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**Research Report**

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EUROPEAN CENTRAL BANK

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## OCCASIONAL PAPER SERIES

NO 83 / MARCH 2008

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# CONTENTS

## CONTENTS

<b>ABSTRACT</b>	<b>4</b>
<b>NON-TECHNICAL SUMMARY</b>	<b>5</b>
<b>1 INTRODUCTION</b>	<b>6</b>
<b>2 PREDICTABILITY AND MONETARY POLICY</b>	<b>8</b>
2.1 What is monetary policy predictability?	8
2.2 Why does predictability matter for monetary policy?	12
<b>3 THE ROLE OF CENTRAL BANK TRANSPARENCY FOR MONETARY POLICY PREDICTABILITY</b>	<b>14</b>
3.1 Why does transparency improve predictability?	14
3.2 What should central banks be transparent about to improve predictability?	16
3.2.1 Transparency regarding the monetary policy strategy	16
3.2.2 Transparency regarding the monetary policy stance	18
3.3 How can transparency improve predictability?	20
<b>4 HAVE CENTRAL BANKS BEEN PREDICTABLE?</b>	<b>23</b>
4.1 The degree of short-term predictability	23
4.2 The degree of longer-term predictability	28
<b>5 CONCLUSIONS</b>	<b>31</b>
<b>REFERENCES</b>	<b>32</b>
<b>EUROPEAN CENTRAL BANK OCCASIONAL PAPER SERIES SINCE 2007</b>	<b>38</b>
<b>BOXES</b>	
1 Perfect predictability and monetary policy rules	10
2 Indicators of longer-term inflation expectations in the euro area	30



## ABSTRACT

Current best practice in central banking views a high level of monetary policy predictability as desirable. A clear distinction, however, has to be made between short-term and longer-term predictability. While short-term predictability can be narrowly defined as the ability of the public to anticipate monetary policy decisions correctly over short horizons, the broader, ultimately more meaningful concept of longer-term predictability also encompasses the ability of the private sector to understand the monetary policy framework of a central bank, i.e. its objectives and systematic behaviour in reacting to different circumstances and contingencies. In this broader sense, longer-term predictability is also closely related to the credibility of the central bank. This paper reviews the main conceptual issues relating to predictability, both in its short and longer-term dimensions, and discusses how a transparent monetary policy strategy can be – and indeed has been – instrumental in achieving this purpose. This latter aspect is investigated in an overview of the empirical literature, highlighting how financial markets have been increasingly able to correctly anticipate monetary policy decisions for a number of large central banks, including the ECB. The paper also reviews several possible empirical proxies for the less-explored concept of longer-term predictability, which is inherently more difficult to measure.

Key words: Predictability, central bank transparency, central bank communication

JEL: E52, E58, E61.

## NON-TECHNICAL SUMMARY

Over the last few decades central banks have progressively increased their emphasis on the transparency and predictability of their actions. Such developments have been inextricably linked to the parallel trend towards central bank independence and the corresponding need for greater accountability.

Central banks nowadays carefully explain their monetary policy framework and are precise about what they want to achieve in terms of policy goals, often going well beyond strict legal requirements. Furthermore, they generally inform the public about the macroeconomic models on which their economic policy analysis is based. This and other information is provided to financial markets and the public at large so as to make them increasingly familiar with the way central banks think and operate. This, in turn, is instrumental in making actions more predictable and in enhancing credibility.

A clear distinction, however, has to be made between short-term and longer-term predictability. While short-term predictability can be narrowly defined as the ability of the public to anticipate monetary policy decisions correctly over short horizons, the broader, ultimately more meaningful concept of longer-term predictability also encompasses the ability of the private sector to understand the monetary policy framework of a central bank, i.e. its objectives and systematic behaviour in reacting to different circumstances and contingencies. In this broader sense, longer-term predictability is also closely related to the credibility of the central bank.

This paper reviews the main conceptual issues relating to predictability and the role of transparency as one of its main determinants. Transparency is, on its own, insufficient to ensure a lasting impact on the formation of expectations by financial market participants. Guiding interest rate expectations in fact requires not only forward-looking communication, but also consistency between words and deeds and

a track record of monetary policy decisions that supports the central bank's credibility. For transparency to have a positive impact on predictability, we show that it does not only matter *what* type of information central banks publish, but also *how* this information is communicated to the general public and financial markets in particular. We argue that those central banks which communicate in a collegial, timely and frequent manner, which adapt their communication to their audience and which manage to communicate clearly and unambiguously will be amongst those central banks whose monetary policy decisions are the most predictable.

Finally, measuring predictability is clearly not an easy task. While more effort needs to be devoted towards the empirical assessment of central banks' longer-term predictability, which is inherently more difficult to measure, the literature shows that financial market participants have been increasingly able to correctly anticipate central banks' monetary policy decisions. Transparent monetary policies and improved communication efforts are likely to have played a significant role in bringing about this improvement.

*“The result we seek is not difficult to define. What we want a monetary framework to produce is predictability in the value of money. We desire a monetary system that will allow the individual decision-maker, whether he be consumer, entrepreneur, seller of productive services, or speculator, to remove from his calculus uncertainty about the future course of the absolute price level.” (Buchanan 1962, p. 163)*

*“Most economic decisions depend, directly or indirectly, on the predictability of monetary policy. Monetary policy decisions can create surprises that affect outcomes from household decisions as to what jobs to take and where to live. Similarly, business firms find that their decisions on hiring and investment in physical capital may turn out well or poorly depending on the course of monetary policy and its effects on the economy.” (Poole 2005, p. 659)*

## I INTRODUCTION

Over the last two decades, central banks have undertaken a long journey from secretive to transparent institutions. Nowadays, they increasingly emphasise both the transparency as well as the predictability of their actions, rather than pursuing a monetary policy that has often largely surprised the public in the past. In the words of Blinder *et al.* (2001, p.1) “[...] Increasingly, central banks of the world are trying to make themselves understood, rather than leaving their thinking shrouded in mystery”.

What has brought about this remarkable development, and what are its effects? An important contributing factor was a radical change in the thinking of economists in the 1970s, with the role of expectations in economic behaviour gaining widespread attention. This “revolution” has not left economic thinking about monetary policy unaffected. Predictability matters because expectations are highly relevant for the effectiveness of monetary policy. In particular, consumption and investment

decisions are based on inter-temporal considerations that are, to a large extent, influenced by longer-term interest rates. These, in turn, largely depend on private expectations regarding future central bank decisions. As a result, the effectiveness of a change in the policy rate is fundamentally dependent upon its impact on market expectations about the future path of short-term interest rates.

Against these developments, central banks nowadays communicate more precisely what they want to achieve in terms of policy goals, often going well beyond strict legal requirements. Furthermore, they generally inform the public about the macroeconomic models on which their economic policy analysis is based. Also, the information they now release on their current internal analysis is both clearer and more plentiful than in previous times, and monetary policy decisions are publicly explained, either at press conferences or via timely releases of the minutes of the meetings of their decision-making bodies. A wealth of information is provided in order to make the public, and in particular financial markets, increasingly familiar with the way central banks think and operate. This, in turn, is instrumental in making actions more predictable and in enhancing credibility. In short, the idea that monetary policy decisions might be a surprise to the public has been replaced by the notion that a central bank should be “boring”, in the sense that the monetary policy “reaction function” should be so well understood by the public that all relevant news comes out of economic developments, and not the actions or communications of the central bank.

A higher degree of monetary policy predictability is particularly relevant for financial markets, where the inaccurate prediction of a central bank’s actions can lead to large financial losses. It is therefore in the interest of financial market participants to understand what central banks do and to take note of what is communicated. Recent research clearly shows that financial markets do indeed listen and react to this communication; after all, in the presence of efficient financial markets, ignoring publicly available information



will entail losses for individual market participants. More generally, there is clear evidence that by having financial markets “in tune” with the central bank, economic outcomes can be substantially improved, to the benefit of both parties. On the one hand, the central bank’s task of maintaining the stability of its currency is facilitated through well-aligned inflation expectations; on the other hand, being aware of the central bank’s intentions has led to more efficient pricing in financial markets. Substantial progress has been made in conveying to the public how central banks think and act, which has facilitated the increase in credibility.

This paper identifies and assesses how, and on which subjects, central banks should communicate, so as to enhance the predictability of the monetary policy process.<sup>2</sup> In so doing, this paper will draw an important distinction between the notions of short-term and longer-term predictability. Short-term predictability is achieved when the public, notably financial market participants, is in a position to anticipate correctly the central bank’s next monetary policy decisions. A more fundamental aspect of monetary policy predictability relates to its longer-term dimension, which requires that the public has a genuine understanding of the central bank’s monetary policy framework and its behaviour over time. We will argue that a high degree of predictability of interest rate decisions is the result of monetary policy being conducted in a credible, consistent and transparent manner that is well explained to the public. Longer-term monetary policy predictability hence enhances the effectiveness of monetary policy, while, at the same time, it contributes to the accountability vis-à-vis the public at large.

Measuring predictability is not an easy task, as this paper will show. While this is particularly true for the case of longer-term predictability, a variety of different approaches may be used to measure short-term predictability. For example, measures of predictability can be based on information derived from different money market asset prices or surveys of financial

market participants. The time span also matters: a shorter horizon focuses the empirical analysis towards the monetary policy decision on a given day and includes the information available to the central bank at the time of the decision, whereas a longer time horizon may incorporate additional information about the future path of monetary policy.

This paper is structured as follows: Section 2 sets out a general discussion of predictability and its role in practical monetary policy-making, addressing in particular the issue of whether central banks should institutionally aim for ever-higher degrees of predictability. Section 3 then turns to the role of central bank transparency for monetary policy predictability, while Section 4 reviews the empirical evidence. Finally, Section 5 offers some concluding remarks.

<sup>2</sup> See also “The predictability of the ECB’s monetary policy” published in the January 2006 issue of the ECB Monthly Bulletin for a related, albeit more condensed, analysis.

