Christian Noyer: The role of inflation - indexed bonds in the process of setting monetary policy: a central banker's perspective

Speech by Mr Christian Noyer, Governor of the Bank of France, at the Morgan Stanley seminar on indexed bonds, Paris, 9 June 2004.

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Ladies and Gentlemen, [Dear Friends],

It is a great pleasure for me to address you here in the context of the first "Séminaire de Paris" on inflation-linked securities organised by Morgan Stanley. Today, I will focus more specifically on "The role of inflation - indexed bonds in the process of setting monetary policy" from a central banker's perspective, based on my own experience as the former Vice-President of the ECB and the current Governor of the Banque de France. Throughout my presentation, I will occasionally refer to the monetary policy strategy framework implemented by the Eurosystem in which asset prices, in particular inflation-indexed government bonds, can play a role in the context of our economic analysis. Having said this, I will neither elaborate further on the ECB's framework nor comment on the last Governing Council's monetary policy decision.

Price indexation of financial contracts is not a new phenomenon. According to Robert Shiller[1], the world's first known inflation-indexed bonds were issued by the Commonwealth of Massachusetts in 1780 during the Revolutionary War. These bonds, the so-called "depreciation notes", were issued to US Soldiers as deferred compensation for their services. They were mainly designed to deal with severe wartime inflation. Although the bonds were successful, the concept of indexed bonds was set aside until the 20th century. Finland introduced indexed bonds in 1945, Sweden in 1952, Iceland and Israel in 1955. Since then, indexed bonds have usually appeared in countries experiencing very high rates of inflation, such as Brazil in 1964[2], Chile (1966), Colombia (1967), Argentina (1972) or even the UK in 1975, with the issuance of so-called "granny bonds", i.e. non-marketable indexed-linked savings retirement certificates. Later on, in 1981, the UK issued a marketable instrument - the index-linked gilt- in a context of rapidly increasing prices. In all of these cases, the issuance of inflation-indexed debt instruments by the government was aimed at developing long-term capital markets and improving the credibility of anti-inflationary policies. As regards this last point, such a rationale is, however, ambiguous as it can also be argued that debt indexation can fuel the inflationary process by spreading inflation-linking to other contracts, such as wage contracts for instance.

Given this historical background, it might appear paradoxical that, since 1980, indexed bonds have largely been issued by industrialised countries, characterised both by low inflation rates and price stability - oriented monetary policies: Australia (1985), Canada (1991), Sweden (1994), New Zealand (1995), The United States (1997), France (1998 and 2001) and recently Italy and Greece (2003). The rationale behind the issuance of these indexed bonds was mainly to reduce the cost of debt and to develop complete financial markets.

From a central banker's standpoint, the role of asset prices in general and of inflation-indexed bonds in particular in the process of setting monetary policy is mainly related to their information content on future economic activity and inflation. As you have already probably noticed, the Governing Council of the ECB sometimes refers to the information delivered by the changes in the inflation-indexed bond yields both in its introductory statement and in its comprehensive assessment of recent economic and financial developments, as presented, for instance, in the ECB's Monthly Bulletin.

To elaborate further on this, I will develop three points. First, I will describe the information content of inflation-indexed bonds and explain why this information is relevant for central banks. Second, I will highlight some of the main drawbacks and potential biases that may alter this information content. Third, I will briefly review the other indicator variables that we also use in our cross-checking exercise at the euro area level. Finally, I will conclude my presentation by raising the issue of what I call the

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[1] Robert Shiller: "The Invention of Inflation - Indexed Bonds in Early America", NBER Working Paper N°10183, December 2003.

[2] In the year prior to the introduction of the indexed bond, the inflation rate was at 69.2% in Brazil, 22.2% in Chile, 19.7% in Colombia, 34.8% in Argentina, 16,1% in the UK in 1974 and still at 14% in 1980.

"circularity problem", a difficulty encountered by every central bank faced with a signal extraction problem, in particular when it tries to get information from asset prices.

Let me now turn to my first point:

1. What is the information content of inflation-indexed bonds and why is it relevant for a central bank?

Over the past decade, policy makers have come to rely on long-term bond yields to measure the public's long-term inflationary expectations. According to some empirical research[3], "almost 80% of the movement in the long nominal rates appears to be due to changes in expected long-term inflation".

According to the Fisherian theory of interest rates, the long-term nominal interest rate depends upon the ex-ante real interest rate and the expected long-term inflation, factoring in an inflation risk premium. The main problem for the central bank is that, in practice, these three components are unobservable. In this respect, the central bank faces a signal extraction problem, which has important implications in terms of monetary policy decision-making. I will mention three of them.

