

The Conduct of Monetary Policy under Uncertainty

Vitor Gaspar

In my contribution, I will review some specific aspects of uncertainty and economic change associated with the creation of the European Central Bank (ECB)—as a new institution and a new central bank responsible for the conduct of the single monetary policy in a new economic entity: the euro area. Some of the relevant questions are: How has the ECB dealt with the prospect of uncertainty and economic change? How has the conduct of monetary policy been affected by imperfect knowledge about the euro area economy? In my view the history of the ECB provides very rich ground for a case study. There are many interesting aspects that might be covered. Therefore, I am selective in my presentation. In my contribution I focus on one issue only. The issue I selected is, in my view, both interesting and representative: How has the ECB managed to establish credibility and reputation for delivering on its mandate (that is for maintaining price stability over the medium term), given the prospect of significant uncertainty and structural change?

I will start by quoting Issing (1999):

As a central banker directly involved in monetary policy-making, I have been dealing with uncertainty and its consequences for a large part of my professional life. From

my experience as a member of the Board of the Bundesbank, I have vivid memories of challenges posed by German reunification and the turbulence surrounding the ERM crises. But never have I felt the impact of uncertainty as acutely as in the weeks that preceded and followed the introduction of the euro and the birth of single monetary policy.

The quote comes from Issing's address to the first major international research conference organized by the ECB. It took place December 3-4, 1999. The topic was "Monetary policy under Uncertainty." The choice was not accidental. It was clear from the beginning that the ECB would have to operate in the context of quick economic change and substantial uncertainty. The creation of the ECB itself was a major change without historical precedent. From January 1999, the ECB became responsible for the conduct of single monetary policy for a geographical region, covering multiple and diverse sovereign nations with a population of more than 300 million people. In January 1999, the first monetary policy operations were carried out according to the euro system's operational framework.

I distinguish four aspects of economic change and uncertainty associated with the creation of the ECB:

1. The first links up directly with data uncertainty. There are two different points to distinguish. The creation of the euro area introduces a discontinuity in statistical time series. Properly speaking, long time series cannot be available for the euro area. In order to perform econometric analysis or even explain economic developments going back, it is necessary to use synthetic aggregates. Moreover, at the start the availability and timelessness of statistical information was less than what is normally available to the central bank of an industrialized country. The situation has been improving rapidly. Further progress is necessary.

2. The creation of the ECB and the start of the single monetary policy and the single currency constitute (potentially) a regime change (“a la Lucas”). Interestingly, the available tentative empirical evidence suggests that the gradual process of convergence, which took place prior to monetary unification, was such that no significant discontinuity occurred.¹
3. The euro is a catalyst for structural change. The role of catalyst relates to the so-called “One Money, One Market” dynamics.² The idea is that the introduction of the single currency impacts the pace, patterns, and depths of trade and financial integration in Europe and, thereby, on the linkages among euro area economics.

As a result of regime change and structural change there is both parametric uncertainty and model uncertainty. In his contribution to this conference four years ago, Duisenberg underlined the importance of obtaining a better knowledge of the structure and functioning of the euro area economy and, in particular, of the transmission mechanism of monetary policy. In the meantime, a lot of work has been carried out in the euro system in order to fill this gap.³

4. Lastly, the ECB, as a new institution, started operating without the benefit of a track record. Blinder (1999), in his book, describes central bankers as obsessed with credibility. I think he is right. There are good reasons for this obsession. Credibility strengthens the forces bringing the economy back to equilibrium in the face of unforeseen shocks. It also widens the room to maneuver policy. More specifically, Goodfriend (2002) has emphasized that anchoring inflation expectations increases the ability of monetary policy to keep economic activity close to potential. In the same view, Svensson (1999) finds that credibility leads to an improved tradeoff between inflation volatility, output volatility, and interest rate volatility.

In my view, issues of credibility and inflation are likely to be more important the higher the uncertainty. The idea is that credibility, by anchoring inflation expectations, contributes to diminish uncertainty

concerning future developments and thus contributes to re-balancing the economy. Frank Smets and I (Gaspar and Smets, 2002) have worked out an example based on a simpler standard new Keynesian model where private-sector expectations are based on learning. In this setting, a central bank focusing on price stability contributes to maintaining output stable around potential. However, I must recognize that my intuition is not backed by strong, general results. On the contrary, I am well aware that it is possible to construct counter-examples.⁴ In my view, these counter examples are unlikely to be of much relevance for the actual conduct of policy.