## 2 PREDICTABILITY AND MONETARY POLICY

The views about the merits of monetary policy predictability held by both monetary policy-makers and academics have changed considerably over time. While central banks were, in the past, generally very secretive institutions and avoided predictability in their actions and objectives, a number of recognised academics eventually began to praise the benefits of an open and predictable monetary authority. For example, as long ago as 1962, James Buchanan suggested that the most meaningful criterion for monetary policy was predictability in the value of the monetary unit (see, for example, the quote at the beginning of this paper). Buchanan's important contribution was to shed light on the harmful impact of price level uncertainty inherent in secretive monetary policy-making. For instance, people were demanding high premiums if they lent money over a longer period in order to cover the potential loss in purchasing power of their money in view of possible future increases in price levels. Today, virtually all central banks recognise that they must be predictable in their

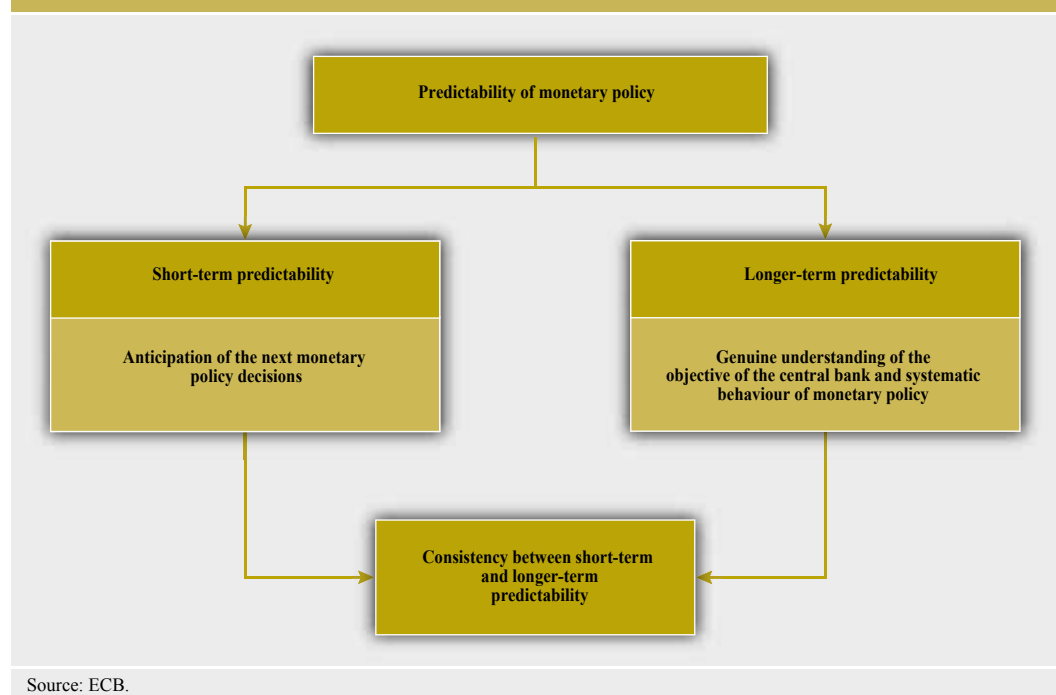
behaviour if the public is to trust the value of their currency.

### 2.1 WHAT IS MONETARY POLICY PREDICTABILITY?

The literature on monetary policy predictability evolved in tandem with the progressive increase in openness and transparency of central banking, a process that was substantially accelerated with the advent of inflation targeting at the beginning of the 1990s. Most of this literature has been empirical in nature, focusing on estimating the “surprise element” of monetary policy decisions at the time of policy announcements. Predictability of monetary policy in these papers is therefore often understood to be the ability of financial markets to correctly anticipate the next monetary policy decision of a central bank (Krueger and Kuttner 1996; Poole and Rasche 2000; Kuttner 2001).

From a normative perspective, predictability of central bank decisions should, however, not be

Chart 1 Predictability of Monetary Policy

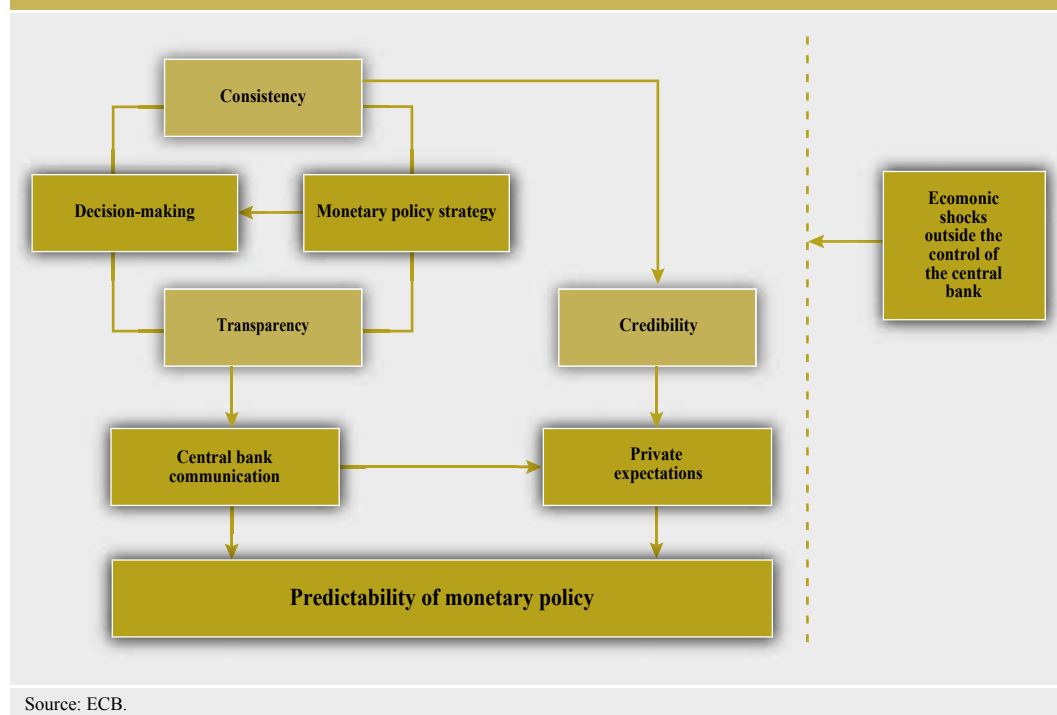


restricted to this narrow, short-term notion for at least two reasons. First, predictability in this limited sense does not adequately reflect the appropriateness of monetary policy decisions towards achieving the objective of price stability. As we will stress in this paper, surprise components in monetary policy decisions often reflect uncertainty about the timing rather than the direction or need for policy rate changes. Against the background of the long and variable lags with which monetary policy actions are transmitted to prices, the precise timing of an interest rate decision is inherently difficult to predict. Second, predictability measures as derived from financial market data focus only on the understanding of monetary policy by financial market participants. Yet, for a central bank to successfully maintain price stability in the medium term, it is critical that the general public is also in a position to predict the broader future course of monetary policy (see also Bill Poole's quote at the beginning of this paper). People must have an understanding of the workings of monetary policy so as to

be able to judge the central bank's ability and determination to safeguard the value of their currency. As a result, such broader understanding helps to guide price and wage-setting behaviour in a fashion that is consistent with the objectives of the central bank.

For these reasons, predictability of monetary policy decisions should be seen in a broader context and over extended periods. This does not imply that central banks do not aim at being predictable in the short term. In contrast, we will show that many central banks have made significant progress in enhancing the short-term predictability of their monetary policy decisions, mainly with a view to smoothing central bank operations and to reducing interest rate volatility. However, we claim that monetary policy predictability is not about predicting the timing or the exact size of policy actions; what matters for long-term rates, and therefore for economic outcomes, is rather the public's ability to generally predict the time horizon over which a new policy will persist (see also Thornton

**Chart 2 The broader notion of monetary policy predictability**



2003). Hence, we claim that a more fundamental aspect of monetary policy predictability relates to its longer-term dimension, which entails that financial market participants and the public at large are in a position to anticipate correctly the broad direction of monetary policy over the medium term (see also ECB 2006; Chart 1).

In this broader sense, predictability of monetary policy is the result of the interaction of a number of largely interdependent factors (see Chart 2). Central to the understanding and anticipation of any policy decision by a central bank is the *monetary policy strategy*. If the central bank is transparent about its strategy, this can provide a systematic and comprehensive framework for monetary policy decisions and clearly identify a central bank's objectives and methods to conduct monetary policy (see also Section 3.2.1). This allows the public to assess the central bank's behaviour over time and is at the essence of acquiring a high level of *credibility*, a necessary precondition for a central bank which aims to be

predictable in its monetary policy deliberations. For example, if the central bank consistently adheres to its institutional objectives and strategy, it will gain credibility and the public will gain an understanding of its behaviour, also as a result of the behaviour of short-term interest rates. Learning about the central bank's responses to a changing economic environment takes time, but it will ultimately result in a genuine understanding of the monetary authority's systematic behaviour. However, the strategy does not entail a rule-like behaviour on the part of the monetary authority, which would imply quasi-perfect predictability, but rather serves as a systematic device to reconstruct the logic of each single policy decision (see Box 1). For instance, the longer inflation is low and stable, the more likely economic agents are to understand the central bank's response pattern to different economic shocks so as to ensure price stability. Put differently, "perhaps the best a central bank can do is to 'teach' the market its way of thinking" (Blinder 2002, p. 25).

#### Box 1

##### PERFECT PREDICTABILITY AND MONETARY POLICY RULES

Monetary policy predictability has often been associated with a rule-like behaviour on the part of the monetary authority (Buchanan 1962, Poole and Rasche 2000, Poole 2005). In the academic literature, there have been several attempts, the most prominent by Taylor (1993), to formulate the monetary policy conduct of a central bank by specifying policy rules or reaction functions. Such rules are typically either postulated in a simple form,<sup>1</sup> linking the policy instrument to a small set of economic variables or indicators, or they are derived explicitly from an optimisation problem given a particular representation of policy objectives and the working of the economy. In practice, market participants often use a central bank's track record to derive a simple and mechanical rule which they employ to predict future monetary policy decisions conditional on past reaction coefficients and forecasts of the economic variables to which the central bank is assumed to react. Although there is a widespread consensus that monetary policy cannot be adequately described by any of the proposed rules in the literature, such rules may fit the data reasonably well.

The reason why simple mechanical rules do not fully describe central bank behaviour is that they are unable to take into account all relevant information to be considered by central banks, and are therefore also unable to offer appropriate guidance for stabilising the economy under all

<sup>1</sup> In the language of Svensson (2003), we are referring to simple *instrument* rules.

conceivable circumstances (ECB 2001). Empirical reaction functions often also disregard the fact that monetary policy decisions involve, to a certain degree, policy-makers' judgement of the implications of new information contained in macroeconomic data, and that this judgement may vary over time and is state-dependent. For example, central banks may react differently to a situation in which inflation is above the announced definition of price stability, depending on whether they expect this situation to last for a longer or a short period of time.<sup>2</sup> Hence, while a deeper understanding of the systematic behaviour of monetary policy should normally result in a high level of longer-term predictability, and to an enhanced short-term predictability, "perfect" predictability would not generally be attainable for a monetary policy geared towards achieving price stability over the medium term.

In principle, a central bank could achieve perfect predictability by systematically pre-announcing future changes in interest rates and later implementing them under any contingency. However, an unconditional commitment by the central bank to the path of future policy rates would restrict the flexibility of its monetary policy, limiting its ability to react swiftly to rapid changes in the economic situation. The need to react quickly may also, on occasion, limit the opportunity to fully prepare markets prior to a monetary policy decision. Alternatively, perfect predictability could be easily achieved if the central bank always mechanically executes the expectations of market participants. However, this would result in these expectations becoming self-fulfilling even if they do not necessarily reflect an adequate monetary policy stance to maintain price stability (Bernanke and Woodford 1997).

2 In this sense, longer-term predictability also encompasses a central bank's ability to allow for temporary deviations from its objective without damaging its commitment to achieve the objective in the medium term.