First, aggregate spending decisions are generally viewed as more closely related to long-term [real] interest rates. This implies that changes in short-term interest rates, used as the operational target for implementing monetary policy, will only affect aggregate spending decisions if they impact long-term interest rates. Under this rationale, the term-structure of interest rates and the relationship between long-term interest rates and long-term expected inflation becomes central to the design of monetary policy.

Second, inflation expectations may be used by policy makers to gain information about the setting of short-term interest rates, whereas changes in the nominal yield curve, on their own are of no use. An increase in long-term nominal interest rates may be driven by a rise in the long-term expected inflation rate or a rise in the inflation risk premium, but it may also reflect an increase in long-term real interest rates, driven by some real factors. The two first movements could justify a change in the monetary policy stance, once the nature of the underlying shock and its likely duration have been clearly identified, but such a change may be inappropriate in the last case.

Third, information on long-term inflation expectations can provide monetary authorities with a measure of the credibility of their commitment to price stability.

The existence of a market for inflation-indexed securities may provide central banks with very useful information, since it may then enable them to identify whether changes in nominal yields mainly reflect changes in the expected long-term inflation rate or rather whether they are due to changes in real yields. If one assumes, for instance, that both the conventional bond market and the inflation-indexed bond market are efficient and arbitraged by economic agents so that they incorporate the same information about the real interest rate, then the difference between the conventional nominal rate and the real rate would provide, by factoring in an inflation risk premium, a measure of the expected inflation rate over the same period, known as the "break-even inflation rate".

Now, if we had both nominal and indexed bonds across the whole maturity spectrum, up to, say, 30 years which is the maximum maturity at which inflation-indexed bonds are currently issued, then we would be able to pin down market expectations of inflation for all the forecast horizons, up to 30 years, as well as forecasts of inflation for each year up to the maximum maturity. So you can easily imagine the importance of such information for central banks, information which is, moreover, updated on a daily basis. Our staff and also private forecasters are unable to routinely produce inflation forecasts in such a detail, at such a frequency and for such horizons!

As far as the euro area is concerned, the reliability of both the inflation-indexed yield and the break-even inflation rate is strengthened by the significant development of the market for indexed bonds over the recent years, which accelerated further in 2003 with the arrival of two new government issuers: Greece in March and Italy in September. If we take into account the overall euro area inflation market, it is now the third biggest market in terms of market capitalisation, just behind the United States and the United Kingdom. However, in 2003, it was not only the fastest growing market in terms

[3] See Barr, D.G. and J.Y. Campbell (1996) : "Inflation, Real Interest Rates and the Bond market: A study of UK Nominal and Index-linket Government Bond Prices", NBER Working Paper, # 5821, November.

of issuance but also the largest and most liquid inflation derivatives market, characterised by both the broadest range of products (government bonds, agency bonds, inflation swaps, etc.) and the largest number of frequent issuers (France, Italy, Greece, CADES, CNA, etc.).

What has the Eurosystem learned to date from inflation-indexed securities? First, since the inception of the euro, long-term expected inflation, i.e. the break-even inflation rate, as derived from the French OAT indexed bond and the French OATei - indexed on the euro area HICP - has been broadly stable in a range of 1,7%-1,9%, i.e. broadly in line with the ECB's definition of price stability, a year-on year increase of the euro area HICP close to, but below, 2% over the medium term. This could be interpreted as the sign of the ECB's credibility and as an illustration of its ability to anchor inflation expectations at a fairly low level, consistent with price stability. However, since the third quarter of 2003, the break-even inflation rate has hovered at around 2.2 - 2.3%, breaking the ceiling defined by the Governing council of the ECB. In a context of rising oil prices and soaring commodity prices, this may reflect concerns about future price developments in the euro area and thus accelerating inflationary expectations. However, there is also anecdotal evidence that the demand for indexed government bonds by insurance companies, pension and hedge funds, has increased slightly over the recent months, pushing the prices of indexed bonds up and, consequently, their real yields down. As a result, break-even inflation rates may have been distorted upward, for some reasons not directly related to changes in expected inflation.

This latter point raises the issue of the drawbacks and potential biases affecting indexed yields, increasing the difficulty to interpret correctly and decipher the movement behind the changes in the nominal yields. I will constitute the second point to my presentation.

2. The biases in the break-even inflation rate.

The break-even inflation rate may be a good measure of expected inflation. It should however be cautiously interpreted and analysed as it may also be severely biased.

When I previously introduced the concept of the break-even inflation rate, I assumed both efficient and arbitraged markets but also perfect foresights and no risk or liquidity premia. Since this seems unlikely to hold in practice, we should then consider that the break-even inflation rate is only related to, but not equal to, inflation expectations. Let me briefly outline some of the biases we need to take into account in the context of our economic and financial assessment. For the sake of simplicity, I will distinguish two main categories of biases: technical biases and institutional biases, leaving aside the treatment of risk aversion considerations, which tends to introduce an upward bias in the break-even inflation rate.

