ARTICLES

MONETARY POLICY "ACTIVISM"

Although there is no commonly accepted notion of monetary policy "activism", any meaningful assessment of "activism" should take into consideration both the determination with which a central bank tries to enact its statutory policy objective in the day-to-day conduct of monetary policy and the features of the macroeconomic environment in which the central bank operates. Indeed, the complexity of the macroeconomy and the uncertainty surrounding the economic outlook interact with the policy mandate and with the central bank's determination to fulfil it. Therefore, central banks which share the same degree of commitment to their objective and determination in pursuing it might nevertheless be observed to behave differently through the business cycle. In line with this view, this article argues that the strong anchoring of inflation expectations in the euro area and the degree of rigidity in the economy as well as the unfavourable mix of macroeconomic shocks that have hit the euro area are key to understanding the ECB's monetary policy conduct over the last eight years.

1 INTRODUCTION

Central banks constantly need to calibrate their monetary policy decisions to their assessment of the state of the economy, including the expected impact of their past policy impulses. Similarly, outside observers continuously make judgements about the appropriateness of the monetary authority's policy course and, in particular, the timeliness of its decisions. In this context, the vigour and timeliness, i.e. determination, with which the central bank takes action and with which it is perceived to do so, are related to but not fully dependant – at least as far as perceptions are concerned – on its success in achieving its policy objective. For example, despite the ECB's overall success in keeping inflation broadly aligned with its objective over the medium term, the degree of "activism" displayed in its monetary policy has been questioned at times, notably over the extended period of stable policy rates from June 2003 to December 2005.

This debate is partly a reflection of divergences in the assessment of the state of the economy and the appropriate monetary policy actions, but it also seems to have emerged from the lack of a common understanding of the meaning of "activism" and the overly simplistic notions that have sometimes been adopted for its assessment. This article reviews some notions of "activism" and argues that any meaningful assessment of the degree of "activism" should, as a minimum, make reference to both the determination with which a central bank tries to enact its statutory objective and the features of the macroeconomic environment in which the central bank operates.

The next section discusses some notions of "activism" and explains how the simplest definitions, based on the frequency and magnitude of policy changes over a given period, fail to account for the nature of economic shocks and structure of the economy. The third section discusses some problems associated with assessments of central bank "activism" based on empirical estimates of "monetary policy rules" or reaction functions. Section 4 illustrates how price flexibility or stickiness and inflation persistence may combine and interact with the credibility of central banks and the actual conduct of monetary policy, thereby also influencing its pattern. The fifth section provides evidence on the euro area: the anchoring of inflation expectations, price rigidity and the unfavourable mix of shocks that have hit the euro area are crucial elements for understanding the monetary policy behaviour of the ECB. The contribution of the ECB's monetary policy to the maintenance of price stability under these conditions is then discussed in the final part of Section 5. The final section concludes.

2 NOTIONS OF "ACTIVISM"

There is no common notion of "activism", and this is especially evident when comparing monetary policy patterns across central banks. One often referred to, but overly simplistic way of measuring "activism" is to compare the frequency and amplitude of policy moves over a period of time, as captured for instance by the volatility of the policy rate. According to such measures, the more frequent and larger the changes in the policy instrument are, the more "activist" a central bank is considered to be. For instance, the ECB has changed its policy rate (the rate on its main refinancing operations) 22 times since 1999. The easing cycle that started in 2001 saw a cumulative reduction in the policy rate of 275 basis points, accomplished in a sequence of seven moves. The ECB started to reverse that cycle in December 2005 and has since changed its policy rate in a sequence of five steps. Other economic areas, such as the United States, have recorded stronger policy actions over the same period in terms of the frequency and size of policy moves in both the easing and the tightening cycles (see Chart 1).

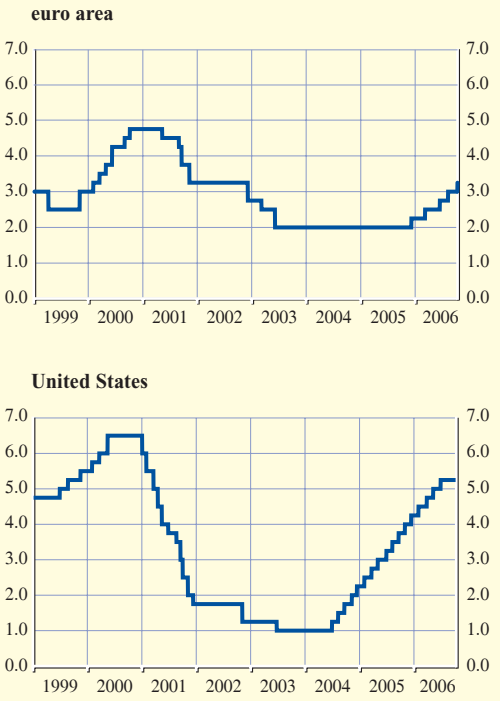
Does this evidence suggest that the ECB has not been sufficiently "active", in the sense of effective or efficient in pursuing its mandate, compared with other central banks? The answer to this question is in the negative. Any meaningful assessment of monetary policy "activism" should encompass at least the following two elements.

First of all, the assessment should be based on the vigour and timeliness of the decisions with which a central bank tries to enact its statutory policy objective in the day-to-day design of the monetary policy course. The legal authority, clarity and comprehensiveness of central bank statutes and the monetary policy strategy are principal determinants of the degree to which it is committed to achieving its objective.

Over the last few decades there has been a convergence of the statutes and objectives of central banks in a number of countries.

Chart 1 Monetary policy rates in the euro area and the United States

(percentages per annum)



Sources: ECB and the Federal Reserve System.
Note: For the euro area the policy rate refers to the rate on main refinancing operations until 28 June 2000 and to the minimum bid rate thereafter. For the United States the Federal Funds rate is shown. The latest observation is 11 October 2006.

