

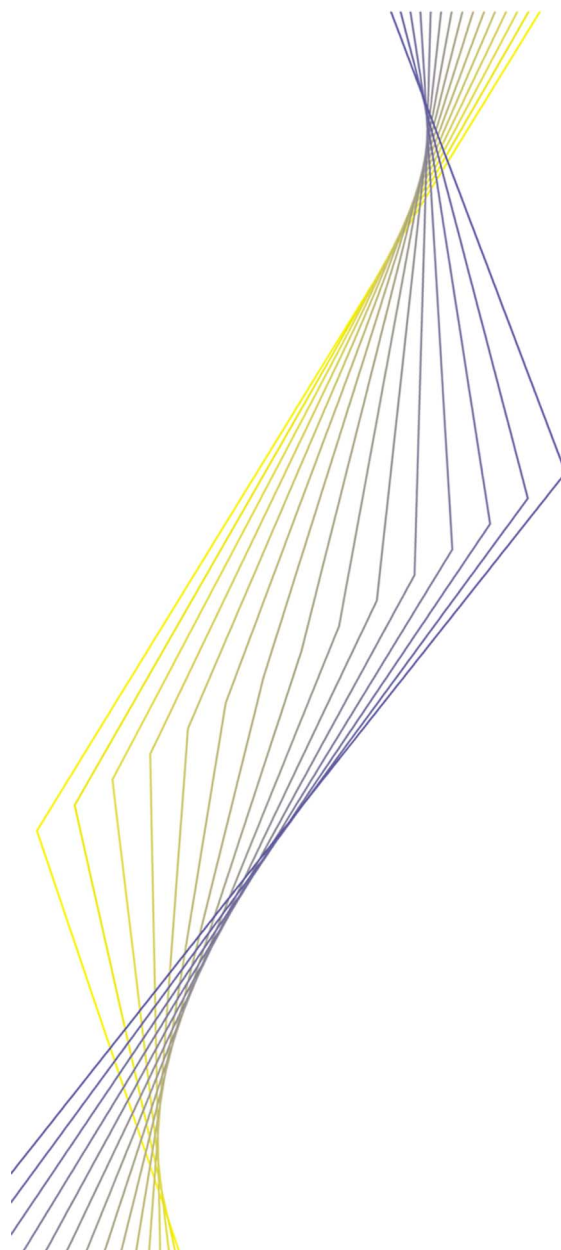
WORKING PAPER NO. 26

**WHICH KIND OF
TRANSPARENCY?
ON THE NEED FOR CLARITY
IN MONETARY POLICY-MAKING**

BY BERNHARD WINKLER

AUGUST 2000





WORKING PAPER NO. 26

**WHICH KIND OF
TRANSPARENCY?
ON THE NEED FOR CLARITY
IN MONETARY POLICY-MAKING***

BY BERNHARD WINKLER**

AUGUST 2000

* Revised version of a paper presented at the ECB-CFS conference on "Monetary Policy-Making under Uncertainty", held in Frankfurt, 3–4 December 1999. I would like to thank conference participants, colleagues at the European Central Bank and an anonymous referee for helpful comments. All errors and misconceptions remain mine. The views expressed in the paper are the author's and do not necessarily reflect the views of the European Central Bank.

** European Central Bank, Kaiserstrasse 29, D-60311 Frankfurt am Main. E-mail: bernhard.winkler@ecb.int.

© European Central Bank, 2000

Address	Kaiserstrasse 29 D-60311 Frankfurt am Main Germany
Postal address	Postfach 16 03 19 D-60066 Frankfurt am Main Germany
Telephone	+49 69 1344 0
Internet	http://www.ecb.int
Fax	+49 69 1344 6000
Telex	411 144 ecb d

All rights reserved.

Reproduction for educational and non-commercial purposes is permitted provided that the source is acknowledged.

The views expressed in this paper are those of the authors and do not necessarily reflect those of the European Central Bank.

