# »Expectations, Learning and Monetary Policy«

*Conference organized jointly by*
*Athanasios Orphanides (Federal Reserve Board, Washington D.C.),*
*John C. Williams (Federal Reserve Bank of San Francisco),*
*Heinz Herrmann (Deutsche Bundesbank), and*
*Volker Wieland (Center for Financial Studies and University of Frankfurt)*
*on August 30-31, 2003 in Eltville*

CENTER FOR FINANCIAL STUDIES
DEUTSCHE BUNDESBANK

Imprint

Publisher
Center for Financial Studies
at the J.W. Goethe-University, Frankfurt
Taunusanlage 6
D-60329 Frankfurt/M.
Tel: +49-(0)69-242941-0
Fax: +49-(0)69-242941-77
http://www.ifk-cfs.de

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Design
Stählingdesign

*Sponsored by the Center for Financial Studies,*
*the Deutsche Bundesbank*
*and the Journal of Economic Dynamics and Control*

# Foreword

It is a great pleasure to report on the conference on "Expectations, Learning and Monetary Policy" sponsored jointly by the Center for Financial Studies and the Deutsche Bundesbank. First of all, thanks are due to Athanasios Orphanides (Board of Governors of the Federal Reserve System) and John C. Williams (Federal Reserve Bank of San Francisco) for taking on the lion's share of the work involved in putting together an excellent program that included many of the leading experts on this topic from academia as well as policy institutions. Furthermore, I would like to thank Heinz Herrmann from the Deutsche Bundesbank for the excellent collaboration in the organisation of this joint event.

Volker Wieland
*(Center for Financial Studies and University of Frankfurt)*

The presentations and lively discussion at the conference clearly showed that this is a vibrant and technically challenging area of research that is also of great relevance for the practice of monetary policy. Thus, it constitutes a perfect example of CFS' commitment to bring first-rate academic research to bear on policy issues of practical concern.

This booklet is intended both as a reminder of the promising discussions and visions expressed at the conference and as an advertisement announcing the volume in preparation. The papers presented at this conference have undergone a rigorous refereeing process at the *Journal of Economic Dynamics and Control* (JEDC) that is soon coming to a close. All papers that pass this mark will appear in a special JEDC issue to be published in 2005. JEDC is one of the most-cited journals in economics having recently been ranked as number 23 among 300 scientific journals in economics in a study sponsored by the European Economic Association. The quality of the journal and the quality of the papers will ensure that this volume will have a significant impact on research as well as monetary policy practice.

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# Opening Remarks

**by Hans Georg Fabritius,**
**Member of the Executive Board**
**of the Deutsche Bundesbank**


Hans Georg Fabritius

Ladies and gentlemen

I am pleased to welcome you to the Training Centre of the Deutsche Bundesbank here in Eltville; the training centre is here to keep central bankers up to date on the latest developments. I expect that we, too, will learn something useful for our monetary policy in the next few days. This location is therefore the ideal place for a conference whose theme is "Expectations, Learning and Monetary Policy".

I am pleased that Athanasios Orphanides and John Williams took on the task of making most of the preparations for this conference. The Bundesbank and the Center for Financial Studies were happy to support this endeavour.

As we have all known for some time now, expectations play a pivotal role in monetary policy making and in economic policy making in general. It is certainly a generally recognised fact that learning also plays an important role in these areas.

In 1975, for example, when the Bundesbank introduced what was then its new strategy of monetary targeting, it first spoke of it as an "experiment", from which both the Bundesbank and the public would have to gain experience. It continued to use this word in connection with its concept for a good number of years thereafter.

This may come as somewhat of a surprise given the tenacity with which the Bundesbank stuck to its strategy right up to monetary union. However, policymakers were aware that by changing strategies too quickly, as we have certainly seen other central banks do in the past, the public becomes confused and monetary policy may lose its credibility.

Allow me to cite another example: after introducing monetary targets, the Bundesbank, in line with this strategy, only gradually reduced its inflation target to 2%. It took ten years for this target to be reduced from initially 5% – 6% to the final goal of 2%. Later on, the Bundesbank continued to hold on to this normative inflation goal, even when the actual inflation rate was much higher. The Bundesbank's awareness that the public has to be given a chance to learn gradually was always coupled with the feeling that it must also give the public clear guidance.

These comments should not be misconstrued to mean that central bankers have always known everything. The question of how fast a change in monetary strategy should be implemented, for example, has always been a contentious one, both at the Bundesbank and at other central banks. Advocates of a "cold-turkey" strategy have always argued with advocates of a gradual change of course. In the end, sensitivity and tact have played a vital role in making such decisions.