Following a global wave of institutional reforms, monetary authorities in many countries have been made independent and are assigned a clear responsibility for providing a nominal anchor to the economy by maintaining low and stable inflation. Moreover, the central bank objective is more often articulated in a well-defined monetary policy strategy explicitly announced by the central bank. For these reasons, the determinants of monetary policy provided by central bank mandates and strategies tend to show broad similarities in many countries. But despite this convergence, central banks continue to follow rather different policy paths and there is not necessarily similarity in the conduct of monetary policy over the cycle. What are the reasons behind continued differences in policy patterns?

To answer this question, it is necessary to make reference to a second element: the features of the macroeconomic environment. The frequency of movements in policy rates is not a sufficient statistic for assessing the appropriateness of the degree of a central bank's "activism" when exogenous forces change the macroeconomic outlook. All other things being equal, an economy where inflation and economic activity move fast, i.e. because exogenous shocks are more potent and are propagated more swiftly, could require more action on the part of the central bank.

More refined measures of "activism" go at least one step further than a mere comparison of policy paths based on the frequency and size of interest rate changes. The simplest ones do so by estimating the strength of the statistical correlation between the policy instrument and a given set of key macroeconomic variables. The basis used by outside observers to assess the degree of policy "activism" in this context is then often the size of the response parameters in estimated monetary policy reaction functions.[1]

A conventional formulation of such a reaction function is the "Taylor-type" rule[2] of the following form:

$$i_t = \rho i_{t-1} + (1-\rho)\{r^* + \pi^* + \beta E_t(\pi_{t+h} - \pi^*) + \gamma(y_t - y_t^*)\} + \varepsilon_t \quad (1)$$

where i_t is the current short-term nominal interest rate. The time evolution of the interest rate is explained on the basis of three terms:

- The first is an inertial term, whereby the current interest rate is postulated to be influenced by its lagged value i_{t-1} with parameter ρ governing the degree to which the current rate depends on its past values. The possible explanations for the substantial degree of inertia which is often encountered in empirical estimates of central bank reaction functions are discussed in more detail in the box.
- The second term is given by the elements contained in the curly brackets and represents the level of the short-term interest rate to which the central bank – according to equation 1 – will bring the actual rate in the long run in response to the current economic conditions. This composite term features the sum of the long-run equilibrium value of the short-term real interest rate, r^*, the central bank's long-term inflation objective, π^*, and the indicators of inflationary pressure $(\pi_{t+h}-\pi^*)$ and $(y_t-y_t^*)$. In the absence of shocks with implications for inflation and output, $r^*+\pi^*$ gives the equilibrium nominal rate to which the central bank's policy rate will converge through time. In the face of shocks, however, the short-term rate will need to be targeted at a level which would be higher or lower than $r^*+\pi^*$ according to the central bank's reaction to deviations of expected inflation several periods in the future π_{t+h} from the central bank's objective π^* and to the deviation of current output y_t from its potential level y_t^*. Parameters β and γ, respectively, measure the strength of those reactions.
- Finally, the third term is given by ε_t, which represents the difference between the actual short-term interest rate and the systematic pattern of monetary policy conduct as captured by the other two terms of the rule.

According to those who view such reaction functions as a fair representation of a central bank's policy orientation in pursuing its objective and hence see the term ε_t as always negligible or simply "white noise", a central bank would qualify as relatively more "active" if a reaction function estimated upon its past policy conduct featured: (1) relatively larger reaction coefficients attached to $(\pi_{t+h}-\pi^*)$ and

1 For a more detailed discussion of monetary policy rules, including such reaction functions, see the article entitled "Issues related to monetary policy rules" in the October 2001 issue of the Monthly Bulletin.

2 This term derives from the seminal paper of John Taylor (1993), "Discretion versus policy rules in practice", Carnegie-Rochester Conference Series on Public Policy 39, pp. 195-214.

(y_t-y_t^*); and (2) a relatively smaller inertial coefficient attached to the lagged interest rate, which translates into a more expeditious process of adjustment of the actual nominal rate i_t towards its desired longer-run level.

While such a conclusion may be premature for the reasons detailed below, a "reaction function" approach to the analysis of monetary policy "activism" can usefully expose the fallacies to which simpler comparisons across central banks based on the frequency and amplitude of interest rate variations may lead. This is best illustrated by the hypothetical case of two central banks which have identical reaction functions in economies with similar economic structures, but which face very different economic shocks. The policy reaction function would prescribe frequent and forceful changes to the policy rate if the central bank in the first economy were to face predominantly "demand shocks", i.e. shocks resulting in persistent departures from trend growth and symmetric and enduring effects on output and inflation moving in the same direction. By contrast, the same reaction function would prescribe a different pattern in the second economy if it were to experience frequent "supply shocks", i.e. shocks that lead to sharp transitory movements in inflation followed – in the absence of countervailing monetary policy action – by smaller "second-round" effects and concomitant movements in real activity in the opposite direction to inflation. In such cases, due to the transitory nature of the initial inflation response, the central bank would "look through" the immediate disturbance and change policy only to the extent needed to offset the anticipated lasting effects of the shock on inflation in subsequent quarters.

In conclusion, while systematically inclined to respond to the same macroeconomic conditions in the same fashion – thus equally "active" – the two hypothetical central banks of this stylised example would be observed to change policy rates at different speeds and over different ranges. Notably, provided that inflation expectations are well anchored, the policy path chosen by the central bank facing predominantly "supply-side" shocks would be smoother and less volatile. The underlying reason would be unrelated to their strategies and the vigour and timeliness with which policy decisions are taken, and would depend instead on the different macroeconomic environments.

Box

THEORETICAL ARGUMENTS FOR INTEREST RATE SMOOTHING BY CENTRAL BANKS

Central banks are constantly receiving new information which affects their assessment of the state of the economy and the outlook. For many central banks, however, this does not lead to a policy rate pattern involving large jumps or frequent reversals. Policy rates are often moved in small steps and empirical studies find considerable evidence for inertial elements in the adjustment process. Economists have sought to find theoretical arguments to rationalise this apparent willingness on the part of central banks to smooth the path of the policy rate. This box provides an overview of the best-known explanations.