ISSN 1561-0810

Contents

Abstract	5
<hr/>	
1 Understanding transparency: some terminology	7
<hr/>	
2 Which kind of transparency: lessons from the literature?	9
2.1 Transparency-cum-credibility	9
2.2 Transparency-cum-rationality	12
<hr/>	
3 The twin roles of a monetary policy strategy: information efficiency and communication	15
<hr/>	
4 A differentiated view of transparency: clarity, honesty and common understanding	18
4.1 Clarity and information efficiency: a simplicity theory of transparency	18
4.2 Honesty: a correspondence theory of transparency	20
4.3 Common understanding: a co-ordination theory of transparency	23
<hr/>	
5 Concluding remarks	26
<hr/>	
References	27
<hr/>	
European Central Bank Working Paper Series	33

Abstract

In most of the existing academic literature the notion of transparency in monetary policy is defined in too simple terms to be of practical relevance. This paper suggests a conceptual framework, which distinguishes different – and potentially conflicting – aspects of transparency. When there are frictions in communication or imperfections in the processing of information, greater “openness” (i.e. more information) need not always enhance the “clarity” of central bank communication. In this perspective transparency primarily hinges on a shared mode of interpretation (“common understanding”) between the central bank and its audience.

JEL classification: E42, E52, E58, F58

Keywords: transparency, monetary policy strategy, communication

“Whereof one cannot speak thereof one must be silent”
(Ludwig Wittgenstein, *Tractatus Logico-Philosophicus*, 1921)

*“Whatever is going to seem right to me is right.
That only means that here we can’t talk about ‘right.’”*
(Ludwig Wittgenstein, *Philosophical Investigations*, 1953)

I Understanding transparency: some terminology

There has been a recent revival of interest in the academic literature on the role of transparency in monetary policy-making. Partly this renewed interest reflects the increased attention that central banks seem to devote to communication issues in monetary policy in practice. The widely perceived trend towards greater transparency can, first, be related to decisive moves towards greater central bank independence in a large number of countries over the last decade or so. In this context it is widely argued that transparency facilitates accountability, which in turn can be regarded as the *quid pro quo* of central bank independence in a democratic society. A second explanation has to do with the growing importance of financial markets and private agents' expectations for the conduct of monetary policy. Here it is often argued that greater transparency makes monetary policy more predictable as well as more effective and credible in achieving its objectives. This latter contention has, however, remained a subject of dispute in the literature.

Section two of this paper provides a tentative and selective overview of the state of the academic debate about transparency in monetary policy. In the standard models used in that literature (as well as in much of the policy debate) transparency is essentially identified with the amount or the degree of precision of information that the central bank releases to the public. The argument then usually revolves around the question of whether transparency – thus defined – is desirable or not in the models under consideration. No robust conclusions seem to have emerged on that count to date. This may be regarded as a first note of caution against drawing specific policy conclusions for practical policy-making from this literature.

The simple, one-dimensional notion of transparency underlying most of the existing academic literature casts no light on the question of how central banks should go about conveying information in a way that is best understood by the public. It assumes that simply “making more information available” (or giving more precise information) automatically translates into greater transparency. In other words there is no potential friction in the process of transmitting information. The remainder of this paper leaves the issue of *whether* transparency is desirable largely to one side. Instead we propose a conceptual framework, in which the question of *how* to achieve transparency becomes non-trivial. To this end we define transparency broadly and loosely as the degree of genuine understanding of the monetary policy process and policy decisions by the public. This opens up the possibility to distinguish several aspects of transparency, which may conflict with each other. *Section three* illustrates our broad notion of transparency by discussing the role of a monetary policy strategy for internal and external communication.

Our “broad” use of the term “transparency” is supported by the empirical observation that, indeed, transparency seems to mean different things to different people. In any case this seems to be true with respect to the debate about the transparency of the European Central Bank (ECB).¹ Some critics (especially academics) call for the release of more information on the range of views expressed in Governing Council meetings, the publication of minutes and voting records. At the same time other commentators (especially from the financial markets) complain about the confusion arising from the slightest variation of emphasis in policy-makers' statements, when they do not sufficiently “sing from the same hymnbook”. In other words the ECB is “talking too little” for some and “talking too much” for others.