I think that the questions to be dealt with at this conference are therefore important for practical policymaking in this respect as well. I hope the conference will help provide monetary policy making, which will always remain an art, a more scientific foundation. The two examples taken from the early phase of monetary targeting in Germany have shown that there has always been an awareness that both central banks and the public need to learn. Both are naturally not independent of one another. How the behaviour of these two players affect each other will, I assume, be an important part of your conference.

It seems to me that in the past few years the academic discussion has been primarily concerned with the question as to what the consequences are when the private sector does not have complete access to all the information concerning the behaviour of monetary policymakers. Such discussions have quickly led to demands for monetary policy making to be as transparent as possible. However, transparency, with regard to monetary policy, has many facets. These range from the demand for clear goals, transparent strategies all the way to the plea for clear procedures on implementing and communicating monetary policy measures.

Today, central banks around the world recognise the value of transparency. It is generally accepted that central banks must endeavour to make their policies understandable to the public. In the light of the large degree of independence granted to monetary policymakers, at least in many industrial countries, this is not only a democratic duty; it also supports the effectiveness of monetary policy.

In my view, the most important point of this discussion is that the public should have no doubts as to the goals of monetary policy. Efforts were made to ensure clarity in European monetary union from the very start. The main goal is price stability and may not be jeopardised by any other considerations. The European Central Bank (ECB) also explained from the very start what it meant by price stability – consumer price inflation below 2%. Incidentally, this


definition came as no surprise; most of the national central banks which entered monetary union had previously established this target for themselves as well. The experience of the past few decades, not to mention centuries, during which high inflation rates have often been witnessed, has undoubtedly left its mark on both central banks and the public. It was therefore no surprise that the ECB first and foremost accentuated what it views as a tolerable inflation-rate ceiling. Nonetheless, there has never been any doubt that one of the tasks of a central bank is also to prevent deflationary trends.

Recent experience of low rates of inflation, and in some countries even negative inflation, have changed this stance somewhat. The ECB has therefore taken the occasion of its strategic review in spring of this year to fine-tune its goals. It made it clear that price stability in the medium term had to be maintained and that price stability means maintaining inflation "below" but "close" to 2%. In my estimation there can be little doubt that the public has received and understood this message.

While clarity about goals is important, it is not the only consideration. A clear strategy, coupled with transparency in the implementation and communication of monetary policy, are two further important facets. I think there is agreement in principle that a clear strategy is desirable. When it comes to the details, however, there are varying opinions about which demands such a strategy should meet.

From the very outset, the ECB recognised the significance of a transparent strategy. It also stressed, however, that the beginning of monetary union was burdened by particular imponderables. Knowledge of the transmission process in monetary union was as incomplete as that of the issues regarding the stability of the demand for money. Against this background, the ECB chose a two-pillar strategy. However, this two-pillar strategy has been criticised, especially by advocates of a direct inflation targeting approach for its lack of transparency.

Within the framework of the strategic review, the ECB has therefore once again made clear how it views the interplay between "economic analysis" and "monetary analysis" and what these two aspects entail. Economic analysis is particularly concerned with factors influencing the price formation process in the short and medium term, such as the demand situation or the cost situation. Monetary analysis, by contrast, focuses more on medium and long-term aspects.

At the same time, it was emphasised that merely comparing actual monetary growth and reference values is not enough. It is much more important to recognise underlying monetary trends which influence price movements in the long term and to differentiate them from temporary disturbances. This requires, for example, a supplementary analysis of both households' portfolio decisions and the development of lending in an economy.

The demands for strategic transparency, as sometimes formulated by academics in particular, are at times quite extensive. Some demand, for example, that central banks disclose the models on which their decisions are based. I think such a demand is naive, not only because no one model can answer all the questions a central bank is faced with. Given the many unanswered questions confronting economic research itself, there is also no alternative to using diverse methods. The Eurosystem, for example, uses a wide spectrum of analytical methods to make its forecasts[1]. The question is, of course, how these different analytical instruments are combined into a single whole.

[1] see ECB: A guide to Eurosystem staff macroeconomic projection exercises, 2001

Inflation targeting is often described as the prototype for a particularly transparent strategy. Many authors have stressed the virtues of such a strategy[2].

I think, however, that there is still no conclusive evidence. More recent attempts to examine the superiority of this strategy empirically have also led to sobering results[3]. According to these studies, in general countries with such a strategy do not do any better or any worse, for that matter than countries which have used other approaches.