1. Learning processes

Brainard's (1967) classical result established that uncertainty about the true values of the parameters of the model economy should have the effect of attenuating the response of the policy instrument to shocks, as the central bank tries to minimise the variance of macroeconomic outcomes. The link between macroeconomic uncertainty and optimal monetary policy was also

explored by Sack (1998), along the lines of the Brainard attenuation result. In his model of the economy, the monetary policy-maker faces uncertainty regarding the effects of monetary policy actions, constraining optimal policy rate adjustments to the vicinity of the rate level at which the central bank is more confident about the outcome of its decisions. Policy rate movements provide new information on the parameters of the model, leading to further rate adjustments and thereby generating inertial monetary policy.[1]

2. Credibility losses

Closely related to the preceding argument, this traditional rationale for observed inertia in monetary policy was formalised by Ellis and Lowe (1997) in the context of asymmetric information between the central bank and the public. If the central bank has imperfect knowledge about the details of the model governing the economy and/or the public thinks that the central bank is not perfectly informed about current economic developments, frequent alterations in the path of policy rates could possibly cast some doubt on the central bank's ability to understand how the economy works. This point was also made by Williams (2003), who referred to the fact that the monetary authority may be willing to avoid policy rate "reversals" out of concerns that they may be misinterpreted as policy "mistakes" and, eventually, undermine the central bank's reputation for professionalism.[2]

3. Disruptions in the capital markets

Cukierman (1989) observed that standard loan contracts extended by commercial banks are characterised by long maturities and predetermined interest rates. However, standard deposit contracts habitually exhibit short-term maturities and, therefore, react quickly to nominal interest rate changes and unanticipated credit or money demand shocks. For this reason, interest rate inertia protects the banking system to some extent against negative shocks to cash flows on the banks' liability side. This mechanism could limit the risk of widespread bank insolvencies and it would help to prevent undue stress in financial markets resulting from monetary policy decisions. [3]

4. Overcoming the stabilisation bias

This argument has been developed by Woodford (2003). In a forward-looking environment, the monetary authority may be more successful in stabilising the economy by committing itself to adjusting the policy rate in an inertial manner. This commitment would strengthen the ability of the central bank to affect expectations of future interest rates and thereby to stabilise inflation and output more effectively. For example, let us assume that the economy is adversely affected by an inflationary shock. If agents anticipate a protracted policy rate increase as part of the central bank's reaction, expectations of persistently higher short-term rates in the future would boost the market rates on long-term securities, as these can be roughly thought of as averages

1 Brainard, W., (1967), "Uncertainty and the effectiveness of policy", American Economic Review, Papers and Proceedings 57, pp. 411-425. Sack, B., (1998), "Uncertainty, learning and gradual monetary policy", FEDS Working Paper 1998-34. Board of Governors of the Federal Reserve System.

2 Ellis, L., and P. Lowe (1997), "The smoothing of official interest rates", in P. Lowe (ed.) *Monetary and inflation targeting*, Reserve Bank of Australia. Williams, J. C., (2003), "Simple rules for monetary policy", Federal Reserve Bank of San Francisco Economic Review, pp. 1-12.

3 Cukierman, A., (1989), "Why does the Fed smooth interest rates?", Economic Policy Conference 14, pp. 111-157. See also Blinder, A. S., (2000), "Critical issues for modern major central bankers", in European Central Bank and Center for Financial Studies (eds.) *Modern monetary policy-making under uncertainty*, pp. 64-74.

of the short-term rates that are expected to prevail until these securities reach maturity. Since medium and long-term rates are regarded as more important determinants of the conditions at which the private sector can borrow to finance spending (Goodfriend, 1991; Tinsley, 1999), higher rates on instruments with longer maturities can be expected to exert a dampening impact on aggregate demand. As a consequence, inflation expectations would also be dampened and the inflationary effects of the initial perturbation would be mitigated by the absence of second-round effects. In other words, the inertial rule suppresses a temporary increase in inflation via two channels: an increase in the current policy rate and lower inflation expectations due to the rise in expected future policy rates. Consequently, a monetary policy able to implement an "optimal degree" of inertia would achieve a better trade-off between inflation stabilisation and output-gap stabilisation, as the need to make large adjustments in the policy rate would be reduced.[4]

5. The zero lower bound on nominal interest rates

Rotemberg and Woodford (1999) pointed out that, in a forward-looking framework, the zero bound on nominal rates generates additional incentives to keep the variance of policy rates low, especially in a low inflation environment. Nominal interest rate inertia would make it easier to deal with the zero bound problem because, as mentioned above, an inertial monetary policy would make relatively large shifts in the policy rate unnecessary in environments in which agents were sufficiently forward-looking. Reifschneider and Williams (2000) and Wolman (2005) built on this concept and found that, once the policy rate had reached its lower bound, a protracted inertial monetary policy could be counted upon to exert downward pressure on longer-term rates via the expectations theory of the term structure and could thus decisively mitigate the adverse effects of the zero lower bound of the short-term nominal rate.[5]

4 Woodford, M., (2003), "Interest and prices: Foundations of a theory of monetary policy", Princeton University Press. Goodfriend, M. S., (1991), "Interest rates and the conduct of monetary policy", Carnegie-Rochester Conference Series on Public Policy 34, pp. 7-30. Tinsley, P. A., (1999), "Short rate expectations, term premiums, and central bank use of derivatives to reduce policy uncertainty", FEDS Working Paper 1999-14. Board of Governors of the Federal Reserve System.

5 Rotemberg, J. J., and M. Woodford (1999), "Interest-rate rules in an estimated sticky price model", in J. B. Taylor (ed.) *Monetary policy rules*, pp. 57-119. University of Chicago Press. Reifschneider, D., and J. C. Williams (2000), "Three lessons for monetary policy in a low inflation era", Journal of Money, Credit and Banking 32, pp. 936-966. Wolman, A. L., (2005), "Real implications of the zero bound on nominal interest rates", Journal of Money, Credit and Banking 37, pp. 273-296.