In a similar vein the reliance of the ECB's monetary policy strategy on two pillars including a wide range of indicators is regarded as non-transparent both by supporters of direct inflation targeting as well as those championing a regime of monetary targets. Both camps generally clamour for

¹ See, for example, the exchange between Buiter (1999) and Issing (1999) and the discussions in Padoa-Schioppa (2000) and Remsperger and Worms (1999).

more details on the data and analysis underlying monetary policy, in particular with regard to variables that they themselves consider ought to be the key determinants of policy decisions. At the same time both camps regard the ECB's strategy as unduly complex and would prefer if monetary policy could be related to a smaller set of variables or even a single indicator in a simple, predictable fashion. Unsurprisingly, both camps claim the attribute of "transparency" exclusively for their own favoured approach. Direct inflation targeting is dismissed by critics as non-transparent because inflation forecasts are hard to assess in terms of the structural relationships and informal judgement they are based on (e.g. EMU Monitor, 1998). By contrast monetary targeting is criticised as non-transparent mainly because targets would be ignored by policy-makers in practice (e.g. Svensson, 1999).

All of this suggests that the notion of transparency has different and potentially conflicting aspects to it, which are discussed in greater detail in *section four*. The first, narrow, notion of transparency as the amount and precision of information that is released will be referred to as *openness* in the remainder of the paper. However, openness is not by itself sufficient for achieving transparency, when the latter is defined more broadly as a measure of genuine understanding and, hence, of successful communication. Information has to be processed, structured, condensed, simplified and put into context in order to become comprehensible. This second element of transparency refers to the degree of *clarity* in the presentation and interpretation of information. The need for clarity in the first instance arises in the "information processing" activity required for filtering and interpreting information. The costs and benefits of this activity will need to be balanced at the margin in order to achieve an efficient use of information. The implied optimal level of clarity will differ across different agents and across different decision problems.

The need for clarity becomes even more pronounced when it comes to communication or the effective transmission of information. This involves both a "sender" and a "receiver" (using game theoretic or linguistic jargon). Thus transparency is a social phenomenon rather than an absolute property of particular communication tools. What matters is the degree to which both parties to the communication process share a common interpretation device (or "language") for encoding and decoding a message. We call this third aspect of transparency *common understanding*. Common understanding can be regarded both as an important precondition for successful communication as well as the ultimate objective of genuine transparency.

The two-sided nature of communication means that a wedge can arise between the understanding of the receiver and the sender of messages. It also opens the door for strategic considerations such as purposeful distortions in the encoding of messages. Therefore *honesty* can be regarded as an additional, fourth, requirement for true transparency or genuine understanding. In the context of the example of a monetary policy strategy honesty refers to the degree to which the framework for reasoning and analysis adopted by central banks internally corresponds to the presentation adopted for the purpose of external communication. Note that to the extent that clarity requires simplification at both the *information processing* and the *information transmission* stages honesty need not necessarily coincide with simple openness.²

Attempting to give precise theoretical meaning to each of these terms and, perhaps, even relate them in a single model would appear to be a rather ambitious task. The more modest purpose of the present paper is to illustrate the different aspects of transparency identified above by drawing selectively on rather separate strands of a wider academic literature than that which has to date been deployed in the debate about transparency in monetary policy. In this context the paper

² These various aspects of transparency seem to correspond nicely to common dictionary definitions, where the term "transparent" is described among others as "easily seen through" (*openness*), "evident" (*clarity*), "frank" (*honesty*) and "easily understood" (*common understanding*).

provides a tentative point of departure for the direction in which the standard presumptions of perfect rationality, limited uncertainty, homogenous information, common knowledge and frictionless communication may need to be relaxed. The main purpose of the paper is to propose a novel conceptual framework, in which communication issues for monetary policy and the question of *how* rather than *whether* to be transparent could be discussed in a more meaningful way. This shift of emphasis is perhaps as stark as the reputed difference between the early Wittgenstein's quest for a unique right (and perfect) language and the later Wittgenstein's recognition of many possible (and equally right) languages.