In my opinion, one should not place too much significance on these results. Perhaps the tests used were inadequate, or maybe there was not enough attention paid to the particularities of the individual countries etc. The results should nonetheless serve as a warning that good monetary policy cannot be simply attributed to any one strategy concept.

I would now like to turn my attention to a third point, i.e. the implementation and communication of monetary policy measures. In the past few years central banks have, often in a pragmatic way, made efforts to make their operations and decisions more transparent. The FOMC is a perfect example. Since the middle of the 1990s, it has changed its communication policy in several steps. It seems that today the markets are much better at predicting changes in the Fed funds rate and do so far earlier than even in the first half of the 1990s. At the same time, longer-term interest rates are reacting less to changes in the official rates than was previously the case. This confirms that US monetary policy has become more predictable.

It is also true, however, that, measured by the reactions of the market, changes in the official interest rate even today are not entirely free of surprise effects. Studies conducted for the ECB as well as for the Bundesbank have produced similar results.

As I said at the beginning, it is certainly important that central banks behave in such a way that the private sector understands them. Important aspects include clear goals, efforts to promote clear strategies as well as easy-to-understand communiqués. Markets will take over a good part of the central bank's work, provided that its policies and behaviour are transparent.

Even so, there is still a lot of work for central banks to do. Central banks have had and will continue to have the important task of accurately assessing the situation in the economy and, for example, of correctly reading the expectations of the markets.

I hope we made some progress in this respect. In the past few years, central banks have learnt to improve the use they make of information derived from market behaviour for their own purposes. The developments in the financial markets permit us, for example, not only to assess the expectation value of interest rate and exchange rate changes but also to assess the entire distribution and to say something about the uncertainties of expectations. As a result, we are better able to understand today how, for example, our interest rate measures are received by the markets.

However, our knowledge of market developments will remain limited in the future. Our strategies have to take account of this fact. In the past, one important criterion used to evaluate strategies was the extent to which a central bank must rely on information when setting monetary policy. This aspect was also discussed with regard to the public's ability to test and learn about a given policy.

The danger of central banks placing too much trust in their information has been emphasised time and again. Experience has shown, for example, that data available to the central banks are inadequate. This argument has been given considerable weight in connection with some monetary policy rules which are popular among economists today. It seems to me that we have yet to find the correct answer to such difficulties. Should we try to minimise errors by using as much information as possible and making as many cross checks as possible or should we rather favour "robust" strategies which make do with less, but more reliable information.

I hope that all of this has made it clear that we at the central banks still face many unanswered questions. We will not solve these problems without a considerable amount of research. I am therefore happy to see that the discourse between central banks and university researchers in Europe has intensified in the past few years. This conference is a sign of such progress. I hope you will find the papers presented in the next two days interesting and that a lively discussion will ensue.

2 see, for example, B. Bernanke *et al*, Inflation targeting: Lessons from international experience, Princeton 1999

3 see L. Ball, N. Sheridan: Does inflation targeting matter? IMF working paper, 2003, M. Neumann, J. von Hagen: Does inflation targeting matter?, *Fed St Louis Review*, 2002

# After Dinner Speech

**by Charles Goodhart,
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of the Bank of England's
Monetary Policy Committee**



Charles Goodhart

I have always found the concept of Rational Expectations quite difficult, partly since we all perceive reality somewhat differently. I am not sure whether it is the same in other countries and cultures, but the British rather enjoy making a joke of the differences whereby the same event, or situation, is perceived by different actors. In particular, there is a declension proceeding from the initial actor, or agent, who is naturally proud of his, or her, activities; through to someone he meets face to face, who is careful in responding to that actor; and finally there is a third, anonymous person, who can give his, or her, critical, sometimes excessively critical, opinions on the standing of the initial actor.

In the case of economic research,
such a declension goes: –
"My research is of path-breaking originality;"
"Your research is certainly very interesting;"
"His research is so bad that no self-respecting journal should publish it."

In the case of teaching, a similar
declension would be: –
"I am an inspiring teacher;"
"You certainly prepare your material thoroughly;"
"He is a pedantic bore."

As a slight digression, let me share
a very English such declension,
which I read in a newspaper recently: –
"I think I am wonderful;"
"You are in love with yourself;"
"She is the Duchess of York."

For the purpose of tonight's declension,
this might go: –
"I speak my mind;"
"You have every right to be heard;"
"He is a prejudiced old fool."