3 LIMITATIONS OF REACTION FUNCTIONS AS EMPIRICAL MEASURES OF "ACTIVISM"

As mentioned in the previous section, estimated reaction functions are, in principle, a more sophisticated approach to uncovering the degree of "activism" with which a central bank reacts to the actual or expected deviation of economic developments from its objective. However, they suffer from three main shortcomings.

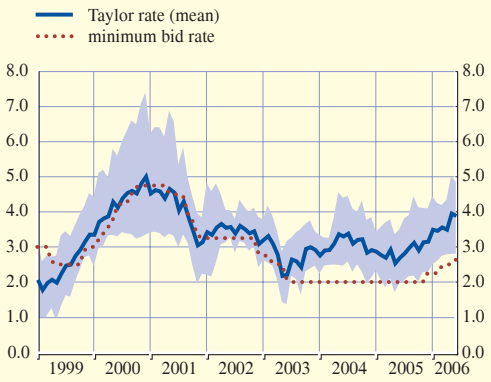
First, and most importantly, the determination and timeliness with which a central bank takes action to pursue its policy objective cannot generally be quantified in isolation from knowledge of the key structural forces and economic relationships that govern the functioning of the economy in which the central bank operates (see also Section 4). Central banks calibrate their policy decisions to the structural features that determine the transmission mechanism of exogenous disturbances and of monetary policy itself over time. As a consequence, the reaction coefficients estimated on past policy regularities reflect a complex convolution of the central bank's desired degree of "activism" and the structural conditions that prevail in the economy in which the central bank operates.

Second, and concomitantly, any stereotypical monetary policy reaction function – while sufficiently concise to be used as a pedagogical device to track monetary policy patterns and for modelling purposes – is an incomplete and unsatisfactory description of central banks' policy behaviour. In the case of the ECB, such empirical tools do not capture the core of its two-pillar strategy. This strategy is grounded on a comprehensive and state-contingent reconciliation of a host of indicators organised in a two-pronged assessment of the risks to price stability within different time frames. The economic analysis concentrates on the assessment of inflation developments over the short to medium run. Monetary analysis cross-checks the indications obtained from economic analysis on the basis of information extracted from low-frequency movements in monetary indicators. This cross-checking is instrumental in protecting policy from the risk that it might become dominated by the short-term influences exerted by excessively volatile and insufficiently reliable indicators. It is a key strategic element that underpins the ECB's medium-term orientation. This complex and thorough cross-checking cannot be compressed into a stable and mechanistic functional relationship linking the policy rate and a handful of macroeconomic indicators. As the ECB has repeatedly made clear in its real-time explanations of policy decisions, monetary policy emerges from a process of synthetic judgement which takes into account the economic contingencies of the euro area and the evolving nature of the structural economic relationships.

Third, estimates of the coefficients of conventional reaction functions are surrounded by a high degree of statistical uncertainty. Empirical estimates of reaction functions yield very different coefficient values depending on the exact specification of the equation. For example, the literature reports coefficients attached to inflationary pressure ranging from negative values or values close to zero to rather high estimates.[3] This uncertainty is further compounded by that surrounding the measurement of the macroeconomic indicators which feature in the reaction function. By way of illustration, Chart 2 provides a visual representation of the uncertainty surrounding the monetary policy prescriptions which one could derive from a standard calibration of a "Taylor rule" that attributes a weight of 1.5 to deviations of inflation from the central bank's objective and 0.5 to the deviation of output from potential. It does so by varying the statistical measure used for the output gap and inflation in the Taylor rule, and displays the resulting values for the short-term nominal

Chart 2 Monetary policy rates in the euro area prescribed by the Taylor rule

(percentages per annum)



Source: ECB.
Note: The shaded area presents the maximum and minimum values of the nominal interest rate implied by the Taylor rule using different statistical measures of the output gap and inflation. The solid line is the arithmetic mean of the rates. The computations use the standard parameter values of 1.5 for deviations of inflation from the central bank's objective and 0.5 for the output gap, as proposed in Taylor's original formulation. A constant term for the monetary policy rate, equal to the average value derived from a set of estimated Taylor-type rules for the period from January 1999 to March 2006, has been included. As discussed in the main text, this measure has conceptual limits due to the reduced-form estimation of the rule. Data are on a monthly frequency. Quarterly data are interpolated using a cubic spline. The latest observation is March 2006.

3 For such estimates, see among others Carstensen, K. (2006), "Estimating the ECB policy reaction function", German Economic Review 7, No 1, pp. 1-34; Gerdesmeier, D. and B. Roffia (2004), "Empirical estimates of reaction functions for the euro area", Swiss Journal of Economics and Statistics 140, No 1, pp. 37-66; Hayo, B. and B. Hofmann (2006), "Comparing monetary policy reaction functions: ECB vs. Bundesbank", Empirical Economics (forthcoming); Heinemann, F. and F. Hüfner (2004), "Is the view from the Eurotower purely European? - National Divergence and ECB Interest Rate Policy", Scottish Journal of Political Economy 51, No 4, pp. 544-558; Sauer, S. and J.-E. Sturm (2006), "Using Taylor rules to understand ECB monetary policy", German Economic Review (forthcoming).

interest rate in the form of a shaded range of values. The alternative measures used in the analysis comprise four different output gap indicators and three measures for inflation or inflation expectations often utilised in the economics literature.[4] From the graph it is evident that the choice of indicator to which monetary policy is postulated to react in the context of a Taylor-type rule affects the implied interest rate substantially. The maximum range of the predicted short-term nominal rates over the sample period is as wide as 400 basis points. Given this wide range, it is not surprising that the various specifications vary vastly in their ability to track actual monetary policy. In particular, some specifications imply interest rate prescriptions that are reasonably close to the actual policy rate of the ECB until mid-2003. However, the ECB's monetary policy then became more accommodative than would have been implied by the standard of most interest rates derived from a simple Taylor rule. This suggests that simple Taylor rules are generally an inadequate description of policy, i.e. the term ε_t in equation 1 cannot always be considered as negligible or simply "white noise" and may also reflect, for instance, deliberate intent on the part of the central bank.