A fundamental prerequisite for credibility is that the actual *decision-making* by the central bank must be consistent with the logic of its strategy. If market participants perceive a persistent mismatch between the broad prescriptions of the strategy, realised policy decisions and public explanations by policy-makers, markets have no grounds to believe that policy-makers will adhere to the strategy in the future. In this sense, the strategy should also serve as a consistent and systematic framework for the policy discussions in the decision-making bodies and as a vehicle for explaining the conduct of monetary policy to the public. This ensures consistency between internal analysis and *external communication*, which is the essence of transparency and is at the heart of a predictable monetary policy.

The perceived adequacy and credibility of the central bank strategy will in turn influence the *expectation formation process* by the private sector and is likely to establish the degree of volatility in these expectations. For example, a credible monetary policy strategy aimed at

securing price stability in the medium term will help to stabilise inflation expectations at levels consistent with those of the central bank if, and only if, the strategy is perceived as credible and adequate by the private sector. In this regard, a coherent track record of reliable policy-making is indispensable for the credibility of the strategy. However, a credible strategy alone will not necessarily result in a highly predictable monetary policy, as it will most likely be strongly affected by external shocks outside the control of the central bank. Given the myriad of these shocks, a central bank's strategy can implausibly address *ex ante* all possible contingencies that may arise and could give guidance to market participants about the policy-maker's reaction to each of these contingencies.<sup>3</sup> These random shocks may drive a wedge between the views of the central bank and the private sector. However,

3 In the words of Trichet (2006): "No central bank [...] can reasonably spell out in advance its reaction to every conceivable contingency. This means that surprises in our behaviour can never be ruled out, notably in the face of potent shocks."

for monetary policy to be predictable, it is important that this divergence of views is only of a temporary nature and does not translate into a destabilisation of longer-term expectations that should at all times remain firmly anchored to the objectives of the central bank.

To sum up, a high level of monetary policy predictability arises if the central bank's strategy is perceived as adequate and credible by the general public, if the decision-makers adhere to the strategy in their internal deliberations and external communication and if, as a result, longer-term private expectations are consistent with the central bank's objectives, even in the presence of shocks outside the control of the policy-makers. A high level of predictability should therefore be seen as the natural outcome of a central bank's consistent pursuit of its monetary policy strategy. As such, the predictability of interest rate decisions can be regarded as an observable reflection of the public's overall understanding of a central bank's monetary policy framework as well as the private sector's ability to translate the changing economic circumstances into anticipations of a central bank's broad policy direction within a well-defined and credible strategy.

## **2.2 WHY DOES PREDICTABILITY MATTER FOR MONETARY POLICY?**

Today, most central banks and academics emphasise the predictability of interest rate decisions as an important ingredient in the successful and effective conduct of monetary policy (King 2000; Woodford 2003; Bernanke 2004b; Blinder and Wyplosz 2004; Issing 2005; Trichet 2005). This is not to say that monetary policy decisions necessarily ratify market expectations. Yet central banks will not attempt to deliberately surprise financial markets. In other words, "a successful central bank should be boring" (King 2000) in the sense that news about monetary policy should arise in the macroeconomic news, and not in the actions and announcements of the central bank.

This remarkable change in the importance attached to predictability in central banking practice was largely influenced by the widespread gain of the role of expectations in economic thinking. In particular, the rational expectations revolution that started in the early 1970s established the view that current inflation reflects, to a large extent, expectations about future price developments and, hence, can be reduced in a less costly manner if the central bank is credible in its future determination to do so (Sargent 1982). If economic agents believe in a central bank's commitment to reducing inflation in a lasting way, this should affect current inflation through the adjustments in future price expectations. Hence, predictability matters because expectations matter for the effectiveness of monetary policy.<sup>4</sup>

In fact, central banks can directly influence only very short-term interest rates through their monetary policy actions. However, consumption and investment decisions and, ultimately, medium-term price developments, are based on inter-temporal considerations that are, to a large extent, influenced by longer-term interest rates. These, in turn, largely depend on private expectations regarding future central bank decisions, and therefore on the public's assessment of a central bank's ability and determination to achieve its objective in the medium to long term. Hence, the effectiveness of a change in the policy rate is fundamentally dependent upon its impact on market expectations about the future path of short-term interest rates. Monetary policy is therefore increasingly recognised as the art of managing expectations, and a predictable and credible monetary policy is vital in order for such expectations to be managed effectively. Moreover, given the partially substantial lags in the transmission of monetary policy, high levels of longer-term predictability are desirable for central banks as this can lead to a

<sup>4</sup> To quote Woodford (2005), p.15: "Not only do expectations about policy matter, but, at least under current conditions, very little *else* matters."



more immediate translation of monetary policy intentions into investment and consumption decisions, thus accelerating the necessary economic adjustments.

In this sense, longer-term predictability also helps to guide price and wage-setting behaviour in a fashion which is consistent with the objectives of the central bank. In a setting where the private sector has no clear understanding of the central bank's reaction to economic developments, poor predictability may result in a perceived lack of commitment to its objectives on the side of the central bank, and thus in inflation expectations not being anchored in a manner that is consistent with the central bank's objectives. Short-term changes in inflation and output might then become more protracted via wage and price-setting behaviour, possibly resulting in unwarranted economic fluctuations and welfare losses (see also Section 3.2.1). Therefore, through a consistent and credible implementation of its monetary policy strategy over time, longer-term predictability is fostered and a central bank can positively influence the price and wage-setting behaviour of private agents.

Moreover, by being predictable in both the short and long term, central banks avoid market uncertainty both *ex ante* and *ex post*. *Ex ante* because the ability of market participants to broadly predict the future course of monetary policy reduces uncertainty among investors and thereby facilitates the pricing of assets and lowers risk premia, which, in turn, contributes to the efficiency of market allocation; *ex post* because market participants are less likely to be surprised by the central bank's monetary policy decisions. If the market anticipates the systematic behaviour of the central bank, then the market should only adjust to news (e.g. data releases), but not to the central bank's announcements of monetary policy decisions. Consequently, private agents are in a better position to manage and hedge the risks stemming from market uncertainty and this, in turn, may contribute to enhancing economic welfare.

To summarise, the above reasoning suggests that central banks affect the economy at least as much through their influence on expectations as through any direct effect of monetary policy decisions on short-term interest rates. Hence it is important not only that a central bank makes the right decisions as often as possible, but also that its actions are predictable (Woodford 2003). This, in turn, will allow for inflation expectations to be in line with the central bank's view of the outlook for price developments, thereby enhancing the effectiveness of monetary policy through its positive influence on the expectation formation process.

### 3 THE ROLE OF CENTRAL BANK TRANSPARENCY FOR MONETARY POLICY PREDICTABILITY

Over the past decades most central banks have steadily increased their level of transparency. The rationale behind this development is manifold and relates, among other things, to the recent increase in central bank independence and its corresponding need for greater accountability.<sup>5</sup> While some degree of transparency is required to safeguard the democratic legitimacy of independent central banks, most have already gone far beyond the legal requirements for accountability in their openness and transparency. This is so because central banks are aware that transparency and its main instrument, communication, have a positive effect on predictability and on the effectiveness of monetary policy.

#### 3.1 WHY DOES TRANSPARENCY IMPROVE PREDICTABILITY?

As we have argued above, monetary policy-making is an inherently complex process that cannot adequately be described by any precise rule which would govern the behaviour of a central bank in any contingency. In a scenario where both the central bank and private agents have complete information about the economy, a perfectly predictable monetary policy could be attained with a minimum level of transparency. The only requirement in this case is the awareness of the policy instrument (or a weak form of policy transparency in the terminology of Geraats 2002). This would allow private agents to infer the policy rule with a high degree of certainty. Monetary policy decisions could then be perfectly anticipated by assessing the impact of new incoming information in line with the policy rule followed by the monetary authority (Woodford 2005).

In practice, the information set on which policy-makers make their decisions is imperfect, and monetary policy decisions are the outcome of a judgemental process in which policy-makers must continuously assess

new economic, financial and monetary data against their implications for the objectives of the central bank. This process implies four potential sources of information asymmetry, which can reduce the level of predictability and thereby increase uncertainty surrounding monetary policy decisions for the private sector. First, the private sector may not know the exact objectives of the central bank (part of what is labelled as “political transparency” in Geraats 2002). Monetary policy actions will be fairly hard to predict if the public are unclear about what the central bank ultimately aims to achieve. It would be hard for the public to know whether an unexpected policy move signals a change in the policy-makers’ objectives, a change in their economic outlook, or both (see also Bernanke 2004a). Second, financial market participants and the public may not be aware of the set of economic indicators and the underlying formal analysis that the central bank uses in its assessment of the monetary policy stance (“economic transparency”; see also Haldane and Read 2000). In this case, even if there were some regularity in terms of policy-makers’ reactions to certain indicators, the public would not be in a position to disentangle the central bank’s behaviour if there is uncertainty about which indicators policy-makers look at. Third, even if the public were to be aware of the set of economic indicators which are of relevance to the central bank, they may be unclear about the policy-makers’ interpretation and reading of the data, their reasoning and their understanding as well as their intentions (Issing 1999).<sup>6</sup> Finally, there may be uncertainty surrounding the workings of monetary policy. Even if the central bank has spelt out publicly the indicators it looks at and the objectives it pursues, the private sector may find it difficult to correctly anticipate monetary policy decisions if it is unclear about how monetary policy reacts to changes in the economic environment and

5 See Geraats (2002) for a survey on central bank transparency.

6 Issing (1999) also argues that if the central bank is clear and open about its objectives and strategy, the policy-makers’ interpretation and judgment of the data is the only possible source of information asymmetry.

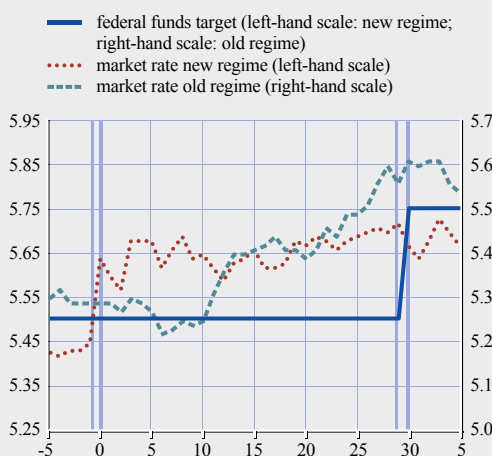
how monetary policy decisions are transmitted to the economy.

By being transparent, a central bank can reduce these sources of information asymmetry (and the associated uncertainty) between the monetary authority and the private sector and can thereby increase the level of monetary policy predictability beyond the market's simple interpretation of the policy regularities governing its past behaviour. By explaining to the public in an open, clear and timely manner the process of monetary policy-making and the rationale behind policy decisions, the central bank enhances the understanding of its mandate, policy strategy and decisions, which in turn allows the markets and the general public to better anticipate the future course of monetary policy. In this sense, transparency complements monetary policy decisions by gaining influence over interest rate expectations beyond the immediate policy meeting. As a consequence, the public will be better placed to correctly interpret central bank behaviour and to form more accurate expectations about future policy decisions in line with the central bank's views.