In the remainder of my contribution I focus on price stability in the euro area and the credibility of the ECB during its first years. I conclude with some general remarks on the conduct of monetary policy under uncertainty and economic change. There is hardly anything more likely to focus one's mind on the importance of uncertainty than to have to decide on the actual conduct of policy. Decisions have to be made in the face of pervasive uncertainty and in the absence of conclusive evidence. The policymaker, therefore, has no choice but to bear the "burdens of judgement."⁵

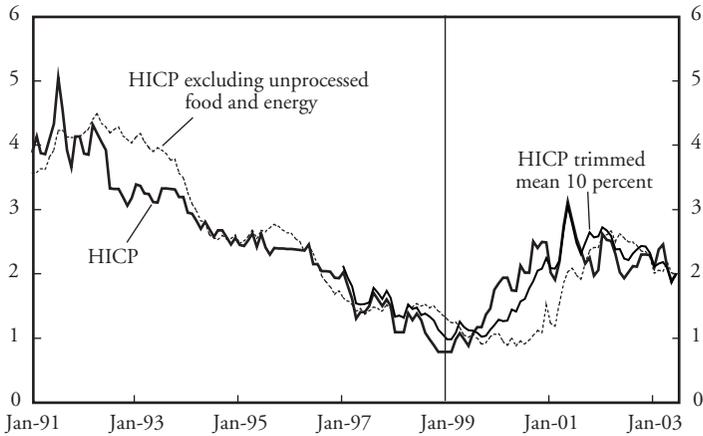
Price stability in the euro area and the credibility of the ECB⁶

The EUT and the statute of the ECB and the ESCB states that maintaining price stability is the primary goal of monetary policy. It also states that without prejudice to price stability it shall support economic policies in the community with a view to achieving the community's objectives, including substantial economic growth, a high level of employment, and convergence of economic performance among member states.

The priority given to price stability reflects important costs associated with departures from price stability, both inflation and deflation. In the practice of central banking, price stability comes to mean "low and stable inflation." The main arguments customarily used in favor of tolerating low (but positive) inflation are: First, measures of inflation may be

Chart 1
Harmonized Index of Consumer Prices for
the 12 Countries Participating in the Euro Area

(annual % changes)



biased; second, inflation may facilitate adjustments in relative prices and wages in the presence of nominal rigidities; third, positive price increases make it less likely that the zero bound on nominal interest rates will become a binding constraint on the conduct of monetary policy.

In 1998, the governing council of the ECB adopted the following definition: “Price stability shall be defined as a year-on-year increase in the Harmonized Index of Commerce Prices (HIPC), for the euro area, of below 2 percent. Recently, on May 8, 2003, when announcing the results of its evaluation of the monetary policy strategy, the governing council confirmed the definition while, at the same time, clarifying that it aimed to maintain inflation close but below to 2 percent over the medium term. One of the justifications was linked to the benefits of making a safety margin against deflation explicit.

The emphasis on deflation may seem surprising. Indeed, the 1990s were a decade of pronounced disinflation in the countries that now constitute the euro area. Chart 1 covers the period from January 1991

to May 2003. It was only in 1996 that inflation fell below 2 percent for the euro area. Going back to 1990, it is striking to remember that all these countries registered inflation rates above 2 percent. At this time, inflation in Portugal and Greece was still at double-digit level.

However, in a situation of price stability—low and stable inflation—it is important to recognize the possibility of upward and downward departures from price stability. Kilian and Manganelli (2003), in a very interesting paper where they consider the central bank as a risk manager, look at how the central bank can assess such a balance of risks. Moreover, the experience of Japan in the 1990s serves as a reminder of the need for a prudent central banker to take into account, *ex ante*, the possibility of deflation combined with a binding zero bound on nominal interest rates.⁷ The formula adopted by the governing council, “an aim of close but below 2 percent for inflation over the medium term,” makes the safety margin against the risk of deflation explicit and facilitates communication by allowing price reference to both upward and downward risks to price stability.