The uncertainty surrounding these estimation results is not specific to the euro area. Numerous studies, based on longer sample periods, exist for the US Federal Reserve System. Point estimates of the parameters of the response to inflation and output are nevertheless found to vary substantially depending on the sample period and the underlying economic measures. For instance, the use of real-time or ex post measures of the output gap leads to substantially different interpretations of US monetary history.[5]

4 ECONOMIC STRUCTURES AND MONETARY POLICY

One key structural dimension which is rather consequential for the extent of central bank "activism" is the degree of flexibility or stickiness with which prices and wages react to shocks. Price-setters and wage negotiators, due to various frictions, may be more or less sluggish in processing economic news, including changes in the monetary policy stance, and in incorporating such news into actual prices and wages.

There are two major consequences of a slow price and wage adjustment mechanism. First, prices and wages reflect changes in fundamentals with considerable lags in economies where nominal frictions are significant. This increases the likelihood that the burden of the adjustment to the imbalances created by economic disturbances will induce undesirable fluctuations in output and employment. A more flexible economy could instead foster overall medium to long-term resilience to exogenous disturbances by transferring the larger share of the adjustment to re-equilibrating changes in prices and wages. Second, and consequently, nominal rigidity can affect the degree of inflation persistence, all other things being equal. Changes in cost conditions tend to be spread out over an extended period of time, as prices in a rigid economy catch up only slowly with changes in the underlying circumstances. Therefore, nominal rigidities tend to both soften and perpetuate the impact of a shock.

As a result of these two effects, stickiness in price adjustments strongly affects the transmission mechanism of monetary policy and the appropriate policy response to economic

4 Output gap measures include deviations of industrial production from a linear-quadratic trend and an HP-filtered trend, the deviation of GDP from an HP-filtered trend and the OECD output gap. Inflation measures are actual inflation and one-year ahead inflation expectations obtained from the Survey of Professional Forecasters and Consensus Economics. Interest rates are computed for all 12 combinations of these output gap and inflation measures.

5 See, among others, English, W. B., W. R. Nelson and B. P. Sack (2003), "Interpreting the significance of the lagged interest rate in estimated monetary policy rules", Contributions to Macroeconomics 3, article 5; Kozicki, S. (1999), "How useful are Taylor rules for monetary policy?", Federal Reserve Bank of Kansas City Economic Review 2, pp. 5-33; Orphanides, A. (2001), "Monetary policy rules based on real-time data", American Economic Review 91, pp. 964-985; Rudebusch, G. D. (2001), "Is the Fed too timid? Monetary policy in an uncertain world", Review of Economics and Statistics 83, pp. 203-217.

disturbances. As regards the transmission mechanism, greater price stickiness implies that a change in the nominal policy rate of a given size will have a stronger impact on the real rate, which ultimately is among the determinants of aggregate demand. For instance, in this environment, a given cut in the nominal policy rate – engineered in such a way as not to jeopardise the maintenance of price stability over the medium term – will at the same time provide a substantially higher degree of support to real economic activity than in a more flexible economy.

As regards the appropriate response to economic disturbances, provided that a central bank is highly credible and inflation expectations are well anchored around the central bank's quantitative definition of price stability – a caveat that will be addressed below – monetary policy may be better advised to adopt a steady posture and look through the short-term developments in inflation. The reason for this is that, in an economy characterised by significant nominal frictions, inflation would tend to be less reactive to a shock as price-setters would be slower in bringing economic news to bear on their decision-making. Furthermore, high central bank credibility implies that price-setters would anticipate that the central bank will ultimately drive inflation back to its pre-shock level. So, in spite of the presence of significant frictions, which would tend to slow down the process by which shocks drive inflation over time, inflation may tend overall to be less persistent and the shocks themselves may dissipate more quickly.

Under these circumstances, exceedingly aggressive reactions to short-term developments would risk introducing unnecessary volatility in the markets and in the economy. However, the seeming "patience", i.e. lower variance of policy rates and the associated divergence from prescriptions suggested by simple reaction functions, would not signal unjustified policy inertia, "passivity" or neglect of macroeconomic conditions. It would reflect careful calibration of the policy course to the structural peculiarities of the underlying economy, leading to a more moderate policy response.

However, this simple description of the features that monetary policy would display in response to shocks in a more rigid economy is insufficient to capture the challenges faced by a central bank in real-life situations. First, the central bank's response to shocks needs to take into consideration the presence of uncertainty regarding the functioning of the economy, in particular regarding the degree of nominal rigidities and inflation persistence. This requires the central bank to favour robustness in its actions, whereby monetary policy eschews any attempt to fine-tune economic developments and rather pursues the medium-term objective of maintaining price stability.

Second, the central bank would adopt a patient pattern of response to cost pull or push shocks only if it can be reasonably sure that inflation expectations will remain well anchored in the face of short-run variations of inflation. One could easily imagine scenarios where agents learn slowly and/or gradually about macroeconomic conditions, including the central bank's determination and timeliness in taking action to maintain price stability. In these instances, inflation expectations might become sensitive to transitory disturbances, as agents would tend to extrapolate current and recent developments into the future. In such a situation, price and wage rigidities might start interacting with dislodged inflation expectations to make the inflationary shock very persistent. If this were the case, then even a central bank operating in an environment with significant nominal frictions would have to react more – rather than less – vigorously to developments to defuse the risk that current and recent shocks might become entrenched in agents' inflation expectations.[6]

6 See Orphanides, A. and J. C. Williams (2002), "Imperfect knowledge, inflation expectations and monetary policy", in *The Inflation Targeting Debate*, B. Bernanke and M. Woodford (eds.), University of Chicago Press; Gaspar, V., F. Smets and D. Vestin (2006), "Adaptive learning, persistence and optimal monetary policy", Journal of the European Economic Association 4, pp. 376-385.

5 MACROECONOMIC ENVIRONMENT AND MONETARY POLICY IN THE EURO AREA

The discussion above has pointed out that monetary policy actions have to be carefully calibrated to the prevailing state of the economy and the outlook, as determined by the exogenous shocks that hit the economy from time to time and the structural channels through which those shocks are propagated, with a view to maintaining price stability over the medium term. Therefore, to understand monetary policy in the euro area, it is necessary to analyse the underlying macroeconomic disturbances that have affected the euro area in the recent past and the propagation mechanism of such disturbances through the economy over time. The degree of nominal rigidity and the anchoring of expectations deserve particular attention in this respect.