Let me start with the question of learning. Much of this Conference deals with the issue of how people might learn. The point that I want to emphasize here is that learning has considerable costs, particularly in time and effort. For example, I was speaking to several other members of this Conference at breakfast, and none of us had any knowledge of German. Of course German is, obviously, perfectly possible to learn, but none of us had done so. Why not? The answer is essentially that our time is limited and constrained, and the costs of learning German, (in terms of the opportunities thereby missed for learning something else of greater utility to us, or for undertaking other actions to earn income, or for leisure purposes), were greater than we were prepared to spend on linguistic learning efforts. So, much of the time, we make a conscious choice not to learn about many developments; I noted this morning how some of the presenters failed to learn how to move their transparencies around an overhead projector in order to make them legible to the audience. Again my father used to tell a story about an icthyologist, who was appointed Vice Chancellor of a University. He tried to learn the names of all the faculty, but every time he learned a faculty name he forgot that of a fish. And as an academic, he preferred to maintain his academic memory, and therefore gave up trying to learn faculty names.

The point of all that is that there is an equilibrium amount of learning, which depends on the costs of learning relative to the time involved and the utility of doing something else. One could, indeed, envisage a production function, in which time was allocated between labour, leisure and learning; and indeed such a production function would in my view be an advance on what is currently done. Given that learning is a costly activity, one of the issues that needs to be addressed is what is the least cost, most inexpensive way to learn. I should add that the application of recursive least squares to time series, which is what has been suggested in several of the papers here, is certainly not for most people a serious least cost way of learning! What do we normally do when we are ignorant? One common response is to ask a friend, or alternatively we go to somebody else whose knowledge on the subject is rather greater than our own. For example, when sent a letter in German, rather than learn German from scratch, I ask a German-speaking friend to translate it for me. That means that a process in which people are not endowed with complete knowledge, but need to learn, will inevitably involve interpersonal interactions, with resulting information cascades and herding; so that issues arising from such interactions, i.e. herding, need to be incorporated into studies of the learning process.

Furthermore, the effort put into learning will not be constant, but will be time-varying and state dependent. Go back to my example about learning a foreign language, e.g. German. If my job was such that I had to go and live in Frankfurt or Berlin, then my application to learning German would certainly increase dramatically. And of course it is exactly the same with economics. When economic developments are calm, and there are fairly steady trends involved, then most of us will be perfectly happy

to use some rule of thumb, and/or to obtain our expectations of the future from some outside guru, or supposed expert commentator. It is only when there are some dramatic, and unexpected, shocks and events, such as a quadrupling of oil prices, that it will be worth people's while to spend the time and effort to carefully examine what the likely effect of such shocks on future developments might be. Thus I have always seen a likelihood that during periods of stability the proportion of backwards-looking expectations will tend to rise, whereas when economics conditions become more unsettled, the proportion of forwards-looking expectations will increase. The standard assumption, that this proportion is constant, strikes me as clearly incorrect.

Let me next go on to conside the variance of projections of future economic outcomes, for example the kind of fan chart that is produced in the Bank of England's Inflation Report. You will recall the new Governor, Mervyn King's, words at the time when the Monetary Policy Committee was first established, that the 1% bands around our central target `would restore the lost art of English letter writing'.

And so all of us thought at the outset, when the MPC began. Moreover, the paper by Cogley and his colleagues, indicates that if you take proper Bayesian account of drifting parameters, model uncertainty, policy regime changes, structural shifts, such factors as misperceptions of the underlying economy, such as the Orphanides/Williams misestimates of the Natural Rate, and so on, then their estimate of the Bayesian VAR probability of being outside the range of 2%, wherein no letter needs to be written, at the end of this year, 2003, from a forecast undertaken in 2002, Q4, would be 0.34, or more than twice the estimate that the Bank made at that time, which was for 0.14. By the same token the BVAR estimate made by Cogley and his colleagues for end-2004, from the forecast in 2003, Q4, was 0.45 of being outside the 2% range, compared with the Bank's 0.18.

The Cogley paper suggests that the Bank's methods may tend to underestimate variance; but the extraordinary feature of the, admittedly short, historical experience of the MPC has been that no letters at all have yet been written. If we applied the Cogley, et al, procedures to each of the forecasts separately, then the probability that many letters would have been written between 1997 and now,



Charles Goodhart,
Reiner König
(Deutsche Bundesbank)

would surely have been overwhelming. Yet none have been written. Indeed the volatility of inflation and output has been at an all-time low, as the evidence collected by Luca Benati has clearly evidenced. The question is why?