Coming back to the main point, the governing council’s definition of price stability provides not only an anchor for expectations but also a benchmark for *ex post* accountability.

A number of remarks are in order:

1. The ECB inherited from the NCBs a situation of price stability. Price stability was the result of a long-lasting process of disinflation carried out by the national central banks of the countries now participating in the euro area. Inflation expectations in the euro area were also compatible with the ECB’s definition of price stability.
2. Inflation was very low in late 1998, early 1999, and then increased gradually to peak slightly above 3 percent in May 2001. Specifically, the annual rate of HICP inflation averaged 1.1 percent in

both 1998 and 1999, before increasing to 2.1 percent in 2000, and then to 2.3 percent in both 2001 and 2002 (see Table 1).

3. In the recent past it has come down gradually, and it is currently around 2 percent. It is projected to hover around, or be slightly above, 2 percent until the end of the year before coming down more substantially in early 2004 as a result of the receding of past temporary shocks. Indeed, the increase in inflation up to May 2001 was associated with sharp increases in oil and unprocessed food prices. The latter ones partly associated with the outbreak of animal diseases.
4. Over these years, average headline inflation was very close to (but not below) 2 percent. Measures of underlying inflation, less sensitive to the impact of temporary shocks, (for example the HICP excluding unprocessed food and energy and the 10 percent trimmed mean) averaged close to but below 2 percent during the same period.

Turning to credibility, the key point to bear in mind is that through the whole period, medium- to long-term expectations have been well-anchored (see Chart 2).

In the euro area there are a number of qualitative survey measures of inflation expectations. I focus on quantitative measures of inflation expectations instead. In the euro area there are two main sources of quantitative measures of inflation expectations:

- Surveys of experts' forecasts (Consensus and the ECB Survey of Professional Forecasts).
- Indicators derived from index-linked financial instruments. In Europe such measures can be derived both from index-linked bonds and index-linked swaps.

Table 1
HICP Inflation in the Euro Area
Headline and sub-index inflation rates, sectoral breakdown
(Annual percentage changes, unless otherwise stated)

	Weight (a)	1996	1997	1998	1999	2000	2001	2002	2003:1	2003:2
Overall index	100	2.2	1.6	1.1	1.1	2.1	2.3	2.3	2.3	2.0
Goods prices	59.1	1.9	1.2	0.7	0.9	2.5	2.3	1.7	2.0	1.5
Food prices	19.3	1.9	1.4	1.6	0.6	1.4	4.5	3.1	2.0	2.6
Unprocessed food	7.6	1.7	1.4	2.0	0.0	1.8	7.0	3.1	0.2	1.6
Processed food (b)	11.7	2.0	1.4	1.4	0.9	1.2	2.9	3.1	3.2	3.3
Industrial goods prices	39.8	1.8	1.0	0.2	1.0	3.0	1.2	1.0	2.0	1.0
Non-energy indus. goods	31.5	1.5	0.6	0.9	0.7	0.5	0.9	1.5	0.7	0.9
Energy	8.2	3.0	2.7	-2.6	2.4	13.0	2.2	-0.6	7.0	1.5
Services	40.9	2.8	2.4	1.9	1.5	1.5	2.5	3.1	2.7	2.6

Notes: (a) referring to the index period 2003. (b) Includes alcoholic beverages and tobacco.