MACROECONOMIC SHOCKS

The euro area macroeconomic landscape has been mainly characterised by an unfavourable mix of shocks: notably, it has been predominantly hit by negative developments on the supply side. This unfavourable mix of shocks has been a distinct feature of the euro area rather than a global phenomenon. In the last ten years, this disparity seems to have grown even more pronounced, despite globalisation and a general shift towards closer international economic integration.[7] This is especially evident when comparing supply-side developments in the euro area and the United States over the stock market boom and bust spanning the past ten years.

In the euro area the stock market boom and bust went hand in hand with a steady decline in the trend growth of labour productivity, as measured by the growth rate of the ratio of GDP to hours worked. In turn, this has negatively affected the euro area's sustainable level of potential output. Despite significant uncertainty about the measurements, from a growth accounting perspective, the sharp decline in labour productivity that has occurred in the euro area may have been induced in broadly equal proportions by a reduction in capital deepening (i.e. the amount of capital endowed to each worker) and total factor productivity (i.e. the degree of efficiency in combining factors of production). In the United States, however, the strength in business investment that the stock market appreciation entailed – comparable in size to that experienced in the euro area – has brought about significant benefits for the supply side of the economy. The contribution to labour productivity growth arising from capital deepening doubled in the United States in the course of the 1990s. Subsequently – and despite the extraordinary drop in business investment that followed the market collapse in 2000 – it stabilised at the elevated levels it had reached at the turn of the millennium. Since then, capital deepening has been replaced as the main engine of output per hour growth by substantial advances in total factor productivity.[8]

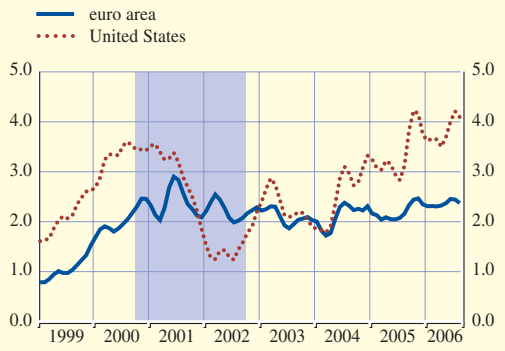
These opposite supply-side developments in the two economic areas have had significant implications for overall macroeconomic performance. In the euro area, the slowdown in total factor productivity has been an important determinant of the weak economic performance and has reinforced the impact of the shocks responsible for the downturn that occurred at the beginning of the new millennium, which

7 See, for instance, Stock, J., and M. Watson, "Has the business cycle changed? Evidence and explanations", paper presented at the Federal Reserve Bank of Kansas City symposium "Monetary Policy and Uncertainty", Jackson Hole, Wyoming, 28-30 August 2003.

8 Observed labour productivity growth in the euro area was on average 2.3% per year in the first half of the 1990s, 1.7% in the second half of the decade and 0.7% in the first few years of the new millennium (2001-2005). The contribution of capital deepening over these same periods was 1.0%, 0.5% and 0.5% respectively, and the contribution of total factor productivity was 1.2%, 1.2% and 0.3%, respectively. In the United States the dynamics were conversely positive: the contribution of capital deepening over these same periods was 0.6%, 1.1% and 1.1%, respectively and the contribution of total factor productivity was 0.5%, 1.0% and 1.9%, respectively. See G. Gomez-Salvador, A. Musso, M. Stocker and J. Turunen, "Labour productivity developments in the euro area", ECB Occasional Paper (forthcoming). See also Box 9 entitled "Developments in euro area productivity" in the March 2005 issue of the Monthly Bulletin and Box 6 entitled "A comparison of employment developments in the euro area and the United States since 1995" in the April issue of the Monthly Bulletin.

Chart 3 Consumer price inflation in the euro area and the United States

(annual percentage changes; monthly data)



Sources: ECB and BIS.
Note: The shaded area covers a two-year period marked by the decline of the S&P 500.

were largely of the same nature across the two currency areas. In the United States, by contrast, the favourable supply-side developments have partly compensated for these adverse forces.

The impact of the shocks at the beginning of the new millennium – which mainly related to the bursting of the equity bubble, with its negative implications for investment, and to weak consumer confidence – operated on the demand side and thus typically exerted downward pressure on both output and inflation. The unfavourable productivity developments in the euro area aggravated the downward movement in real activity while at the same time preventing inflation from falling. By depressing income growth prospects and reducing the prospective return on capital, these developments brought about further retrenchment of consumption spending and business investment. The adverse underlying developments in total factor productivity have also made it more difficult for firms to smooth through the volatility of the many non-wage cost disturbances that they have encountered since 1999. Inflation has thus remained more vulnerable to unexpected shocks in the euro area, such as the increases in oil prices in 1999-2000 and in 2004, the increases in unprocessed food prices associated with the outbreak of BSE and foot-and-mouth disease in 2001 and rises in administered prices and tobacco taxes announced in late 2004. Although inflation may have become more resilient to these shocks more recently, it edged higher in the downturn that started in 2001 and remained at elevated levels thereafter, at a time when the accumulating margin of slack in the economy could in fact have been expected to reduce price pressures (see Chart 3). By contrast, in the United States inflation sharply declined during the early years of the new millennium when the slack in the economy was rapidly increasing.

This evidence leads to two observations. First, although full capacity of either labour or other production factors cannot be directly observed and the strength of the relationship that links factor utilisation and inflation is difficult to measure, this latter connection is seemingly weak in the euro area. Therefore, decreases in capacity utilisation do not necessarily translate into lower inflation and may lead to an asynchronous fluctuation of output and prices. Second, the stronger role in the euro area of adverse disturbances that can be generally characterised as "supply shocks" – a finding confirmed by comparative analyses of the euro area and the US economy on the basis of structural models[9] – has important implications for monetary policy. Given that unfavourable supply shocks tend to move inflation counter-cyclically at times of weak economic activity, the mix of shocks that have hit the euro area over the last few years implies that the macroeconomic environment has been particularly challenging for monetary policy.

