players on certain market segments.

In addition, some of the risk premiums included in long-term interest rates are nowadays probably below their 1994 level, owing to factors unconnected with monetary policy, such as the strong demand for secure, liquid assets. If that demand for safe haven assets were suddenly to dry up, it would be very difficult to prevent long-term rates from rising again. The composition of the population of investors in longer-term instruments also seems to be a significant factor in the risk of a bond market sell-off, as the events of 1994 demonstrated (Goldman Sachs, 2013).

Conclusion

This article leads to a number of considerations and policy recommendations. Today, risk-free interest rates are low on account of the macroeconomic context, with stable inflation expectations and meagre potential growth compared to the early 2000s. This results in a fall in the equilibrium interest rate which the central bank takes as the benchmark for determining its monetary policy stance – and which it sees as a given – while expectations of a decline in real growth weigh heavily on the outlook for interest rates at more distant horizons. If these expectations of a fall in potential growth – such as those implied by the IMF forecasts[1] – prove correct, investors will face lower real returns in the future, leaving aside the current highly accommodative monetary policy.

The persistent economic headwinds plaguing the advanced economies for several years now have caused central banks in many countries to pursue a very accommodative policy which, in multiple ways, exerts downward pressure on short- and long-term interest rates. Somewhat paradoxically, that policy creates the best conditions for restoring higher interest rates in the medium term. As argued by Bernanke (2013a), for instance, cutting interest rates today is precisely the way to create the preconditions for an economic recovery and rising interest rates tomorrow. In other words, in the current circumstances, excessively high interest rates would hamper growth and fuel deflation, which would depress long-term interest rates. Sustainable, strong growth is the only way for investors to get a positive real return.

However, as we have said, this very low interest rate environment also carries risks for financial stability. Since those risks are likely to be concentrated in specific sectors, it is necessary to adopt an appropriate, targeted prudential policy. That should enable the monetary authorities to pursue an appropriate monetary policy and avoid being hampered by concerns about its potential adverse effects on financial stability (IMF, 2013b).

In a persistently low interest rate environment, it is vital for prudential authorities to closely monitor interest rate risks. In this connection, in the latest issue of its Financial Stability Review (NBB, 2013) the Bank called on the insurance sector to exercise prudence, and in October 2012, in the light of the fall in risk-free interest rates, it suggested that the maximum benchmark rate for long-term life insurance contracts should be confined to 2 %. Since this proposal was not taken up, the Bank stated that it would ensure, via its prudential policy, that every insurance company applied an interest rate compatible with its risks and costs.

One last point which may be mentioned is that, even more so than in the past, central banks will have to be very cautious in their announcements, especially if they are considering abandoning the current very accommodative policy. That is evident from the recent bond market volatility, fuelled in particular by market players' perception that the Federal Reserve might cease or moderate its purchases of debt instruments sooner than expected. Moreover, credible communication by the central bank, on the lines of the indications given by the ECB Governing Council since July 2013 concerning its future monetary policy stance, can contribute to curb any undesirable interest rate movements.

(1) The IMF's five-year growth projections published in the spring of 2008 (IMF, 2008) indicate growth of 3.2 and 2.4 % respectively for the United States and the euro area. The corresponding forecasts published in April 2013 were revised downwards, to 2.9 and 1.6 % respectively (IMF, 2013a).

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