Ehrmann and Fratzscher (2007a) provide an illustration of how central bank transparency may reduce the lag in the transmission of monetary policy and render monetary policy more effective. They show how market interest rates evolved during a six-week period prior to a 25 basis point rise in the federal funds target rate once in 1997 – when the Federal Reserve did not provide any indications about likely future changes in the policy rate – and once in 2000 – when the Federal Reserve issued in advance a bias statement that was tilted towards a tightening of the policy rate. Although in both scenarios the markets had successfully anticipated the change in the policy rate by the time of the FOMC meeting, in the 2000 case, financial market participants had priced in the expected change immediately following the release of the bias statement, whereas in 1997 market interest rates changed significantly later and only shortly prior to the meeting in which interest rates were set (see Chart 3).<sup>7</sup>

**Chart 3 Adjustment of market interest rates under alternative disclosure regimes**

(comparison of 25 bp tightening on 25 March 1997 versus 2 February 2000)



Source: Ehrmann and Fratzscher (2007a).

Note: Both tightening days are scaled so as to be shown on day 30 on the horizontal axis. Day 0 refers to the corresponding previous FOMC meetings.

Nevertheless, transparency itself cannot be understood as an independent 'policy tool' and there are limitations to its effectiveness. First, it is by itself insufficient to ensure a lasting impact on the formation of expectations by financial market participants. In order to guide interest rate expectations, not only is forward-looking communication necessary but also consistency between words and deeds and a track record of monetary policy decisions that supports the central bank's credibility. For instance, Rosa and Verga (2005), in the case of the ECB, and Pakko (2005) and Ehrmann and Fratzscher (2007a), in the case of the US Federal Reserve, found that words are usually followed by consistent facts. Second, transparent communication alone will not reduce all uncertainties surrounding monetary policy-making. For example, both the central bank and the private sector may face uncertainties regarding the structure and the working of the economy. What needs to be minimised, therefore, is the uncertainty about

<sup>7</sup> Ehrmann and Fratzscher (2007a) show econometrically that this enhanced anticipation effect, owing to the change in the disclosure practice of the Federal Reserve, holds true in general, and not only for the above example.

central banks' responses to new information (Poole 2003).

Predictability is therefore often viewed as an immediate consequence of central bank transparency. However, given the intrinsically uncertain functioning of the economy and the fact that monetary policy decisions are necessarily based on judgement and cannot be taken mechanically, a lack of predictability might not necessarily be related to a lack of transparency (Perez-Quiros and Sicilia 2002). Therefore, while central bank transparency can reduce some of the uncertainty by making relevant information publicly available, it will, under normal circumstances, not result in perfect predictability due to the remaining sources of uncertainty outside the control of the central bank. However, as long as the central bank provides all relevant information to financial market participants and the general public, monetary policy will not be a source of uncertainty itself and will be predictable in the broader sense as described above.

### **3.2 WHAT SHOULD CENTRAL BANKS BE TRANSPARENT ABOUT TO IMPROVE PREDICTABILITY?**

As pointed out in the preceding section, there are four potential and relevant sources of information asymmetry between the monetary authority and the private sector: (1) the policy-makers' objectives; (2) the transmission of monetary policy; (3) the set of economic indicators used in a central bank's assessment and the underlying formal analysis; and (4) the policy-maker's judgement, assessment and interpretation of the state of the economy. While this catalogue seems already very suggestive to what central banks should be transparent about,<sup>8</sup> it is neither exhaustive nor exclusive, but provides a reasonable 'norm' for a central bank striving to be transparent and predictable.<sup>9</sup> Below we will refer to the first three categories as transparency about the monetary policy strategy, i.e. the central bank's objectives and its solid conviction as to how monetary policy affects the economy in broad

terms, while we will refer to the last category as transparency about the monetary policy stance, i.e. the central bank's assessment of the implications of the prevailing interest rate setting on the current and future state of the economy.

#### **3.2.1 TRANSPARENCY REGARDING THE MONETARY POLICY STRATEGY**

For a central bank to achieve high levels of longer-term predictability, it is essential that it is transparent about its monetary policy strategy, and that it is credible in terms of its objective(s). Market participants' uncertainty about the ultimate objective of monetary policy may have several undesirable macroeconomic consequences. If a central bank's objective is to deliver price stability, uncertainty about its notion of price stability could increase inflation persistence, as market participants may not be in a position to attribute fluctuations in inflation to exogenous disturbances outside the control of the central bank or to changes in its objective. In this case, monetary policy actions cannot be assessed against the central bank's objectives and the private sector may not expect monetary policy to overcome a positive inflationary shock, for example. This adjustment in expectations would lead to an increase in inflation today and thus to a slower reversal (Orphanides and Williams 2005). A central bank which aims to achieve price stability but which has not made the definition of its concept of price stability public, would need to react to such misconceptions, for instance by reacting particularly strongly to inflationary risks in order to pre-empt the emergence of doubts about its determination

8 Blinder et al. (2001) provide a similar listing, comprising three main categories of information: the central bank's goals, its methods of analysis and its decision-making process.

9 For instance, an example of non-exhaustiveness would be a central bank's public announcement of monetary policy decisions. Nowadays, it is common practice among central banks to inform the public about monetary policy decisions as soon as the decision has been taken; there is substantial evidence that this practice has improved the markets' understanding of monetary policy considerably (see Lange et al. 2003; Poole, Rasche and Thornton 2002) for a description of this in the case of the US Federal Reserve Bank.

in delivering its objectives. Furthermore, more inflation persistence implies a less favourable environment when the economy is hit by supply shocks which move inflation and output in opposite directions. Since the inflationary process is stronger and more persistent, it requires a more sizeable and protracted reaction on the part of the central bank, which might unnecessarily increase macroeconomic volatility.

In practice, transparency about central banks' objectives varies. On the one hand, some central banks have announced a quantified objective, most notably for the case of inflation targeting central banks or central banks with a fixed exchange rate, while others have published a precise definition of the concept of price stability (e.g. the ECB's definition of price stability is based on inflation being "below, but close to 2 per cent"). On the other hand, a number of central banks remain more vague by publishing no more than the type of objective they aim to deliver (e.g. the Federal Reserve's objective to pursue maximum employment, stable prices and moderate long-term interest rates). In fact, there is compelling empirical evidence that the quantification of the central bank's objective positively influences the longer-term predictability of monetary policy in the sense that the quantified objective can serve as a focal point for private agents' expectations (see also Section 4 below).<sup>10</sup> For example, empirical findings confirm that the precise definition of price stability, or the announcement of an inflation target, both lowers inflation expectations and helps to anchor them at levels consistent with the central bank's definition of price stability (see Johnson 2002; Levin et al. 2004). Moreover, the quantification of the objective also reduces the sensitivity of inflation expectations to past inflation and, at the same time, to macroeconomic news (Gürkaynak et al. 2006).

Beyond the public announcement of a central bank's objective, openness about the monetary policy strategy that a central bank pursues also

supports the markets' general understanding of the workings of monetary policy, i.e. the systematic response of monetary policy to changing economic developments. Firstly, this requires transparency about the set of economic indicators that the central bank uses in its regular assessment of the monetary policy stance. Financial markets must be clear about what economic, financial and monetary data the central bank looks at if they want to anticipate the future course of monetary policy. Only with a clear understanding of what matters for monetary policy and, possibly even more importantly, what does not matter, will financial market participants be able to adequately form their expectations about future monetary policy decisions as a response to economic news.<sup>11</sup> Secondly, central banks should disclose how monetary policy will typically react to developments in these indicators in the face of risks to the achievement of the central bank's objective. For example, the ECB has provided an exhaustive account of how it assesses risks to price stability in the framework of its two-pillar monetary policy strategy (ECB 2004). Thirdly, central banks must be open about how monetary policy affects the economy, i.e. the transmission mechanism of monetary policy and how it affects the systematic conduct of monetary policy. This includes the publication of

10 In cross-country analyses, it has also been found that the existence of a quantified objective has a measurable impact on actual inflation outcomes. In that regard, it is primarily the quantification of the objective that matters, more than its exact form. While quantified monetary or exchange rate objectives also tend to lower actual inflation, the largest effects were found for central banks that announced a precise definition of price stability (Fatas et al. 2007).

11 Gerlach (2004) and Rosa and Verga (2005) examined official ECB publications to identify the set of economic and monetary variables that the ECB seems to consider relevant for its policy decisions. Gerlach, for instance, concluded that output gaps are likely to play no decisive role in actual interest rate settings of the ECB, though they may be highly significant in empirical reaction functions, because they are not mentioned in the Editorials of the ECB's Monthly Bulletin. By contrast, he finds that measures of economic sentiment or confidence appear to play an important role as they are both frequently referred to in the Editorials and found to be statistically more significant than other measures of real economic activity.



macroeconomic models that underlie the in-house analysis,<sup>12</sup> but also requires a central bank to explain the limits of its mandate and abilities to the public so as to avoid raising false expectations that result in a loss of credibility (see also Issing 2005). For example, given the long and variable lags of monetary policy, the central bank can control inflation only in the medium to longer term and cannot offset short-term changes in the inflation rate that are caused by more volatile components of the price index (e.g. energy and food prices). A precise and consistent central bank strategy will minimise the sensitivity of expectations to short-term shocks and, more generally, increase monetary policy predictability by avoiding raising false expectations from the outset.

### 3.2.2 TRANSPARENCY REGARDING THE MONETARY POLICY STANCE

In an environment of incomplete information about the state of the economy and how it functions, genuine understanding of the central bank's strategy and objective is a necessary, albeit insufficient, condition for market participants to form pertinent expectations regarding the future course of monetary policy. Discrepancies between the expectations of the private sector and those of the central bank may emerge at any point in time because of differences in the interpretation and assessment of the state of the economy and the associated policy reactions.

Central banks therefore make considerable efforts to explain the economic rationale underlying monetary policy decisions by providing detailed and comprehensive analyses of the current economic and monetary conditions and their conditional expectations of the most likely evolution of the economy in the future. In doing so, the central bank can help the public interpret new developments in key economic variables, such as aggregate demand, inflation or money growth, and allow markets to react accurately to these developments. For instance, based on an analysis of the Editorials of the ECB's Monthly Bulletin, Gerlach (2004) found that the Governing Council's interest

rate decisions can be systematically tied to its assessment of economic conditions. Hence, based on such explanations, observers can continuously refine their understanding of the systematic behaviour of monetary policy and will be in a position to infer the central bank's inclination of future policy changes from its regular and consistent discussion on the economic outlook, resulting in a high level of short and longer-term predictability.

One aspect of such communication on the economic outlook, namely the central bank's forecast on key economic indicators, seems particularly relevant with respect to the predictability of monetary policy. Given the forward-looking nature of monetary policy, virtually all central banks generate forecasts on key economic variables (such as inflation and economic activity) which enter into their assessment of the monetary policy stance.<sup>13</sup> Publishing these forecasts provides the public with additional information on the central bank's assessment of the potential future course of monetary policy.