STRUCTURAL FEATURES OF THE ECONOMY

The structural features of the euro area economy, primarily the degree of products and labour

9 Comparative exercises based on structural models indicate that the euro area, compared with the United States, is subject to demand shocks of smaller magnitude but is more frequently hit by supply shocks. See, for example, Smets, F. and R. Wouters (2005), "Comparing shocks and frictions in US and euro area business cycles: a Bayesian DSGE approach", *Journal of Applied Econometrics* 20, No 1, pp. 161-183.

Measures of price stickiness for the euro area and the United States

Index	Statistics	euro area	United States
CPI	Frequency[1)]	15.1	24.8
	Average duration *(months)*	13.0	6.7
	Median duration *(months)*	10.6	4.6
PPI	Frequency[1)]	20.0	n.a.
PPI (survey evidence)	Frequency[1)]	15.9	20.8
	Average duration *(months)*	10.8	8.3
New Keynesian Phillips Curve	Average duration *(months)*	13.5-19.2	7.2-8.4

Sources: CPI: Dhyne et al. (2005) for the euro area and Bils and Klenow (2004) for the United States. PPI: Vermeulen et al. (2005). Survey evidence: Fabiani et al. (2005) for the euro area and Blinder et al. (1998) for the United States. New Keynesian Phillips Curve: estimates in Galí et al. (2001, 2003) referring to the GDP deflator are converted from original quarterly figures. Detailed references are given in footnote 11.
1) Frequency refers to the average percentage of prices changed each month.

market rigidity and the way in which the private sector forms its expectations, strongly affect the transmission mechanism of any given disturbance that hits the economy.

The large body of research recently produced within the Inflation Persistence Network – a joint effort by staff at the ECB and the Eurosystem NCBs – has confirmed the widely held view that the price adjustment process in response to changing economic conditions is rather slow in the euro area.[10] This is particularly evident when a comparison is made with the United States. The average duration of consumer price spells in the euro area – a measure of the time that it takes for retailers to re-price their products – is 13 months (see the table). According to surveys, the average duration of a producer price is 11 months. Corresponding measures for the United States show that durations are much shorter than in the euro area, namely less than seven months for consumer prices and slightly more than eight months for producer prices.[11]

This evidence does not in itself rule out the possibility that euro area prices are stickier because shocks themselves are less potent and less volatile in the euro area, thus reducing the need to change prices in the first place. However, the evidence summarised above and estimates obtained from structural models, which take into account the volatility of the fundamental forces driving inflation, suggest that long price durations in the euro area are indeed a reflection of a more sluggish adjustment of prices and wages to economic news.

Further structural elements that determine the transmission mechanism of macroeconomic disturbances are related to the way in which the private sector forms its expectations – first of all the degree to which price and wage-setters are forward-looking – and the interactions between the actions and communication of the central bank on the one hand and the way they are perceived by the private sector on the other hand. Although there is still much to be learnt about expectation formation, the evidence available suggests that the ECB's quantitative definition of price stability has provided strong guidance to inflation expectations in the euro

10 See the article entitled "Price-setting behaviour in the euro area" in the November 2005 issue of the Monthly Bulletin.

11 For the euro area, see Dhyne, E., L. Alvarez, H. Le Bihan, G. Veronese, D. Dias, J. Hoffmann, N. Jonker, P. Lünnemann, F. Rumler and J. Vilmunen (2005), "Price-setting in the euro area: some stylised facts from individual consumer price data", ECB Working Paper No 524; Vermeulen, P., D. Dias, I. Hernando, R. Sabbatini, P. Sevestre and H. Stahl (2005), "Price setting in the euro area: some stylised facts from individual producer price data and producer surveys"; Fabiani, S., M. Druant, I. Hernando, C. Kwapil, B. Landau, C. Loupias, F. Martins, T. Mathä, R. Sabbatini, H. Stahl and A. Stokman (2005), "The pricing behaviour of firms in the euro area: new survey evidence", ECB Working Paper No 535; Gali, J., M. Gertler and D. Lopez-Salido (2001), "European inflation dynamics", European Economic Review 45, No 7, pp. 1237-1270; Gali, J., M. Gertler and D. Lopez-Salido (2003), "Erratum", European Economic Review 47, No 4, pp. 759-760. For the United States, see Bils, M. and P. Klenow (2004), "Some evidence on the importance of sticky prices", Journal of Political Economy 112, pp. 947-985; Blinder, A. S., E. Canetti, D. E. Lebow and J. B. Rudd (1998), "Asking about prices: a new approach to understanding price stickiness", Russel Sage Foundation.

area, irrespective of the fact that euro area HICP inflation has remained at or above 2% since late 2000. First, survey-based measures of inflation expectations have remained below and close to 2% and have shown that the central bank's leverage on expectations has become stronger since the launch of the euro.[12] Second, measures of the predictability of the ECB's policy moves show that the markets have correctly understood how developments in the state of the economy are mapped into policy decisions with the aim of maintaining price stability, as defined quantitatively, over the medium term.[13] Third, there is some evidence from structural macroeconomic models showing that price and wage-setters in the euro area form their expectations focusing strongly on the central bank's quantitative objective.[14] This implies that the influence of the ECB's quantitative definition of price stability on the time evolution of inflation can outweigh the influence of past shocks. An inflationary shock dissipates quickly in the euro area despite the high degree of price rigidities, and inflation has a tendency to return to its long-run norm reasonably quickly.

These findings also help to explain why, despite sluggish price-setting mechanisms, inflation persistence in the euro area is similar to levels seen in other economic areas. The half-life of the effect of a shock to inflation is considerably less than one year,[15] which is close to the figure obtained, for example, for the United States. This similarity is interesting, given the size of the differences in price-adjustment practices across the two areas. This suggests that some of the persistence of the inflation process generated by price sluggishness – which in itself tends to perpetuate past inflation pressures into the future – can be balanced by the strong anchoring of expectations of price and wage-setters to the objective of the central bank, thereby partly compensating for the added inertia resulting from a more rigid economic structure.