Chart 2
Inflation Expectations in the Euro Area

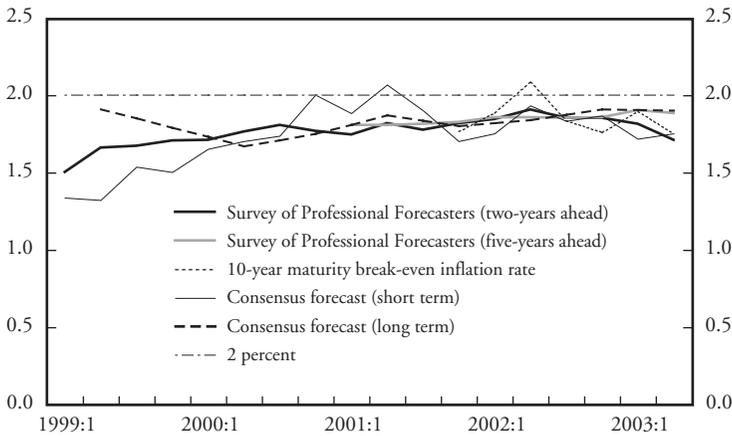


Chart 2 plots five such measures. The two-year-ahead and five-year-ahead Survey of Professional Forecasters, the short-term and long-term consensus and the 10-year break-even inflation rate (derived from the 10-year indexed-linked bond). On the basis of these indicators it is possible to perform a very simple exercise, in the spirit of Castelnuovo and others (2003). The first finding is that the volatility of long-run inflation expectations is less than the volatility of short-run expectations, which is again less than the volatility of headline inflation. The quarterly standard deviation of long-term inflation expectations is smaller than 0.12 percent, according to all measures. This compares with a number about five times larger for headline inflation. The second finding is that both the five-year (SPF) and the long-term consensus have been, for most of the time, inside a very narrow range of 1.7 percent to 1.9 percent. Such a range is clearly compatible with the ECB's definition of price stability and also with the governing council's aim of close to, but below 2 percent. The third finding is, still following Castelnuovo and others (2003), that there is a very weak correlation between short-run expectations (or changes in short-run

forecasts), which are more volatile, and long-run expectations (or changes to long-run forecasts).

A simple way to look at this question involves running two very simple regression equations:

$$y_t = \alpha + \beta x_t + \varepsilon_t \quad (1)$$

$$\Delta y_t = \alpha + \beta \Delta x_t + \varepsilon_t \quad (2)$$

where the dependent variable, y_p , refers to long-run inflation expectations, and the dependent variable, x_p , refers to short-run price developments (or to short-term expectations).

Three alternative measures of long-run inflation expectations in the euro area are used in this exercise:

SPF5 : Survey of Professional Forecasters five years ahead.

BOND10 : 10-year maturity break-even inflation rate.

CONLON : Consensus forecast long term.

Five alternative measures of short-run developments in the euro area are used in this exercise:

HICP : Overall HICP.

HICP EX : HICP excluding unprocessed food and energy.

HICP TR : HICP trimmed mean 10 percent.

SPF2 : Survey of Professional Forecasters two years ahead.

CONSH : Consensus forecast short term.

Table 2
Co-Movements of Long-Run Inflation Expectations and Short-Run Price Developments in the Euro Area
Sample period 1999:1-2003:2
(Equation 1)

	HICP		HICP EX		HICP TR		SPF2		CONSH	
	β	Pv	β	pv	β	pv	β	Pv	β	Pv
SPF5	-0.022	0.604	0.021	0.548	-0.085	0.055	0.056	0.781	-0.168	0.072
BOND10	-0.043	0.859	0.217	0.290	-0.023	0.931	1.311	0.099	0.744	0.212
CONLON	-0.031	0.436	0.056	0.044*	0.028	0.407	0.086	0.753	-0.006	0.950

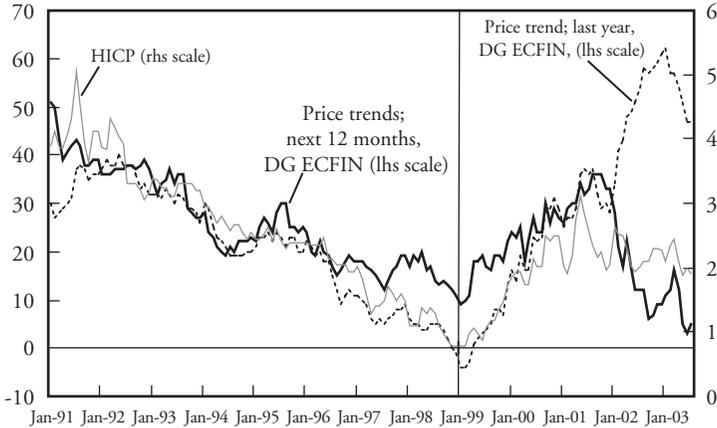
Note: pv denotes probability value, i.e., values smaller than 0.05 indicate significance at a 5 percent critical value. Data for SP5 and CONLON is only available from 2001.