Technical biases

The compound and the convexity biases: the definition of the break-even rate as the difference of the conventional nominal bond yield and the inflation - indexed bond yield is a first order approximation which does not take into account interest rate compounding. Consequently, the break-even rate is an upward biased estimator of expected inflation - provided that inflation expectations are positive[4]. Interest rate compounding has also another implication as it implies that bond prices will respond in an asymmetric manner to changes in the yield: indeed, bond prices are more sensitive to a fall in yields than to an increase in yield, and therefore, will also rise when the volatility of the yield increases, therefore pushing down the forward rates[5]. The net convexity adjustment will therefore bias the break-even inflation rate either upward (the most likely) or downward.

The inflation lag: by construction, bond cash flows can not be adjusted instantaneously for actual inflation. This implies that the break-even inflation rate includes another bias reflecting the discrepancy between the lagged and the contemporaneous inflation rate. For instance, in the case of the French indexed bonds, the lag length is limited to three months, equivalent to that of the US TIPS and the Canadian indexed government bond, but slightly below that of the UK where an eight-month lag is

[4] To give a magnitude order, a real rate of 4% and an expected inflation rate of 2% would generate a compound bias of 8 basis point, which is in practice fairly small.

[5] This phenomenon is known as the convexity bias. It grows with maturity, as compounding increases, and may vary across time, as volatility in the yield is also likely to change over time. There is no reason to think that the convexity adjustment is the same for the conventional forward curve and for the indexed forward curve.

required. As a consequence, because the real yield is distorted, the information content of the break-even inflation rate will also be affected. According to some empirical research[6], this bias is also estimated to be fairly small, at around 5 basis points.

Liquidity bias: Finally, to conclude with this non exhaustive review of technical biases, one should also mention that, in general, indexed bonds are relatively less liquid than conventional government bonds. Holding periods seem to be longer for the former and this is also reflected in the relatively low trading volumes of inflation-indexed bonds. The existence of a liquidity premium results in an understatement of the level of expected inflation derived from the break-even inflation rate. Some in-house research suggests this bias to be at around 5 to 15 basis points.

Besides these technical biases, institutional arrangements may also introduce distortions in real yields, which impact in turn on the break-even inflation rate. I will mention two examples.

Institutional biases

The tax bias: the main source of distortion is probably related to taxation. Investors are primarily interested in real net-of-tax cash flows, which implies that differences in tax treatment between conventional and indexed bonds will influence their relative prices and therefore the break-even inflation rate. In the French case, where inflation compensation gains and interest rate income are equally taxed, this bias is generally considered as relatively small - less than 10 basis points. But even if it is small, it constitutes another upward distortion in the break-even.

New regulations - supply and demand factors: as I mentioned, earlier, and I will conclude this section by this point, the French OATi, which so far has been the main inflation-indexed indicator used by the ECB in its economic and financial assessment, has been distorted by a significant upward demand shift which can be, to a certain extent, attributed to the adoption by the French Banking and Finance Regulation Committee (CRBF) of a new regulation on Livret A (passbook saving vehicle), aiming at linking this savings account partly to inflation . Anecdotal evidence suggests that a surge in demand for OATi originated from banks, which tried to hedge against this new regulation. An insufficient outstanding amount of French inflation linkers relative to the overall demand for hedging purposes led to an upward pressure on the prices of other euro area linkers (Greece and Italy).

To conclude this point, all these biases are likely to be small, but they add together, potentially in a non-systematic way. They are also likely to vary over time. It is therefore difficult to smooth out all these noises to get a good proxy of inflation expectations over the medium to long-term.

Two main lessons may be drawn from the existence of the various premia and biases affecting the break-even inflation rates. First, it may be more informative to focus on the changes in the break-even rates rather than on their levels. This is however at a cost since the level by itself conveys relevant information for the central bank. Second, break-even inflation rate may provide interesting information as regards long-term inflation expectations, although it is necessary to cross-check against other inflation expectations' measures. This leads me to my third and final point.

3. Other useful indicators of expected inflation

Inflation-indexed bonds are not the sole financial instrument to provide information on long-term expectations of inflation, as similar information can be extracted from inflation-linked swaps. The market for inflation-linked swaps has developed rapidly since 2002 in the euro area. Companies with revenues linked to inflation may use this market to hedge against the perspective of low inflation while companies with liabilities linked to inflation may use it to hedge against the risks of high inflation. Compared to inflation-indexed bonds, they provide a wider maturity spectrum for short and medium horizons. However, they are affected by the same biases, in particular the inflation risk and liquidity premia. This tool, however, usefully complements inflation-indexed bonds in the Eurosystem's information set[7] and, so far, the information provided by this new financial instrument has been broadly

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[6] See F. Alonso, R. Blanco and A. del Rio: "Estimating Inflation Expectations Using French Government inflation-indexed bonds", Banco de Espana, Documento de Trabajo, n° 0111, 2001.