MONETARY POLICY IMPLICATIONS

In taking action, the central bank would ideally need accurate and contemporaneous readings of the state of the economy and the outlook, in particular detailed knowledge of the structural features of the economy, any disturbances affecting it and their potential to destabilise inflation expectations. However, the central bank has at its disposal only very imprecise estimates and, even in hindsight, different estimation methods yield quite different figures. This state of pervasive uncertainty suggests that the central bank must pay due attention to all relevant information, broadening the analysis of the risks to price stability and enacting a policy course that is "robust", i.e. yields satisfactory outcomes even under unexpected and very unfavourable circumstances. This is the essence of the ECB's two-pillar strategy.

With the benefit of hindsight, the ECB's monetary policy strategy has worked well in providing it with a compass that has firmly pointed to the objective of maintaining price stability over the medium term. In particular, it has continuously helped the ECB to carefully calibrate its policy actions to the structural characteristics of the euro area and, most importantly, to anchor long-term inflation expectations.

Maintaining inflation expectations strongly anchored and closely in line with the ECB's definition of price stability, as well as preventing second-round effects from materialising, are of the essence for the ECB. First, in a relatively

12 A broadly similar picture emerges from long-term inflation expectations derived from financial instruments when taking into account inflation risk premia. See the article entitled "Measures of inflation expectations in the euro area" in the July 2006 issue of the Monthly Bulletin.

13 See the article entitled "The predictability of the ECB's monetary policy" in the January 2006 issue of the Monthly Bulletin.

14 See Christiano, L., R. Motto and M. Rostagno (2006) "Shocks, Structures or Policies? A Comparison of the Euro Area and the US", *Journal of Economic Dynamics and Control* (forthcoming).

15 See Altissimo, F., M. Ehrmann and F. Smets, "Inflation persistence and price-setting behaviour in the euro area", ECB Occasional Paper No 46, June 2006.

rigid economy, as is the euro area, it might well be that temporary imbalances between demand and potential supply are slow to show through convincingly to inflation. But if and when they finally do, they would be more costly to correct in terms of macroeconomic disruption. Monetary policy should therefore remain constantly "alert" to any threats to the outlook for price stability, so that it does not find itself acting belatedly – and thus with less chance of success – to trends that have long been under way. Second, the expectation that inflation will not come loose from its anchor affords some short-term flexibility to respond to economic disturbances, with a view to ensuring more balanced macroeconomic conditions in the longer term. However, such flexibility can only last as long as the anchoring of inflation expectations is not endangered.

Certainly, the ECB would not have brought the nominal and real policy rates to the very low levels which they reached in the first half of 2003 – despite actual HICP inflation having been at or above 2% for more than two years – and would not have maintained them at such levels without consistent signs that expectations were well-anchored and inflationary shocks were being quickly reabsorbed. During most of this period, inflation expectations effectively remained aligned with the ECB's quantitative definition of price stability without explicit policy action. At times when expectations displayed signs of overreacting to events – such as surging oil prices – the renewed emphasis in the ECB's communication regarding the price stability objective on its vigilance and determination to enforce it and on its steady "alertness", provided effective resistance to inordinate developments.

In view of the prevalence of unfavourable "supply-side" shocks that have hit the euro area, and the understanding that a central bank operating in a relatively rigid economy is able to deliver the same quantum of support to macroeconomic conditions by adjusting its policy instrument in more moderate steps than in a more flexible economy, the monetary policy stimulus put in place by the ECB in the early years of the new millennium has been sizeable.

Since December 2005, the ECB has begun to withdraw such monetary accommodation in order to avoid the materialisation of upside risks to price stability that have been identified in both the economic and monetary analyses.

This process has been and will continue to be guided by the principle – which is well established in the ECB's monetary policy strategy – that the most effective contribution that a central bank can make to promoting growth prospects and standards of living in the medium to long term is by maintaining price stability and a stable and reliable currency.

6 CONCLUSION

From the start of the single currency, monetary policy has prevented disorderly movements in medium and long-term inflation expectations in the euro area. Moreover, it has achieved a level of predictability comparable to the monetary policy of other major central banks. This would not have been possible without both a credible monetary policy showing characteristics of persistence and regularities in interest rate-setting and an understanding of the rationale driving monetary policy on the part of financial markets and the public at large. Within this context, there has nevertheless been a challenging debate on the ECB's conduct of monetary policy, questioning whether the ECB has been sufficiently "active".

This article argues that any meaningful assessment of monetary policy "activism" cannot be performed in the abstract, but should instead take into account the determination and timeliness of the decisions with which a central bank tries to enact its statutory policy objective against the concrete features of the macroeconomic environment which it faces. In this respect, assessments based purely on the frequency and amplitude of policy moves over a given period may be highly misleading.

The appropriate degree of central bank "activism" depends on the adjustment to outside disturbances required by the central bank's objective. The associated monetary policy pattern hinges upon the structural characteristics of the economy and the sequence, nature and size of the shocks to which the central bank has to respond.

The pattern of policy rates observable in the euro area in comparison with those of other central banks, rather than reflecting an inappropriate lack of commitment on the part of the ECB in the pursuit of its objective, has to be understood against a background of stable long-term inflation expectations, which in turn reflect and interact with the credibility of monetary policy, an unfavourable mix of shocks that have hit the euro area, notably disappointing supply-side developments, and the high degree of nominal rigidity displayed by the economy.

The ECB's determination in maintaining price stability over the medium term and ensuring the anchoring of long-term inflation expectations has as a consequence created an environment more favourable to output growth and job creation in the euro area.

Looking ahead, a challenge for the euro area is to accelerate the implementation of the structural reforms that are needed to enhance competition and flexibility in products and labour markets, thereby fostering productivity growth and improving supply-side developments. Such reforms would not only prepare the ground for solid growth in economic activity but would also improve the macroeconomic environment faced by monetary policy.