2 Which kind of transparency: lessons from the literature?

The simplest way to think of transparency relates to the amount or the precision of information, i.e. the extension or the degree of "coarseness" of the information set, upon which economic agents base their decisions or expectations. It is thus often simply treated as the inverse of uncertainty, modelled as "noise" terms in the signals that private agents receive. This conceives of information – and hence transparency – like any other normal and homogenous good: more of it will always be better (at least in the absence of further distortions). It can only but help economic agents make better-informed choices. Most of the existing literature on transparency vs. secrecy in monetary policy making treats transparency as a one-dimensional variable and analyses the case for and against it. This section provides a brief, preliminary assessment of this literature and examines the underlying assumptions, which would need to be relaxed for a richer notion of transparency.

2.1 Transparency-cum-credibility

The general case for transparency is clear and compelling. A convenient starting point is the early discussion in Goodfriend (1986). He presents the arguments used by Federal Reserve officials in arguing a legal case against demands for the prompt release of information on FOMC minutes and policy directives and surveys the nascent academic literature on monetary policy games at the time. The gulf between the modes of reasoning of academics and practitioners is instructive for our purposes. Goodfriend forcefully rejects arguments for secrecy on the ground that the release of information and providing more precise information would reduce asymmetric information and uncertainty in the markets. This reasoning rests on the assumption that financial markets use information efficiently and form expectations rationally. From such a perspective greater transparency should reduce forecast errors and is welfare improving almost by definition. The concerns expressed by Fed officials at the time – in particular that the release of particular pieces of information could destabilise markets and increase interest rate volatility – are indeed difficult to rationalise in such a framework. One point of departure for a more comprehensive notion of transparency would therefore suggest a relaxation of the efficient market and rational expectations hypotheses as well as allowing for heterogeneous agents. This opens up the possibility that an identical piece of information can be interpreted differently or "mis-read" by market participants.³

The literature on secrecy or transparency in monetary policy-making has gone largely in a different direction and has retained the rational expectations and rationality assumptions. Most work in this area has since drawn on the Barro-Gordon (1983) time-inconsistency model and the subsequent string of variations on monetary policy games (cf. the survey in Cukierman, 1992).

³ Subsequently the older literature explored the impact of secrecy on the variability of interest rates, which – depending on how uncertainty was introduced – was argued to decrease (Dotsey, 1987) or increase (Tabellini, 1987). Both contributions established adverse effects of secrecy on the quality of private sector forecasts, in contrast to Rudin (1988), who considered heterogeneous agents with differing forecasting accuracy.

The reliance on the Barro-Gordon model means that in interpreting results it will be difficult to disentangle “pure” transparency and credibility issues. In such a setting any incentive to withhold information will usually depend on the presence of an inflation bias arising from postulated benefits of surprise inflation. This seems to be an ill-suited point of departure, given that most central bankers – and certainly those of the independent variety – firmly reject the notion that any of them would ever wish to surprise inflate in an (ultimately futile) attempt to drive unemployment below its natural rate (Blinder, 1997). The case for secrecy – to the extent that it relies on the Barro-Gordon set-up – can thus be argued to rest on questionable foundations with respect to the characterisation of policy makers. One could perhaps say that the central bank as the “sender” in the communication game is portrayed as *not rational enough*, while the public and market “receivers” are pictured as *too rational*.

One needs to keep in mind that the literature on monetary policy games has been developed in order to explore the notion of credibility and that interpretations in terms of transparency have been rare until recently. In the older literature of the 1980s, often the central bank’s strategy space was in fact the inflation rate directly (with no independent role either for a transmission mechanism or for central bank communication).⁴ Uncertainty was either introduced with respect to central bank preferences (“incomplete information”) or asymmetric information about the state of the economy (“imperfect information”).

Both types of uncertainty have been combined in the early attempt by Cukierman and Meltzer (1986) to model the notion of ambiguity. In the presence of both types of uncertainty the public faces a signal extraction problem in inferring whether observed policy outcomes are driven by changing central bank objectives or are due to noise. In their model transparency relates to the precision of monetary control and they show – when preferences are assumed to evolve stochastically as an AR(1) process – that some degree of ambiguity (i.e. deliberately not minimising errors in the monetary control technology) could be welfare improving since it allows monetary authorities to make better use of surprise inflation in stabilisation policy. This model has been extended with a view to achieving a more meaningful description of transparency than as a monetary control error both by Faust and Svensson (1998), again in an infinite horizon setting, and by Geraats (2000) and Jensen (2000) in a two period set-up.