An interesting dimension of these forecasts relates to the inherent assumptions about the future path of monetary policy. Macroeconomic forecasts are based on a set of underlying technical assumptions, including the assumption about future monetary policy. In some central banks projections are produced on the assumption of unchanged short-term interest

<sup>12</sup> With Fagan et al. (2001), the ECB has published a detailed account of its Area-Wide Model (AWM), which is used to deliver input into the policy debate, in January 2001. Importantly, also the data underlying the model have been published. Other models in regular use, such as the components of the ESCB multi-country model, estimated DSGE models for the euro area and short-term forecasting tools have also been presented to the public (see, for example, Willman and Estrada (2002), Coenen and Wieland (2005), Smets and Wouters (2003) and Benalal et al (2004)). Similarly, the US Federal Reserve has published a complete description of its main macroeconomic model (Brayton and Tinsley 1996) as well as a Working Paper that delivers an in-depth description of the evolution of macroeconomic models used in-house (Brayton et. al 1997).

<sup>13</sup> Central banks differ as regards whom carries responsibility for the forecast. While in most inflation targeting countries the Board or the Governor assumes responsibility, in others, most notably the E(S)CB, projections are produced by staff.



rates in order to best inform policy-makers about what could happen if policy rates remained unchanged. Given that this assumption is most likely not to reflect optimal future monetary policy, it should be clear that the forecast will not, in general, be the best predictor of future outcomes, in particular over longer time periods.<sup>14</sup> A number of central banks, among them the ECB and the Bank of England, have therefore decided to condition their forecasts on an interest rate path based on market expectations of future interest rates as derived, for example, from the yield curve. Under the assumption that the policy rate evolves according to market expectations, if the central bank's projections for inflation deviate significantly from the monetary authority's objective, market participants will be in a position to review the implications for their expectations accordingly.<sup>15</sup> Finally, a few central banks, namely the Reserve Bank of New Zealand, Norges Bank and more recently Sveriges Riksbank, base their forecasts on their own projections of the future path of short-term interest rates, and release these projections to the public (see Chart 4). While, at first glance, this method may seem to provide the most precise guidance to market participants about the central bank's views on the likely future course of monetary policy and, at the same time, reduces the complexity of explaining the process of monetary policy-making (see also Woodford 2005), it could also entail the greatest risks for central banks in various respects.<sup>16</sup> First, the publication of the future path of policy rates poses particular challenges in making the conditionality on the projected evolution of the state of the economy understood; otherwise,

14 Blinder (2002) argues that the "no change" assumption would be the preferred solution and is likely to reveal the need for an adjustment of policy. However, Blinder acknowledges that this assumption will lead to inconsistencies in the forecast, especially as regards long-term interest rates.

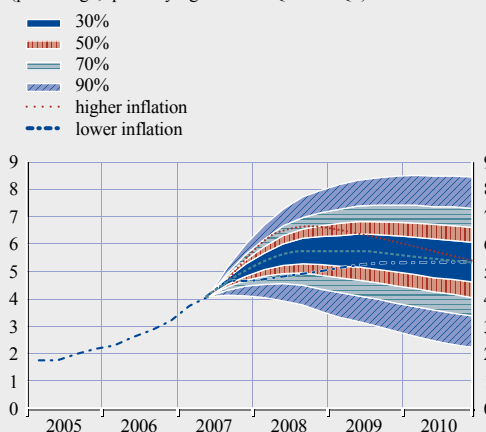
15 It is noteworthy that central bank do not commit on using the interest rate path suggested by market expectations after all. If this were the case, Bernanke and Woodford (1997) have shown that expectations will then become self-fulfilling.

16 Mishkin (2004) claims that "except in exceptional deflationary circumstances like the one Japan has experienced, announcement of a policy path does not have much to recommend it."

**Chart 4 Future path of short-term interest rates: some examples**

**a) Key policy rate in the baseline scenario and in the alternatives with higher and lower inflation**

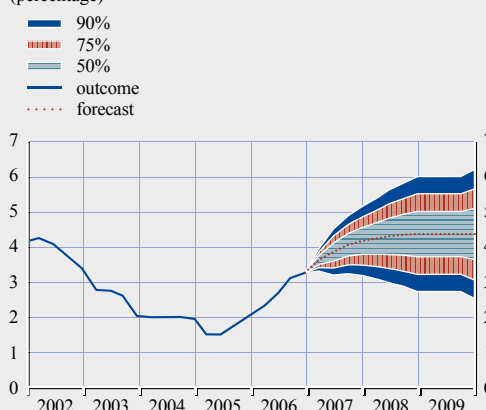
(percentage; quarterly figures 2005Q1-2010Q4)



Source: Norges Bank, Monetary Policy Report, February 2007.

**b) Reporate with uncertainty bands quarterly averages**

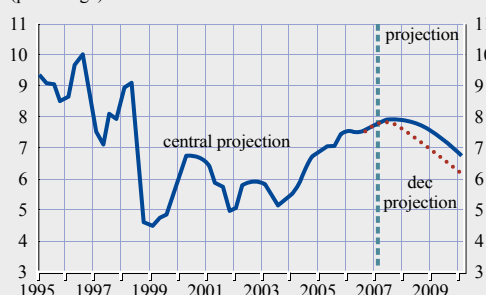
(percentage)



Source: Sveriges Riksbank, Monetary Policy Report, February 2007.

**c) 90-day interest rates**

(percentage)



Source: Reserve Bank of New Zealand, Monetary Policy Statement, March 2007.

there is a risk that it may be misinterpreted as a quasi-promise or a fixed commitment to this path, raising false expectations and resulting in disorderly adjustments of interest rate expectations. Second, the central bank may crowd out the important diversity of market views on the likely future course of monetary policy and aggravate the risks of herding. This may happen if financial market participants attach unreasonably high importance to the central bank's forecasts relative to private judgements.<sup>17</sup> Finally, the central bank may lose credibility over time if its forecasts repeatedly turn out to be different from the subsequent actual path of interest rates.

Indeed, while only very few central banks have embarked on announcing an explicit numerical path for the future policy rate, a number of other central banks, among them the ECB, the Federal Reserve and the Bank of Japan, have occasionally conveyed qualitative information through official statements, regular reports or public speeches about the future path of the policy rate. Qualitative guidance has been used rather flexibly in the past among central banks, both in terms of the frequency of the announcements and in the degree of precision of the policy inclination, as well as with regard to the relevant time horizon of the indications. On the one side, central banks aim to increase the short-term predictability of monetary policy by providing indications on policy inclinations in the run-up to monetary policy decisions. A central bank thereby reduces uncertainty among market participants and can help to curb interest rate volatility. For example, the ECB at times signals an impending policy decision through the flexible use of implicit forward language in its regular economic and monetary assessment, while avoiding any kind of pre-commitment with regard to future policy decisions. The Federal Reserve has issued explicit 'bias' or 'balance of risks' statements in post-meeting statements to indicate the conditional likely future direction of monetary policy given the balance of risks to non-inflationary growth. Similarly, after an extended period of unchanged interest rates, in 2006 the Bank of Japan

announced that it will provide markets with forward guidance on its "thinking on the conduct of monetary policy for the immediate future" (Fukui 2006). On the other hand, some central banks have enhanced the predictability of the medium-term path of future policy rates through the implicit use of forward-looking language when economic circumstances are unusual. For instance, at the end of 2003, the Bank of England signalled that, all things being equal, interest rates could be expected to rise gradually over the following months as this followed a prolonged period in which interest rates had been in decline and the MPC wanted consumers to be aware that economic conditions were changing (see Bank of England 2003). In the same way, the Federal Reserve announced in its August 2003 statement that it "believes that policy accommodation can be maintained for a considerable period" at a time when risks to inflation in the United States became undesirably low. Likewise, in order to address the unusual circumstances of deflation, the Bank of Japan announced in April 1999 its intention to keep the call rate at zero "until deflationary concerns are dispelled". It is important to stress that regardless of the approach taken to forward guidance, all central banks continuously stress the conditionality of such statements to ensure that they maintain the flexibility to react to changing circumstances without loss of credibility, and to avoid that economic agents take decisions under a misguided impression of certainty about the future path of interest rates.<sup>18</sup>

### 3.3 HOW CAN TRANSPARENCY IMPROVE PREDICTABILITY?

Transparency means more than simply releasing information, as this does not by itself translate into a better understanding of monetary policy. For transparency to have a positive impact on

17 This could happen if, for instance, the central bank projections outperform private forecasts (e.g. Romer and Romer 2000), or if market participants take the central bank projections as a focal point for their own expectations (Morris and Shin 2002).

18 In Kohn's (2005) words: "We need to be particularly careful that people understand how limited our knowledge actually is – the uncertainty and conditionality around any statement we make about future developments."

predictability, empirical studies have shown that not only does it matter *what* type of information central banks publish, but also *how* this information is communicated to the general public and to financial markets in particular.

If monetary policy decisions are taken by a committee, an issue arises as to whether the committee members should represent their personal or the consensus view about the monetary policy stance in the public. This is likely to have repercussions on the predictability of monetary policy. For instance, a committee that informs the public about its different views might enhance predictability if this allows the public to better understand the flow of the discussion and the effect this has on decision-making.<sup>19</sup> On the other hand, releasing dispersed views raises the “cacophony issue” (Blinder 2007), in the sense that the clarity of the message conveyed might suffer, leading to a loss of predictability. In that regard, Ehrmann and Fratzscher (2005 and 2007b) show that, on the one hand, a higher degree of communication dispersion among committee members about the conduct of monetary policy lessens the ability of financial markets to anticipate future monetary policy decisions and raises the degree of uncertainty. They found this to hold true for the Bank of England, the ECB and the Federal Reserve. On the other hand, they find that communicating the risks and diversity of views on the committee surrounding the *economic outlook* enhances the financial markets’ ability to anticipate the future path of interest rates, albeit only for the Federal Reserve.

In a similar vein, there is evidence that financial markets react more to communication by the entire committee than to statements by individual committee members. In the latter category, communication by the chairman is often found to be the most influential. Reeves and Sawicki (2007) find that markets react more to collective forms of communication by the Bank of England’s MPC, such as the MPC minutes and the Inflation Report. Reinhart and Sack (2006) also show that FOMC statements are more influential than speeches by FOMC members individually. Furthermore, statements

by the FOMC Chairman are moving financial markets more than those of all other FOMC members (Ehrmann and Fratzscher 2007b). Indisputably, whether a committee chooses to speak with one voice or individually is largely dependent on the underlying decision-making process in the respective committees. Decisions that are taken in a highly collegial manner are likely to be presented uniformly and vice versa.