Table 3
Co-Movements of Long-Run Inflation Expectations and Short-Run Price Developments in the Euro Area
(Equation 2)

	HICP		HICP EX		HICP TR		SPF2		CONSH	
	β	Pv								
SPF5	0.012	0.445	-0.006	0.844	-0.009	0.747	0.053	0.663	-0.046	0.352
BOND10	-0.037	0.875	0.210	0.709	-0.659	0.200	2.156	0.101	0.584	0.454
CONLON	0.000	0.997	0.054	0.298	0.038	0.426	-0.061	0.803	0.028	0.737

Note: pv denotes probability value, i.e., values smaller than 0.05 indicate significance at a 5 percent critical value.

Chart 3
Price Survey Data for the Euro Area



The regression results are summarized in Tables 2 and 3. The results clearly show that long-term inflation expectations are well-anchored and largely uninfluenced by temporary price developments significantly impacting headline price developments or short-term expectations and forecasts.⁸

It may be conjectured that these findings would be confirmed using data from index-linked swaps. The advantage of using their measure is that they allow for the derivation of a full range covering maturities from two to 30 years (at the moment, the liquid segments range from two to 10 years). However, since these instruments have been available only from mid-2002, a sufficiently long time series is yet unavailable.

It seems that the degree of credibility of the ECB is particularly remarkable, given, as stressed before, that it is a new institution without a track record. Moreover, inflation has been affected in the last years by a long list of factors that have kept it above the 2 percent ceiling most of the time. Furthermore, the cash changeover can be seen as a true test on economic agents' trust on the ability of the ECB to keep price stability over the medium run. The impact of the cash changeover on

measured inflation may have been significant but limited. Eurostat advances 0.3 percent as an upper bound. However, hikes in prices of frequently purchased items, including some foodstuffs, restaurants and cafes, hairdressing, and dry cleaning, biased the public toward perceiving a much higher inflation than warranted by the data. Chart 3 displays data on actual inflation (HICP), and perceived inflation (over the last 12 months) and inflation expectations (for the next 12 months), according to a survey of European households conducted by the European Commission. The survey results are qualitative. However, Chart 3 shows that it is possible to re-scale the balance of responses to make track measured inflation quite closely. In fact, it looks like the three measures move close together most of the time. However, in January 2002, with the cash changeover, there is a very strong disconnect. Inflation perceptions go sharply up while, for most of the time, both inflation expectations and measured inflation move down. The increase in perceived inflation may have been related, with developments in some frequently purchased items. The important point, however, is that this misperception did not affect the trust of the public on the ability of the ECB to deliver price stability going forward.

Conclusion: monetary policymaking and the burdens of judgment

I conclude with one last remark on the general topic of the panel. Theories are simplifications of reality. There is always a lot that any theory must dismiss as irrelevant. What is relevant in a particular situation and how it is relevant for action requires an act of judgment. Given the complexity of the economy and the pervasive character of economic change, it is never possible to reach a definite assessment on the current economic situation and prospects. Even when there is agreement on what is relevant, there may be doubts concerning the appropriate weight to give to different considerations. And, of course, economic change itself creates permanent challenges by constantly testing our conceptual frameworks through hard, unclear cases. The need to exercise judgment, the burden of judgment, comes from the responsibility for action.

Immanuel Kant provides an example involving a medical doctor: "The physician must do something in the case of a patient who is in danger, even if he is not sure of the disease. He looks out for symptoms and judges, according to his best knowledge (...) His belief is even in his own judgement only a contingent one; someone else might perhaps judge better."⁹

Monetary policy is conducted in an environment where evidence is always changing in complex, conflicting, and unexpected ways. Economic change makes our concepts difficult to apply and constantly presents us with hard choices. Policymakers have, therefore, to decide on the conduct of monetary policy in the face of pervasive change and uncertainty. In many cases, conclusive evidence is absent. The policymaker must make up his or her mind on the relevant considerations and weights in a particular situation. He or she must bear the "burdens of judgement."