Now I would like to say that all this is due to the wise decisions of the MPC, but I do not think that I can. Why not? For one thing, the rule of thumb, by which we have tried to assess the effects on economic outcomes of a change in interest rates, suggested that a 1% change in nominal interest rates would lead to a change of about a 0.33% in real output after a lag of 4 quarters and to a change of 0.3% of inflation after about 8 quarters. Since 1997 interest rates in the UK have varied between about 7% and about 3%. This means that, by our rule of thumb on the transmission mechanism of monetary policy, that we have at the most pushed real output and inflation relative to a no change course by about 1%.

This rule of thumb, however, may now underestimate the effect of changes in nominal interest rates since inflation expectations are now much better anchored, and therefore a given change in nominal interest rates may have a greater effect on real interest rates. The Kurtz/Jin paper, however, is so pessimistic about the likelihood of beneficent stabilising expectations, that they would have the authorities seriously considering whether to abandon discretionary policy altogether! Certainly the authorities have to work hard at their communications in order to explain

their actions and response functions, and they sometimes get it wrong, as perhaps evidenced by recent bond market gyrations. Nevertheless, the interaction between the private sector's expectations and the Central Bank's policy is one that has to be carefully assessed by the decision-makers in the Central Bank, and is, in principle, amenable to good communications skills.

In any case, even if inflationary expectations are now better anchored, the foreign exchange market has become, if anything, even more fitful and wayward. Uncovered interest parity (UIP) continues to work, if at all, in reverse, and there seems no reliable link between interest rate changes and those of exchange rates. Hence much more weight has had to be put on domestic transmission mechanisms, and this has meant in effect the housing market. We have replaced an equity bubble with a housing market bubble, and how we get out of that imbalance, no one quite knows. But that is another story.

What surprised me was the general tone of scepticism, and indeed of mild pessimism, about Inflation Targeting in many of the papers here. It may work in practice, but not in theory. Take the constant interest rate forecasts that most of us with inflation targets actually use. Honkapohja and Mitra claim, in a paper that I found quite difficult to follow, that such procedures lead to indeterminancy of equilibria and instability under learning. What is the evidence of that?

My own main reason for supporting such a constant-interest rate forecasting procedure is that it improves the behaviour of the decision-makers themselves. They tend to be subject to the common fallacy that current conditions are extremely, indeed `uniquely', uncertain, and that by waiting to observe future outcomes, then current uncertainties will be dispelled. And of course they are, but they just get replaced by future (and unforeseeable) uncertainties. The `let us wait and see' syndrome led, in my view, to the tendency towards varying interest rates `too little, too late'. It was this tendency to defer taking actions until the situation became clearer, which of course it never did, that was one of the main causes, in my view, of the process that led to increasing inflation in the post-war world. The constant interest rate forecast, aiming to hit the target at a given horizon, acts, I believe, as a sovereign counter to that `too little, too late' pathology.



Note that if decision-makers aim to adjust interest rates at each forecast so that, if then kept constant, the target inflation rate should be hit at the horizon, then, subject to a few qualifications which I believe to be of minor importance, short-term interest rates should approximately follow a random-walk path. But they have not done so. They have moved in just an autocorrelated and smooth a way since the Monetary Policy Committee started in the UK, as they had before. Why is this? Glenn Rudebusch and I worry about why this is so. Alex Cukierman, in an intervention today, attributed this autocorrelation to an auto-correlated series of errors by forecasters. I completely agree. My belief is that the autocorrelation lies in the errors of forecasters, and not as an aspect of the decision-making procedures of MPCs. For example, the FOMC has taken a series of 13 downward steps since the end of the IT boom, and the start of the recession in the US. Were these 13 consecutive similar steps planned from the outset by the FOMC, perhaps in order to introduce greater inertia into short-term interest rates? My answer to that is certainly no! The series of small downwards steps occurred because the forecasters were continuously expecting that the US economy would recover more, and more quickly, than actually occurred.

Everywhere in these papers uncertainty is rightly emphasized, for example, parameter uncertainty, model uncertainty, etc.; everywhere except the preferences of the decision-makers. These are assumed to be known, fixed, and, what is more, quadratic. Let us start with the fact that most decisions are taken by committees. I can promise you that with a committee containing M. King, D. Julius, S. Wadhwani and W. Buiter, there is no such thing as a representative committee member. More seriously, theorists have simply failed to come to terms with the fact that decisions are taken by committees. What difference does this make? Moreover, the membership of such committees is continuously changing. What will happen, for example, when Greenspan eventually steps down from the FOMC? Is that not, perhaps, one of the more important market uncertainties at the moment?