This discussion stresses that central banks can, at times, face a trade-off between the amount and the clarity of communication, suggesting that more communication does not necessarily enhance transparency (ECB 2002). It is important that a central bank organises and presents the information available to it in a structured manner and maximises its efforts to convey messages with the highest degree of clarity (Winkler 2000; Blinder 2002). The need for clarity largely stems from the sources of information asymmetry discussed above that may drive a wedge between the understanding of the public and the central bank. For example, the same piece of information can be interpreted differently by, say, market participants than by policy-makers. Given that financial market participants react almost in real time to central bank communication, they may act before ambiguities or miscommunication can be corrected by the monetary authority, resulting in unnecessary market reactions and financial assets being temporarily mispriced. Moreover, the information disseminated by the central bank can also be interpreted differently among market participants if the communication is ambiguous. In this case, the risk exists that the “common knowledge” that emerges is affected by inconsistencies in the policy message as perceived by different market participants and reflects rather the “lowest common denominator” found among market participants than the central bank’s view (Morris and Shin 2007).<sup>20</sup> A central bank will therefore only

19 Blinder (2002) argues for instance that “multiple voices are welcome because they help to reveal the underlying reality”.

20 As we will argue below, when a central bank relies on a myriad of speeches and other vehicles of public communication without aiming at a consistent message, common knowledge may also decrease.

succeed in achieving high levels of monetary policy predictability – in both the shorter and longer-term sense – if its communication is coherent and unambiguous.

In a similar vein, central banks need to strike a balance between the benefits of communicating in a timely manner and the potential cost of providing noisy or premature information such as data that are still prone to revisions. In that context, it has also to be borne in mind that at some point, excessive frequency of announcements risks generating more noise than signal (Malcolm and Stone 2004). When central banks communicate about issues on which they receive noisy signals themselves, such communication may coordinate the actions of financial market participants away from fundamentals, in the sense that they attach too much importance to the central bank's views, not taking into account that they reflect a noisy signal (Amato et al. 2002). Hence, central banks have to be careful in commenting upon early or provisional data releases. By contrast, timely information about issues on which the central bank has more precise signals (such as its own deliberations in the meetings of the decision-making committee) seems beneficial. For example, Reinhart and Sack (2006) show that the expedited release of the minutes of FOMC meetings has increased the magnitude of the average reaction of short and medium-term interest rates by 50% and 100% respectively. Reeves and Sawicki (2007) report similar results for the release of minutes by the Bank of England. The ECB's press conference, which provides a particularly timely explanation of its policy decisions (i.e. on the same day), is also a strong market mover (Brand et al. 2006, Ehrmann and Fratzscher 2007c). This suggests that delays in the release of information reduce its relevance.

Finally, policy-makers do not only need to consider how they talk, but also to whom they are speaking. The monetary authority needs to adapt its communication in terms of contents and complexity to its various audiences, for no single method will achieve predictability in all

domains. For example, financial market participants care first and foremost about precisely anticipating the exact timing and magnitude of the next monetary policy decisions. For the general public, however, this is of no or little importance. For them, monetary policy predictability is closely related to a central bank being credible in the longer term, e.g. in being successful in delivering price stability over an extended period and for monetary policy to serve as a reliable anchor for price and wage-setting. While central banks should therefore strive to be transparent among different audiences, and adapt their communication, it is at the same time important that their messages remain consistent.<sup>21</sup>

21 So far there is a lacuna in the empirical literature on the issue of how central banks communicate with the general public and the success of such communication.

## 4 HAVE CENTRAL BANKS BEEN PREDICTABLE?

In this section, we will discuss how measures of predictability can be obtained empirically and review the evidence on the degree to which central banks have been predictable in recent times. In doing so we shall continue to distinguish between measures of short-term and longer-term predictability.

### 4.1 THE DEGREE OF SHORT-TERM PREDICTABILITY

Most empirical studies available to date have focused on the notion of short-term predictability, given the ease with which it can be measured. This is most commonly done using changes in the prices of money market contracts around the time of monetary policy decisions, which can be interpreted as a measure of the “surprise” element contained in the announced policy decision (e.g. Krueger and Kuttner 1996; Poole and Rasche 2000; Kuttner 2001). In this context, unexpected changes in the policy rate or changes of a different magnitude to those anticipated – as well as unchanged policy rates when a change in the policy rate was expected – constitute a surprise. An alternative approach consists of the use of survey data. A number of institutions (e.g. Bloomberg, Reuters) poll financial market analysts in a short time window preceding monetary policy decisions about their expectations as regards the upcoming decision. The difference between the announced decision and the expectation can then be taken as a measure of monetary policy surprise.

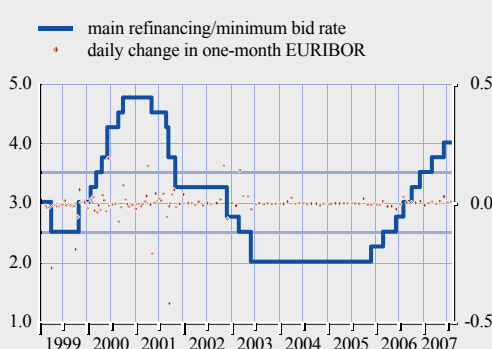
Despite using somewhat different approaches and data, studies on the short-term predictability of monetary policy decisions generally conclude that financial markets have recently been able to predict the monetary policy decisions of central banks rather well, and that predictability has increased over time. In a cross-country study, the Bank for International Settlements (2004, p. 77) provides compelling evidence that market forecast errors of monetary policy decisions have declined substantially in the last decade, compared with

the period between the late 1980s until the mid-1990s, and that this development has occurred simultaneously for a large number of central banks.<sup>22</sup> Focusing on the case of the United States, Lange et al. (2003) show a similar increase in predictability for FOMC decisions, and they relate this to changes in transparency. This is also in line with the more recent findings of Swanson (2006), according to whom, since the late 1980s, increases in Federal Reserve transparency have been instrumental to the ability of both US financial markets and the private sector to forecast the federal funds rate at horizons of several months. In a similar vein, Bell and Windle (2005) and Bernoth and von Hagen (2004) show that the predictability of monetary policy decisions of both the Bank of England and the ECB has improved since the late 1990s.

As an illustration of this finding, Chart 5 shows developments in the minimum bid rate for the main refinancing operations of the Eurosystem together with daily changes in the one-month EURIBOR. The dots close to zero (on the right-hand scale) correspond to days on which the absolute daily change in market rates was smaller

22 Haldane and Read (2000) find particularly large surprises for Italy and the United Kingdom in the early 1990s in comparison with those observed in Germany and the United States over the same time period.

**Chart 5 The minimum bid rate and daily changes in the one-month EURIBOR**



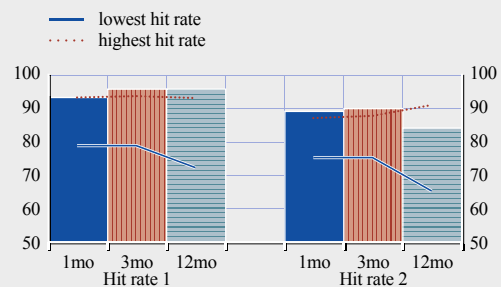
Sources: Reuters and ECB calculations.  
Notes: The green thin lines represent  $\pm 12.5$  basis points threshold values.



than 12.5 basis points, i.e. days on which the financial markets forecast the ECB's monetary policy decisions well.<sup>23</sup> The dots outside the threshold band reflect days on which financial markets were surprised by the decision. These results show that, out of a total of 144 days on which Governing Council meetings were held from 1999 to December 2007, financial markets were surprised – according to this definition – on only eight occasions. The greatest surprise occurred on 17 September 2001 when the ECB lowered interest rates at an unscheduled meeting in response to the exceptional events of 11 September 2001. The surprises are roughly evenly split between days on which the policy rate was changed and days on which it was not. All surprises that occurred on days on which there were no changes to policy rates were followed by a change in policy rates a month later, suggesting that these surprises were related to the precise timing of the decisions. It is also likely that some of the surprises were related to the size of the change in policy rates. This is particularly true for surprises that occurred within longer periods of a gradual tightening or loosening of policy rates (such as in early 2000 or early 2003 respectively). Finally, the greatest surprises occurred within the first three years of Monetary Union, indicating that the short-term predictability of the ECB may have increased over time.<sup>24</sup> This evidence may reflect the fact that financial markets have gradually learned about the ECB's monetary policy framework and communication strategy.

How does this compare with other central banks? As a summary measure of short-term predictability, “hit rates” can be calculated, defined as the number of days when the surprise element in a monetary policy decision was smaller than a given threshold value, divided by the number of all monetary policy decision days. Higher hit rates indicate a higher degree of predictability. Monetary policy decision days include all days with scheduled meetings of the decision-making bodies, as well as those with unscheduled meetings at which interest rate decisions were taken. In the case of the ECB, this includes the monthly meeting of the

**Chart 6 Hit rates of the ECB compared with other major central banks**



Sources: ECB calculations based on data from Reuters, the BIS and Global Financial Data.  
Notes: Bars indicate hit rates for the ECB and lines represent the range of hit rates for a group of major central banks, i.e. the Federal Reserve System of the United States, the Bank of England, the Bank of Canada, the Reserve Bank of Australia, the Swiss National Bank and the Reserve Bank of New Zealand. For details on the methodology, see Wilhelmssen and Zaghini (2005). The sample period is 1 January 1999 to 12 December 2005 (owing to the unavailability of data, the sample length for some assets in the international benchmark is slightly shorter). The underlying data are based on interbank rates of different maturities (EURIBOR for the euro area).

Governing Council at which monetary policy decisions are normally discussed. In the exercise considered in Chart 6 taken from the ECB (2006), two threshold values were used to calculate hit rates. They are defined as a 12.5 basis point daily change, corresponding to a 50% probability of a 25 basis point change in the policy interest rate (hit rate 1), and twice the normal volatility of daily changes (hit rate 2). While the threshold values and the corresponding hit rates are to some extent arbitrary, they are a useful tool for comparing short-term predictability across major central banks. The hit rates are calculated using money market interest rates for assets with three different maturities (one month, three months and twelve months). As shown in Chart 6, the hit rates for different maturities and threshold values indicate a high

<sup>23</sup> The choice of 12.5 basis points as a threshold value is rather arbitrary, but should give a good indication of the surprise element contained in each policy decision. Using a stricter definition would even strengthen the point made in Chart 5.

<sup>24</sup> Accordingly, relatively early papers on the predictability of the ECB's monetary policy occasionally find the ECB to be less predictable than other central banks (see, for example, Ross 2002), whereas more recent contributions tend to attribute a degree of predictability to the ECB that is internationally comparable, or even slightly better than that of other major central banks (see, for example, Ehrmann and Fratzscher 2007b or Barclays Capital 2007).