Author's note: The views expressed in the paper are the author's and do not necessarily reflect those of the ECB or the euro system. The author gratefully acknowledges the contribution of Ignazio Angeloni, Gonzalo Camba-Mendez, Carsten Detken, Paola Donati, Silvia Luz, Joseph Pearlman, Gerhard Rünstler, Oreste Tristani, Juan-Luis Vega, Caroline Willeke, and James Yetman.

Endnotes

¹This conjecture was, indeed, made in early research by, for instance, Angeloni and Dedola (1999).

²See Gaspar and Mongelli (2003) for a survey.

³A sample of this work has been made available through 14 working papers released in the ECB WPS in late 2000 and early 2001. A book will be forthcoming soon.

⁴For example, Yetman (2003) shows that, in an uncertain world, credibility makes learning by the central bank more difficult. The reason is that credibility reduces the volatility of the relevant economic variables. Therefore, it reduces the central bank's ability to get precise estimates of the relevant parameters. However, for reasonable parameter values, the losses from decreased precision in estimates are an order of magnitude smaller than the direct benefits of credibility through diminished inflation volatility.

⁵I borrow the expression "burdens of judgement" from John Rawls (2001). I don't know whether the expression is originally his.

⁶This section benefits from the valuable collaboration of Gonzalo Camba-Mendez and Paola Donatti.

⁷This point has been made, for example, by Lars Svensson (2001).

⁸The probability values reported in the table have been computed without taking into account the possible presence of serial correlation and heteroskedasticity in the residuals. This would be required in more thorough analysis. However, accurate estimates of the long-run covariance of the residuals are not possible, given the small number of observations available. The results presented are for illustrative purposes only, but in my view the collection of rejections of the null of no link between long-run inflation expectations and short-run price developments provide a very interesting picture.

⁹This pragmatic approach does not come at the expense of theory. Kant (again) makes this clear: "No man has the right to pretend that he is practically expert in a science and yet show contempt for theory without revealing that he is an ignoramus in his field (...) However, it is more nearly permissible that an ignoramus should declare theory to be unnecessary and dispensable for his imagined peace than that a smart aleck should concede the value of theory for academic purposes, perhaps as an exercise of the mind, but then, at the same time assert that things work quite differently in practice."

References

- Angeloni, I., and L. Dedola. 1999. "From the ERM to the Euro: New Evidence on Economic and Policy Convergence among EU Countries," ECB working paper 4.
- Blinder, A. 1999. *Central Banking in Theory and Practice*, MIT Press.
- Castelnuovo, E., S. Nicoletti-Altimari, and D. Rodriguez-Palenzuela. 2003. "Definition of Price Stability, Range and Point Inflation Targets: The Anchoring of Long-Term Inflation Expectations."
- Gaspar, V., and F. Smets. 2002. "Monetary Policy, Price Stability and Output Gap Stabilisation," *International Finance*, vol. 5, number 2, summer, pp. 193-211.
- Gaspar, V., and Mongelli, F. 2003. "Monetary Unification and the Single Market," Gertrude Tumpke-Gugerell and Peter Mooslechner (eds.), *Economic Convergence and Divergence in Europe*, Edward Elgar.
- Goodfriend. 2002. "Monetary Policy in the New Neoclassical Synthesis: A Primer," *International Finance*, vol. 5, number 2, summer, pp. 165-192.
- Issing, O. 1999. "The Monetary Policy of the ECB in a World of Uncertainty," in Ignazio Angeloni and others (eds.), *Monetary Policy Making under Uncertainty*, proceedings, ECB.
- Kilian, L., and Manganelli S. 2003. "The Central Bank As a Risk Manager: Quantifying and Forecasting Inflation Risks," ECB working paper series 226,
- Rawls, J. 2001. *Justice as Fairness: A Restatement*, The Belknap Press of Harvard University Press.
- Svensson, L. 2001. "The Zero Bound in an Open Economy: a Foolproof Way of Escaping from a Liquidity Trap," *Monetary and Economic Studies*, special edition, vol. 19, S-1, February.
- Yetman, J. 2003. "Probing Potential Output: Monetary Policy, Credibility, and Optimal Learning under Uncertainty," *Journal of Macroeconomics*, 25(3), forthcoming. Also available at <http://www.econ.hku.hk/~jyetman/PDFfiles/ProbingPotentialOutput.pdf>