[7] See for instance the box entitled "Deriving euro area inflation expectations from inflation-linked swaps", ECB monthly Bulletin, September 2003.

in line with the information derived from indexed bonds, suggesting an average ten-year expected inflation rate of around 2%.

In addition to financial indicators, central banks, and the ECB in particular, also rely heavily on surveys to extract relevant information as regards long-term inflation expectations. I will limit myself to two examples:

The first is the quarterly survey that has been carried out by the ECB since 1999, in which information is gathered from professional forecasters. In particular, it surveys inflation expectations over the medium term, at a 4-year horizon, and delivers very useful information since each forecaster is asked about his own probability distribution of inflation over the forecast horizon. It might then be completed by other surveys looking at longer horizons, such as the *Consensus Forecast* for instance. According to these surveys, medium to long-term expectations have proven remarkably stable in the euro area, standing at a level around 1.8 - 1.9%, in spite of short-term inflation dynamics being adversely affected by a series of sizeable supply shocks that have impacted the economy since 2000.

Another very useful kind of survey is the European Commission's harmonised survey of price expectations of individual households, which completes the set of alternative measures of inflation expectations. Here, households are asked whether they expect price over the next 12 months to rise more or less rapidly than over the past 12 months. The time horizon here is very short and, since 2000, the survey has delivered more worrisome results. A divergence has actually emerged, both in France and the euro area as a whole, between actual inflation and inflation as perceived by households. The proportion of households that feel that prices have risen sharply has substantially increased, without any correlation to actual developments in the general price level.

Central banks must also avoid misperception and for that reason, they should not rely on a limited set of indicators but should use a comprehensive and rigorous analysis aimed at picturing the economy as a complex and permanently evolving system. Central banks also have the difficult task of identifying shocks hitting the economy and of addressing them appropriately by assessing their potential implications in terms of risks to price stability. Model analysis, monetary analysis, model -based forecasts are additional useful tools employed in this context. This is precisely the approach taken by the ECB, which developed its two-pillar-strategy in order to help to sort through the wealth of potentially conflicting statistics.

Conclusion

Let me now briefly conclude my remarks by asking the question: what information do we really get from asset prices, and particularly from inflation - indexed securities?

Financial markets do indeed play a critical role in the process of setting monetary policy. In effect, the influence of monetary policy on the real economy and ultimately on prices is largely transmitted through asset prices. As pointed out by Blinder, the economic activity is not directly affected by the changes in the key policy rates, but rather by long-term interest rates and, where relevant, through wealth effects. In short, monetary policy affects the economy through its interaction with long-term expectations, which in turns affect asset prices and then economic activity and inflation.

But central banks also rely on financial markets for information to help explain their monetary policy decisions. This points out to a sort of "circularity problem" whereby it is unclear how informative the information extracted from asset prices actually is. Consider for instance the stable break-even inflation rate at a level close to but below 2% in the euro area. Then suppose that, as sometimes observed on other financial markets -as the money market for instance- for any reason, the market for indexed-bonds is indeterminate in the sense that the market is unable on its own to determine an ex-ante equilibrium price. Thanks to the existence of a central bank, an equilibrium price may however be set if issuers or price-makers believe the central bank will commit to price stability as defined by a year-on-year increase of a consumer price index at around 2% over the medium run. The indexed-bond price will then be set on the basis of the actual conventional bond prices and the long-term nominal anchor defined by the central bank, factoring in certain margins or premia.

This clearly indicates the central bank's credibility, and a stable break-even inflation rate will reflect this aspect. But what else can we draw from this information to take a monetary policy decision? This might be another illustration of what some economists have recently named the "credibility paradox". On the one hand, the information variable of the central bank is consistent with its definition of price stability: therefore no cause for concern. On the other hand, whatever the underlying market's

dynamics, economic agents are convinced the central bank will ensure price stability: credibility matters. In such a context, misperception from both sides can generate aggregate instability, characterised by unsustainable market developments and the emergence of financial imbalances.

This is one of the reasons why central banks have to make use of the widest possible set of information variables to cope with uncertainties. In such a context, asset prices, inflation - indexed bonds play an important role as information variables; but one has to bear in mind that they are endogenous to the monetary policy decisions via the expectations channel.

Thank you for your attention.