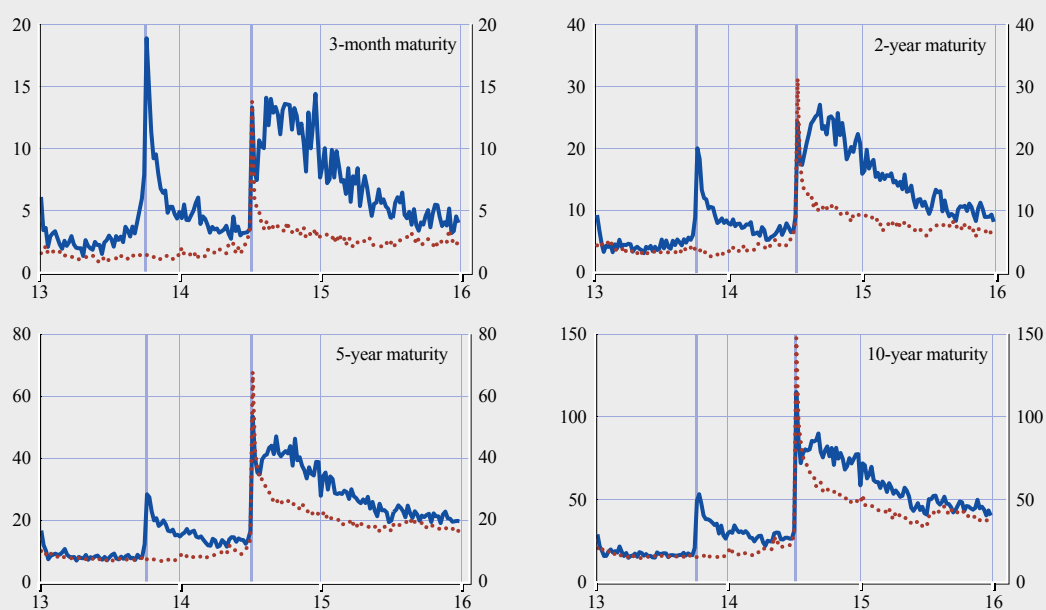
level of predictability for ECB decisions. The ECB hit rates are high in absolute terms, ranging from a low of 84% to a high of 96%, and in all cases are close to the upper bound of the range of hit rates for a group of major central banks. The two hit rates provide similar information, with hit rate 2 providing a somewhat more stringent test of short-term predictability. Wilhelmsen and Zaghini (2005) discuss differences across central banks according to these hit rates in more detail. They find that when considering the two hit rates and a number of different interest rate maturities, it is not possible to distinguish a single best-performing central bank in terms of predictability. Focusing on hit rate 1 and the one-month maturity, Wilhelmsen and Zaghini find that the euro area leads other major central banks in terms of predictability.<sup>25</sup> The euro area is closely followed by the United States and Australia, with Canada, the United Kingdom, Sweden and New Zealand trailing somewhat. The ranking of the industrialised

countries in the Wilhelmsen and Zaghini sample is largely unchanged when using hit rate 2. However, predictability improves substantially when hit rate 2 is used in countries where usual market volatility is high (e.g. Hungary, Poland, South Africa and Thailand). Other comparative studies (e.g. Perez-Quiros and Sicilia 2002 and Coppel and Connolly 2003) also show that short-term predictability is similar across major central banks and at relatively high levels, in the sense that there are only minor market reactions on the day of policy announcements.

While this evidence might not come as a surprise, an important point is whether these surprises are fundamental, i.e. whether a change or not in the policy rate was completely unexpected, or whether the surprises merely reflect market participants' erroneous

25 The results refer to the time period from January 1999 to April 2004.

**Chart 7 Average number of trades per minute, on press conference days and on Thursdays without Governing Council meetings, 1999-2006**



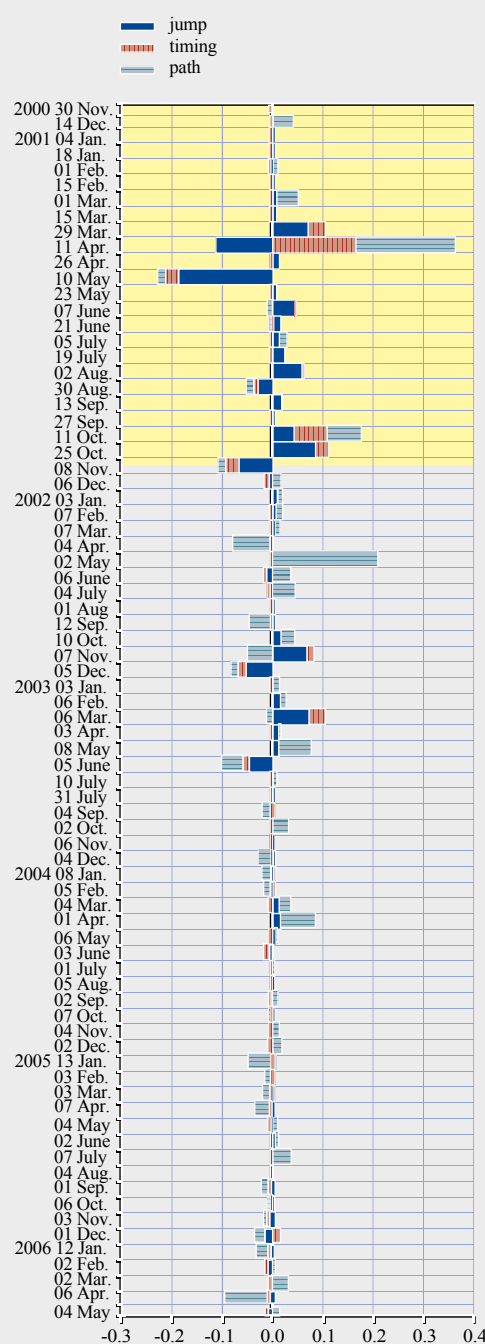
Sources: ECB calculations (see ECB (2007)).

Notes: Press conference days (thick line) versus Thursdays without Governing Council meetings (thin line). Vertical bars indicate 13:45, the time of the announcement of the monetary policy decision, and 14:30, the beginning of the ECB press conference. 3-month maturity: 3-month EURIBOR futures traded on LIFFE; 2-year maturity: German two-year Schatz futures traded on EUREX; 5-year maturity: German five-year Bobl futures traded on EUREX; 10-year maturity: German ten-year Bund futures traded on EUREX. The marked increase in trading activity at 14:30 on press conference Thursdays and other Thursdays is related to the opening of the US markets and the weekly release of data on US jobless claims.

expectations about the timing of a policy decision. Furthermore, because most central banks not only release a monetary policy decision on a given day but also provide explanations on the assessment or explicit forward guidance on the future course of monetary policy, an interest rate response on the day of a policy announcement could just as well be due to the news contained in the surrounding communication rather than the decision itself. The ECB's case provides an interesting opportunity to extract these differing components, as unlike with other central banks that release their decisions and explanatory statements simultaneously, there is a short time difference between the release of the decision (at 13:45 CET) and its explanation (starting at 14:30 CET). Chart 7 shows trading activity on a number of future markets in a time window ranging from 13:00 to 16:00 on the days of the monthly press conference (thick line) and on Thursdays (i.e. the same day of the week) without Governing Council meetings (thin line), expressed as averages over the time period 1999- 2006.<sup>26</sup> It is apparent that trading rises markedly in response to the announcement of the monetary policy decision at 13:45, but also during the time window of the press conference, i.e. in the time after 14:30. This chart gives a first indication that both the announcement of the decision and the surrounding communication provide news to financial markets.

Chart 8, taken from Brand et al. (2006), provides a decomposition of the impact of policy announcements and communication by the ECB. The first component of the decomposition relates to unexpected changes in policy interest rates (which can be further decomposed to news about the size (here labelled jump) and timing of changes in policy interest rates) measured during a small time window around the announcement of the policy decision. The second component relates to changes in expectations about the path of monetary policy, measured during a time window around the

**Chart 8 Decomposition of changes in the money market yield curve on governing council meeting days**



Source: Brand et al. (2006).

Note: The chart shows extracted jump, timing and path news relating to different, non-overlapping time windows. Jump and timing news are measured during a decision window spanning from 13:35 to 14:05, whereas path news is measured during a communication window spanning 14:20-15:50. Shaded areas indicate fortnightly meeting frequency, except for the 30 August 2001 meeting where four weeks elapsed between meetings.

<sup>26</sup> For related evidence, see Andersson (2007).

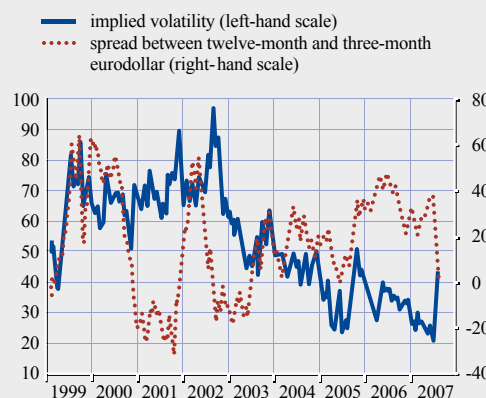
detailed communication of the policy decision at the ensuing press conference. The two time periods do not overlap. Therefore, changes in forward rates that are used to measure news during the press conference can only be due to communication news and cannot be contaminated by news relating to the announcement of the policy decision. The chart reconfirms that there has been not only a reduction in market reactions on Governing Council days, but that the small remaining reactions relate much less to the surprise component for any given decision, particularly most recently, and much more to the surrounding communication and its implications for the future path of interest rates.<sup>27</sup>

Beyond the surprise component contained in a given monetary policy decision, predictability of monetary policy has another dimension that we have not yet discussed. The response of interest rates provides interesting insights about the degree to which a “representative” financial market participant has been surprised by a given decision, yet does not tell us anything about the disagreement among participants. There are two ways to measure such uncertainty: by means of implied volatility derived from options on futures contracts on money market interest rates or by means of the disagreement observed in the above-mentioned surveys.

Chart 9 depicts the evolution of implied volatility for the euro area.<sup>28</sup> Given appropriate assumptions, implied volatility is normally calculated using option pricing models to obtain an estimate of the expected dispersion of future changes in short-term interest rates measured in percentages per annum. However, this direct estimate can hide very different levels of volatility in the futures interest rates, as it depends on the level of the implied interest rate itself. This is addressed by weighting the implied volatility, measured in percentages per annum, against the level of the implied interest rate. For instance, a value of implied volatility equal to 20% is equivalent to an annualised expected deviation of 40 basis points in interest rate changes, if the interest rate implied by the

**Chart 9 Euro area volatility with six months to maturity**

(basis points; ten-day moving average)



Sources: Bloomberg and ECB calculations.

futures rate is 2%. Chart 9 uses a derivation of a constant maturity measure, obtained on the basis of an interpolation of an implied volatility term curve weighted with a corresponding measure of the implied interest rate. The implied volatility with six months to maturity as derived from EURIBOR futures was, on average, 52 basis points in the period from March 1999 to August 2007. However, it is easily recognisable from the chart that implied volatility has fallen drastically from relatively high levels at the end of 2002 to comparably lower values, until the most recent increase in August 2007 which was due to turbulences on international financial markets. This shift in the level of implied volatility might support the view that the ECB may have become more predictable over time, while, at the same time, this decline may have also been affected by the underlying macroeconomic environment.

Looking at the evidence from survey results to gauge uncertainty and differences of opinion amongst financial market participants, Berger et al. (2006a, 2006b) show that the assumption of a representative financial market participant

<sup>27</sup> The same applies to the case of the Federal Reserve, see Gürkaynak et al. (2005a).