Another key feature of decision-making by Central Banks, and by Governments, is that the decision-makers are agents; their principals in the case of independent Central Banks are Parliament, and in the case of Governments are the electorate as a whole. There is generally some kind of implicit, or explicit, contract whereby the agent,

the Central Bank or Government, will either do well enough, and be reappointed, or if it fails to pass some test of competence, will get kicked out, (except, of course, for the European Central Bank (ECB) which cannot be so disciplined). Anyhow, this kind of principal/agent contracting relationship appears nowhere in the preference function. I think that it should.

Let me give you an analogy from a game that I like, Bridge. Assume that you just bought the contract. How do you play? Assume that after the opening lead, your partner tables her cards, and you smile (inwardly only of course, so as not to inform the opponents), since it should be easy to make your contract if the cards lie at all well. What should you do? A good Bridge player would consider a safety play how to bring home the contract even if malevolent nature has given a bad, or perhaps even the worst possible state of nature, to the other unseen cards; in other words in such a case a good Bridge player would follow a minimax, or robust policy.

But what do you do if, after the opening lead, your partner tables a horrible, poor set of cards. After the polite `thank you partner', (and inward curse), what you ought to do is to work out what favourable distributions might, even so, let you make the contract; and you should play for that, even if the more likely distributions might result in an extra lost trick, or even two.

In other words, you are risk averse under good conditions, and risk loving under bad. The curvature of the loss function varies as your state varies. This was the theme of the paper in the Financial Markets Group Discussion Paper series by Margaret Bray, and myself, whose title was `You might as well be hung for a sheep as a lamb'; and we reflected the varying curvature in a loss function which had an inverse normal distribution.

As a generality, the projected variance of outcomes is much less of a problem for decision-makers than is skew, asymmetric risk. If uncertainty is symmetric, then the decision-maker goes for the central tendency, and whether the exponent in the loss -function is quadratic, unity, or below unity, as the experimental work of Kahneman and Tversky suggests, does not really matter very much. In the MPC, for example, we never spent much time discussing variance, but we spent a large amount of effort in assessing skewed risks, and how to respond to them. Particularly if the probability and extent of such a risk is also a function of the policy instrument, then the policy choice can be quite complex. May I recommend a recent paper which Lars Svensson gave at Chuck Freedman's recent Festschrift at the Bank of Canada to you for reading on this subject.

So, to conclude, what do I want you theorists to do?

(1) I want you to explain why inflation targeting has worked so well, and why the variances in the outcomes have actually been much smaller than we expected at the outset.

(2) I want you to be more careful about the decision-making procedure. It is done by a committee, who in turn are agents. That means that they are likely to have an agenda of their own to meet, arising from principal/agent considerations.

(3) I want you to focus on the problems of dealing with asymmetric risk, i.e. skew, rather than variance, as the main concern in the process of reaching a policy decision.

That said, I want to end by applauding the coming together of theory and practice in this general field. Before I left to come here to this Conference, I was talking to the Governor of the Bank of England, Mervyn King, who asked me to get the collected papers and send them to him for him to read. Although Mervyn is, no doubt, something of an outlier in this respect, understanding and discussions between economic analysts and Central Bank practitioners has become much closer in recent decades than it was at the beginning of the 1960s when I started doing economics. Then economists did not seem to understand what central bankers were doing, or why they were doing it. And equivalently central bankers took no notice, and had very little appreciation, of the arguments and analyses of economists. Since then in the field of monetary policy, analyses and practice have become much more closely interactive and supportive of each other. That has been a great advance, and one of the real pleasures of my professional life.

Athanasios Orphanides



# Paper Abstracts

**Monetary Policy, Indeterminacy and Learning**

**Escapist Policy Rules**

**Performance of Inflation Targeting Based On Constant Interest Rate Projections**

**Imperfect Knowledge, Inflation Expectations, and Monetary Policy**

**Permanent and Transitory Policy Shocks in an Empirical Macro Model with Asymmetric Information**

**The Role of Expectations in Economic Fluctuations and the Efficacy of Monetary Policy**

**Policy Evaluation in Uncertain Economic Environments**

**Bayesian Fan Charts for U.K. Inflation: Forecasting and Sources of Uncertainty in an Evolving Monetary System**


Bruce McGough

## Monetary Policy, Indeterminacy and Learning

George W. Evans
*(University of Oregon)*
Bruce McGough
*(Oregon State University)*

The development of tractable forward looking models of monetary policy has lead to an explosion of research on the implications of adopting Taylor-type interest rate rules.