Faust and Svensson (1998, 1999) split the monetary control error into two separate noise terms and modify the objective function used by Cukierman and Meltzer (1986) to be quadratic, rather than linear in output. They also conduct a more comprehensive welfare analysis and find that transparency, in their definition, is “almost always” preferred by society, but often not by the central bank, which prefers discretion to pursue idiosyncratic output goals. Here one can again take issue with the notion that central banks pursue hidden objectives, which are both changing over time and distinct from society’s. Moreover, the authors themselves point to the – to their mind – “paradoxical” result that complete transparency about central bank preferences actually leads to the worst of all outcomes. This is in fact unsurprising, since complete information takes away the reputation incentive, i.e. the possibility to conceal the central bank’s true objectives. It is this possibility which leads to a beneficial reduction of equilibrium inflation relative to the inflation bias prevailing under complete information.

In this class of models the case for/against transparency depends on the presence of an inflation bias and results are also unlikely to be robust to even the slightest variations in the specification of the game in terms of time horizon, strategy space and information structure. Jensen (2000),

⁴ Cukierman and Liviatan (1991) and related work has introduced a role for policy announcements in order to model “dependable” types of policymakers, who never break promises. The issue of transparency as the precision of inflation control under inflation targeting (Cukierman, 2000) or in the comparison of inflation and monetary targeting (Laubach, 1999) has only recently been raised in this type of signalling model.

using a two-period model, overturns the results in Faust-Svensson (1998) by replacing the standard Lucas-type supply function with a New-Keynesian forward looking Phillips Curve. This gives rise to a trade-off: transparency is good for credibility (reducing inflation expectations) but constrains flexibility in the pursuit of output stabilisation.⁵ Moreover, all the models mentioned do not allow reputation incentives to play out more fully, since the strategy space is restricted by the assumption of a linear learning rule for the updating of the public's beliefs. Relaxing that assumption (i.e. allowing for a richer set of signalling strategies by the central bank) could also lead to rather different results as in the example presented by Illing (1998) for a two-period model.

Geraats (2000) has probably gone furthest in trying to give a more concrete meaning to the notion of transparency, which she identifies with the release of central bank forecasts. In her (two-period) model central bank forecasts of output and inflation jointly represent a complete summary ("sufficient statistic") of the central bank's (private) information on economic shocks. The publication of such forecasts would therefore allow the public to infer central bank preferences perfectly and thus predict interest rate decisions accurately. Unlike in Jensen (2000) in her model transparency appears to be a "free lunch" improving both credibility and output stabilisation. By contrast other work has highlighted potential costs of forecast publication in the context of models which do not assume uncertainty about central bank objectives. In such circumstances greater transparency, by reducing the information advantage of central banks, impedes effective output stabilisation as well as potentially also raising inflation variability (Gersbach, 1998) or interest rate variability (Cukierman, 1999).

Mayes and Tarkka (1999) portray the role of published forecasts rather differently. They are not seen as instruments to convey the central bank's private information on the economy to the public. Rather their publication seeks to reveal the central bank's estimate of the private sector's inflation forecasts as well as signalling the central bank's time-varying inflation target and policy intentions. Unlike the literature discussed so far their paper thus starts from the presumption that the central bank and private agents differ in their assessment of economic data even in the absence of any private information on the part of the central bank. Somewhat counter-intuitively the non-publication of private agents' forecasts is the source of the relevant information asymmetry. In such a situation the publication of the central bank's own forecasts serves as an (imperfect) substitute for the private sector's inability or unwillingness to reveal their forecasts or expectations. This seems a somewhat round-about way of achieving transparency between the central bank and the public.