<sup>28</sup> We are grateful to R. Pilegaard in the ECB for providing us with the chart.

is unrealistic. The differences in forecasting performance are sizable, with the best 10% outperforming the worst 10% of forecasters by an average of 5 to 10 basis points in the United States, and by 8 basis points in the euro area. There are a number of patterns that affect the forecasting performance of agents. In addition to skill, geography appears to be an important factor. For instance, forecasters of ECB and Federal Reserve decisions are affected by their local macroeconomic environment. In particular, there is evidence that forecasters located in regions which experience more idiosyncratic economic conditions perform worse in anticipating monetary policy.

#### 4.2 THE DEGREE OF LONGER-TERM PREDICTABILITY

While a number of measures of short-term predictability are currently available, measuring a central bank's longer-term predictability is inherently more complex. As defined in Section 2, longer-term predictability can be regarded as the public's general understanding of the overall process of monetary policy making, resulting in the ability to anticipate the broader future direction of monetary policy. This would suggest that measuring a central bank's longer-term predictability ultimately translates into the measurement of how well the public has understood the central bank's objectives, its systematic reaction to changing economic circumstances and – more generally – its economic thinking.

While longer-term predictability is inherently difficult to measure and observe, possible proxies may nevertheless be defined along the following dimensions.<sup>29</sup> First, the public should be in a position to infer the central bank's objective, and this objective should be credible. The extent to which this is the case can be measured, for example, by means of long-term inflation expectations as extracted from surveys. These should be stable and anchored at levels consistent with the central bank's announced objective. A second proxy is the extent to which financial markets price long-

term inflation expectations (see Box 2). Again, these should reflect the central bank's objective and be stable (implying, for instance, that they should be unresponsive to central bank communication or other news – as opposed to short-term inflation expectations, which should adjust in response to relevant news). Finally, a full understanding of the monetary policy strategy would also ensure that market participants are in a position to interpret new economic data releases in line with the view of the central bank, thus increasing the responsiveness of affected financial asset prices as a result of higher longer-term predictability (see also King 2000). However, this aspect is inherently difficult to measure.

Turning to the first point, there is strong empirical evidence from survey data that inflation expectations for all major central banks are indeed well-anchored at levels consistent with their objectives.<sup>30</sup> For instance, long-term inflation expectations (six to ten years' ahead) for the euro area, as compiled by Consensus Economics Forecast, have remained in a range between 1.7% and 2% since the introduction of the euro in 1999.<sup>31</sup> These expectations are very close to the ECB's definition of price stability of inflation being “below, but close to 2%” and confirm its credibility and determination to achieve its objective in the medium to long run. An important factor in achieving this credibility clearly has been the fact that actual inflation outcomes have been consistent with the ECB's definition of price stability. Likewise, long-term inflation expectations for the United Kingdom have been between 1.8% and 2.1% since October 2004, the first survey Consensus Economics Forecast conducted after the Bank of England had changed its inflation target to 2% in January 2004.<sup>32</sup> Similarly, in Sweden and

29 For a more ECB-specific reference, please refer to “The monetary policy of the ECB” (second edition, 2004).

30 Evidently, this assessment can only be made for central banks that have quantified their objective in one way or another. See also Castelnuovo et al. (2003) for a similar exercise.

31 The last observation refers to October 2007.

32 The April 2004 forecast round included expectations for the Retail price index, although this was no longer the reference index following the change in the Bank of England's mandate.

Canada, both countries in which the national monetary authorities have followed an explicit inflation target of 2% for a considerable period of time, inflation expectations have been solidly anchored at 2% for around ten years. For the United States, which has not defined its inflation objective in precise quantitative terms, long-term inflation expectations have gradually gone down from 2.7% in early 2000 to 2.1% now. Overall, this solid, broad-based anchoring of long-term inflation expectations seems even more impressive when seen against the background of the recent surge in oil prices that has been in evidence since about 2002. Trehan and Tjosvold (2006) found that this increase in oil prices does not appear to have led to a noticeable jump in inflation expectations in the United States, United Kingdom and Canada, contrary to their reaction in the 1970s. It seems likely that this development can, at least in part, be attributed to an increase in the level of longer-term predictability of monetary policy.

Similarly, the extent to which long-term inflation expectations react to fluctuations in current inflation provides another insight into how well the central bank's objective is taken on board by market participants and the public at large. In theory, if the objective is credible and well-understood, long-term inflation expectations should be decoupled from the developments in current inflation. The Deutsche Bundesbank (2006) shows that long-term inflation expectations have stabilised at very low levels for a large number of countries, in most cases even more so than actual inflation, suggesting that even if inflation fluctuates at current periods, private agents tend to adjust their long-term inflation expectations by very little. Moreover, they show that over the last years the link between long-term and short-term inflation expectations has broken down, and, contrary to what was observed in earlier periods, there is no statistically significant relationship between the two any longer. This suggests that long-term inflation expectations have stabilised across countries to an impressive and unprecedented degree.

This pattern is related to the transparency and institutional independence of central banks. Compared with the Bundesbank's study, which analyses the time period from 1999-2006, Levin et al. (2004) show that there is a significant correlation between private-sector long-run inflation forecasts and lagged inflation for a number of industrial economies over the period 1994-2003. Interestingly, for that sample, this correlation is largely absent for countries that introduced explicitly quantified inflation objectives, but not for the others. This finding suggests that inflation expectations had not been entirely anchored in some countries, but were instead subject to adaptive learning. Further supporting evidence in this direction is provided by studies analysing the anchoredness of long-term inflation expectations as derived from financial data. Kliesen and Schmid (2004) and Gürkaynak et al. (2005b) show that the long-term inflation compensation demanded by US financial market participants is responsive to macroeconomic news. This is in stark contrast to findings for the United Kingdom with an independent Bank of England, and for Sweden (Gürkaynak et al. 2006), as well as for the euro area (Beechey et al. 2007; Ehrmann et al. 2007), where inflation expectations as derived from financial markets are well-anchored and are generally unresponsive to macroeconomic news.

### INDICATORS OF LONGER-TERM INFLATION EXPECTATIONS IN THE EURO AREA

Alongside more traditional survey-based methods of longer-term inflation expectations, recent years have witnessed increasingly important evidence of break-even inflation rates (BEIR) among sources of information on inflation expectations for a central bank. This box briefly reviews such main sources for the euro area, flagging elements of caution when interpreting these data for monetary policy purposes.

#### BEIR<sup>1</sup>

Market participants' long-term inflation expectations can be extracted from long-term bonds indexed to an inflation rate by taking the difference between the nominal yield on a standard bond and the real yield on the inflation-indexed bond (by the same issuer and, as far as possible, with the same maturity). Such a measure is commonly referred to as the BEIR because it provides an estimate of the level of expected inflation at which, under certain assumptions, an investor would be indifferent as to which of the two types of bond to hold.

While references to BEIR measures are likely to become more frequent over time in line with the increase in available maturities and liquidity in the inflation-linked bond markets, it is important to stress that such measures remain an imperfect means of measuring inflation expectations.

The difference between nominal and index-linked bond yields may exist for several reasons. Firstly, part of the difference may be due to the existence of an inflation uncertainty risk premium, required by investors to hold long-maturity nominal bonds. It is natural to expect this inflation risk premium to rise with the maturity of the bond. Hence, the presence of an inflation uncertainty premium would imply that the BEIR is biased upwards. Secondly, as the liquidity of the index-linked bond is typically lower than that of the corresponding nominal bond, this may also lead to the presence of a liquidity premium, which in turn is likely to vary for the different maturities. A liquidity premium would therefore imply that the BEIR tends to be biased downwards. Thirdly, break-even inflation rates may sometimes change due to technical factors in the markets, which may have little to do with changes in inflation expectations. Furthermore, tax factors may also have an impact.

#### Survey-based measures

Survey measures of long-term expectations from private-sector professional forecasters are available from three sources: the ECB Survey of Professional Forecasters (SPF), Consensus Economics Forecast and the Euro Zone Barometer. The main advantage of survey measures is that they may be considered “pure” or direct measures of inflation expectations, in that they are not affected by various premia or by technical market factors. Among the survey measures, the SPF may be considered the most useful for the ECB in terms of considering monetary policy credibility, mainly because of the large panel of respondents and the opportunity to assess risks around the point forecast. However, Consensus Economics Forecast is equally useful given its longer time span (since 1989). However, one important limitation of survey measures is that they are only available on a quarterly basis at most.

<sup>1</sup> For more information on BEIR and inflation-linked bonds in particular, see also “*Inflation-linked bonds from a central bank perspective*” by Juan Angel Garcia and Adrian van Rixtel, ECB Occasional Paper Series, no 62, June 2007.



## 5 CONCLUSIONS

Over the last few decades central banks have gradually placed more emphasis on the transparency and predictability of their actions. Such developments have been inextricably linked to the parallel trend towards central bank independence and the corresponding need for greater accountability.

Against this background, in this paper we have reviewed the main conceptual issues relating to predictability and the role of transparency as one of its main determinants. Our intention has been to identify and assess how, and on which subjects, central banks should communicate so as to enhance the predictability of the monetary policy process. In this pursuit, we have made an important distinction between *short* (i.e. the ability of financial markets to anticipate the next interest rate decision by the central bank) and *longer-term* predictability – encompassing the ability of the private sector to understand the monetary policy objective(s) and systematic behaviour in reacting to different circumstances and contingencies – and arguing that this broader concept is ultimately the more meaningful from an economic perspective.

Predictability matters because central banks affect the economy as much through their influence on expectations as through any direct effect of monetary policy decisions on short-term interest rates. Policy-makers can raise their level of predictability by being transparent about their monetary policy strategy and providing in an open, clear and timely manner all relevant information on their objective(s), economic assessment and the rationale underlying their policy decisions. In this respect, a high level of short-term predictability should be regarded as the natural outcome of a central bank's consistent pursuit of its monetary policy strategy combined with credible communication that supports the understanding of market participants and the general public.

Transparency by itself is insufficient to ensure a lasting impact on the formation of expectations,

and hence on predictability, by financial market participants. Guiding interest rate expectations in fact requires not only forward-looking communication, but also consistency between words and deeds and a track record of monetary policy decisions that supports the central bank's credibility. Moreover, transparency means more than simply releasing information, as this does not, on its own, translate into a better understanding of monetary policy. For transparency to have a positive impact on predictability, we have shown that it does not only matter *what* type of information central banks publish, but also *how* this information is communicated to the general public and financial markets in particular. We have argued that those central banks which communicate in a collegial, timely and frequent manner, which adapt their communication to their audience and which manage to communicate clearly and unambiguously will be amongst those central banks whose monetary policy decisions are the most predictable.

Finally, measuring predictability is clearly not an easy task. Whilst it is clear that more effort needs to be devoted towards the empirical assessment of central banks' longer-term predictability, which is inherently more difficult to measure, the literature clearly shows that financial market participants have been increasingly able to correctly anticipate central banks' monetary policy decisions. Transparent monetary policies and improved communication efforts are likely to have played a significant role in bringing about this improvement.

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