Indeterminacies have been found to arise for some specifications of the interest rate rule, raising the possibility of inefficient fluctuations due to the dependence of expectations on extraneous "sunspots". Separately, recent work by a number of authors has shown that sunspot equilibria previously thought to be unstable under private agent learning can in some cases be stable when the observed sunspot has a suitable time series structure. In this paper we generalize the "common factor" technique, used in this analysis, to examine standard monetary models that combine forward looking expectations and predetermined variables. We consider a variety of specifications that incorporate both lagged and expected inflation in the Phillips Curve, and both expected inflation and inertial elements in the policy rule.

We find that some policy rules can indeed lead to learnable sunspot solutions and we investigate the conditions under which this phenomenon arises.

*The paper was discussed by:*
Stephen G.F. Hall
*(Imperial College, University of London),*
Julien Matheron
*(Banque de France)*



## Escapist Policy Rules

James Bullard
*(Federal Reserve Bank of St. Louis)*
In-Koo Cho
*(University of Illinois at Urbana-Champaign)*

We study a simple, microfounded macroeconomic system in which the monetary authority employs a Taylor-type policy rule. We analyze situations in which the self-confirming equilibrium is unique and learnable according to Bullard and Mitra (2002). We explore the prospects for the use of, large deviation' theory in this context, as employed by Sargent (1999) and Cho, Williams, and Sargent (2002). We show that our system can sometimes depart from the self-confirming equilibrium towards a non-equilibrium outcome characterized by persistently low nominal interest rates and persistently low inflation. Thus we generate events that have some of the properties of "liquidity traps" observed in the data, even though the policymaker remains committed to a Taylor-type policy rule which otherwise has desirable stabilization properties.

*The paper was discussed by:*
Leopold von Thadden
*(Deutsche Bundesbank)*

## Performance of Inflation Targeting Based On Constant Interest Rate Projections

Seppo Honkapohja
*(University of Helsinki)*
Kaushik Mitra
*(Royal Holloway College, University of London)*

Monetary policy is sometimes formulated in terms of a target level of inflation, a fixed time horizon and a constant interest rate that is anticipated to achieve the target at the specified horizon. These requirements lead to constant interest rate (CIR) instrument rules. Using the standard New Keynesian model, it is shown that some forms of CIR policy lead to both indeterminacy of equilibria and instability under adaptive learning. However, some other forms of CIR policy perform better. We also examine the properties of the different policy rules in the presence of inertial demand and price behaviour.

*The paper was discussed by:*
Anders Vredin
*(Sveriges Riksbank),*
Giuseppe Ferrero
*(Banca d'Italia)*


## Imperfect Knowledge, Inflation Expectations, and Monetary Policy

Athanasios Orphanides
*(Federal Reserve Board, Washington, DC)*
John C. Williams
*(Federal Reserve Bank of San Francisco)*

This paper investigates the role that imperfect knowledge about the structure of the economy plays in the formation of expectations, macroeconomic dynamics, and the efficient formulation of monetary policy.

Economic agents rely on an adaptive learning technology to form expectations and to update continuously their beliefs regarding the dynamic structure of the economy based on incoming data. The process of perpetual learning introduces an additional layer of dynamic interaction between monetary policy and economic outcomes. We find that policies that would be efficient under rational expectations can perform poorly when knowledge is imperfect. In particular, policies that fail to maintain tight control over inflation are prone to episodes in which the public's expectations of inflation become uncoupled from the policy objective and stagflation results, in a pattern similar to that experienced in the United States during the 1970s. Our results highlight the value of effective communication of a central bank's inflation objective and of continued vigilance against inflation in anchoring inflation expectations and fostering macroeconomic stability.

*The paper was discussed by:*
Alex Cukierman
*(Tel Aviv University)*




## Permanent and Transitory Policy Shocks in an Empirical Macro Model with Asymmetric Information

Sharon Kozicki
*(Federal Reserve Bank of Kansas City)*
Peter Tinsley *(University of Cambridge)*

Despite a large literature documenting that the efficacy of monetary policy depends on how inflation expectations are anchored, many monetary policy models assume: (1) the inflation target of monetary policy is constant; and, (2) the inflation target is known by all economic agents. This paper proposes an empirical specification with two policy shocks: permanent changes to the inflation target and transitory perturbations of the short-term real rate. The public sector cannot correctly distinguish between these two shocks and, under incomplete learning, private perceptions of the inflation target will not equal the true target.

The paper shows how imperfect policy credibility can affect economic responses to structural shocks, including transition to a new inflation target – a question that cannot be addressed by many commonly used empirical and theoretical models. In contrast to models where all monetary policy actions are transient, the proposed specification implies that sizable movements in historical bond yields and inflation are attributable to perceptions of permanent shocks in target inflation.

*The paper was discussed by:*
William Branch
*(College of William and Mary)*
Michael Binder *(University of Frankfurt and Center for Financial Studies)*

## The Role of Expectations in Economic Fluctuations and the Efficacy of Monetary Policy

Mordecai Kurz
*(Hehui Jin)*
Maurizio Motolese
*(Stanford University)*

We show diverse beliefs is an important propagation mechanism of fluctuations, money non neutrality and efficacy of monetary policy. Since expectations affect demand, our theory shows economic fluctuations are mostly driven by varying demand not supply shocks. Using a competitive model with flexible prices in which agents hold Rational Belief (see Kurz (1994)) we show that (i) our economy replicates well the empirical record of fluctuations in the U.S. (ii) Under monetary rules without discretion, monetary policy has a strong stabilization effect and an aggressive anti-inflationary policy can reduce inflation volatility to zero. (iii) The statistical Phillips Curve changes substantially with policy instruments and activist policy rules render it vertical. (iv) Although prices are flexible, money shocks result in less than proportional changes in inflation hence the aggregate price level appears "sticky" with respect to money shocks. (v) Discretion in monetary policy adds a random element to policy and increases volatility. The impact of discretion on the efficacy of policy depends upon the structure of market beliefs about future discretionary decisions. We study two rationalizable beliefs. In one case, market beliefs weaken the effect of policy and in the second, beliefs bolster policy outcomes and discretion could be a desirable attribute of the policy rule. Since the central bank does not know any more than the private sector, real social gain from discretion arise only in extraordinary cases. Hence, the weight of the argument leads us to conclude that bank's policy should be transparent and abandon discretion except for rare and unusual circumstances. (vi) An implication of our model suggests the current effective policy is only mildly activist and aims mostly to target inflation.

*The paper was discussed by:*
Margaret Bray
*(London School of Economics),*
Maik Heinemann
*(University of Hannover)*



## Policy Evaluation in Uncertain Economic Environments

William A. Brock, Steven Durlauf, Kenneth West
*(all University of Wisconsin)*

This paper describes some approaches to macroeconomic policy evaluation in the presence of uncertainty about the structure of the environment under study. The perspective we discuss is designed to facilitate policy evaluation for several forms of uncertainty. For example, our approach may be used when an analyst is unsure about the appropriate economic theory that should be assumed; it may also be employed when an analyst is unsure about the particular functional forms that translate a general theory into a form amenable to statistical analysis. As such, these methods are, we believe, particularly useful in a range of macroeconomic contexts where there are fundamental disagreements as to the determinants of the problem under study. In addition, this approach recognizes that even if one agrees on the underlying economic theory that describes a phenomenon, policy evaluation often requires taking a stance on details of the economic environment such as lag lengths and functional form that are not specified by the theory.

As such, our analysis is motivated by similar concerns as led to the development of model calibration methods. Unlike the usual calibration approach, we do not reject formal statistical inference methods but rather incorporate model uncertainty into them.

*The paper was discussed by:*
Marc Giannoni
*(Columbia University)*


# Bayesian Fan Charts for U.K. Inflation: Forecasting and Sources of Uncertainty in an Evolving Monetary System

Timothy Cogley
Sergei Morozov
*(both Stanford University)*
Thomas J. Sargent
*(New York University and Hoover Institution)*

We estimate a Bayesian vector autoregression for the U.K. with drifting coefficients and stochastic volatilities. We use it to characterize posterior densities for several objects that are useful for designing and evaluating monetary policy, including local approximations to the mean, persistence, and volatility of inflation. We present diverse sources of uncertainty that impinge on the posterior predictive density for inflation, including model uncertainty, policy drift, structural shifts and other shocks. We use a recently developed minimum entropy method to bring outside information to bear on inflation forecasts. We compare our predictive densities with the Bank of England's fan charts.

*The paper was discussed by:*
Kenneth West
(University of Wisconsin)
Sylvia Kaufmann
(Austrian National Bank)