What can we take away from this literature for practical policy-making? Unfortunately: rather little. *First*, results on the welfare case for or against transparency are all over the place, despite a strong intuitive presumption in its favour. *Second*, the case for or against transparency usually is predicated on the presence of central bank incentives for surprise inflation in the pursuit of output objectives and, consequently, a potential trade-off between credibility and flexibility. This is a questionable assumption, but – more importantly for our purposes – it does not allow to discuss (and separate out) "pure" communication issues independently from the time inconsistency problem. *Third*, in most of the models discussed the public faces a signal extraction problem in making inferences about hidden central bank objectives from observed actions and any additional private information released by central banks. This raises the question of why such

⁵ Earlier work drawing on Lucas-type surprise Phillips Curve (but in the context of single-period models) by Eijffinger et al. (1997, 1998) also finds that greater transparency will allow for less output stabilisation while reducing the inflation bias. These effects of "transparency" are, however, not robust to the exact way in which uncertainty on central bank preferences is introduced. This difficulty is echoed in the literature on optimal central bank contracts aimed at removing the time inconsistency problem altogether, initiated by Walsh (1995) and Persson and Tabellini (1993). Here Beetsma and Jensen (1998) reach different conclusions on the impact of preference uncertainty on optimal contracts and targets than Nolan and Schaling (1996) and Schaling et al. (1998).

an indirect way of revealing information should be more effective and credible than a direct commitment to (and communication of) policy goals. After all, central bank's primary objectives are in many cases clearly and publicly defined. Similarly the extent to which central banks possess systematically superior information about the state of the economy compared to sophisticated private agents – the second source of information asymmetry underlying these models – can also be called into question.

Given the information asymmetries and the presence of an inflation bias usually assumed in this literature, it is not clear how any “optimal degree of transparency” (as in Faust and Svensson, 1999) derived from such models can be committed to. How would a central bank be able to commit to reveal information truthfully and completely, when at the same time in these models it is assumed to *lack* the commitment ability to resolve the time consistency problem and to have an incentive to misrepresent information about its true objectives initially? Thus the difficulty of imposing transparency on a central bank that is *assumed* to be recalcitrant is underestimated or not properly addressed within these models.⁶

Even if one leaves any potential incentive problems aside and instead – perhaps more realistically – starts from the presumption that the central bank is genuinely interested in promoting transparency and public understanding of its policies the policy recommendations typically based on this literature underrate the difficulties of communication that arise even in the absence of credibility problems. It gives the impression that achieving transparency is an all too simple task: various noise terms and sources of uncertainty introduced into these models instantly and miraculously disappear just by making available “all information” at central banks' disposal. Transparency is sold as a “free lunch” while the models (if not the modellers) remain silent on the issue of how to obtain it.

2.2 Transparency-cum-rationality

The treatment of “transparency” in the context of the older credibility literature on monetary policy games – outlined above – can be regarded as unsatisfactory for two deeper reasons. On the one hand agents are already assumed to *know too much* to start with; the source and nature of uncertainty is limited and such that it can be easily remedied. Thus the problem of transparency is underestimated. At the same time it can be argued that agents *know too little* to resolve the notorious multiplicity problems in games under incomplete information and signalling games in particular. Equilibrium in this class of games will be a function of both strategies and beliefs. Multiplicity arises from the difficulty of finding reasonable restrictions on beliefs, in particular off the equilibrium path, in other words how to describe how agents would adjust beliefs in situations where what was expected to happen did not happen (Kreps, 1989). Such “strategic” uncertainty about equilibrium behaviour in game situations, on top of uncertainty about the “true” model of the economy, needs to be recognised for a more comprehensive understanding of communication challenges in monetary policy.

The literature on monetary policy games in fact mirrors and imports the results of the game theoretic research programme of the 1980s on equilibrium refinements. The objective was to define and push to the limit the notion of individual rationality in the (ultimately futile) attempt

⁶ The incentives for central bankers, who suffer from time-inconsistency, to misrepresent information is recognised, for example, in Walsh (1999) and Muscatelli (1999). Information will be revealed – but only partially – if central banks are held accountable for inflation targets they would themselves announce after the realisation of (non-verifiable) shocks. The general problem of how to induce truthful revelation of information, which may only be partly verifiable, is approached by the literature on mechanism design (e.g. Green and Laffont, 1986). Optimal performance contracts thus need to resolve the twin problem of providing performance incentives and inducing truthful revelation of information. Moreover, if some aspects of central bank performance are not verifiable this could lead to “optimal” contract incompleteness even along performance dimensions, which can be verified (Bernheim and Whinston, 1998).

to derive a uniquely rational way to play in game situations. Where multiplicity of equilibria persists reference will have to be made to information outside the game, such as pre-play communication, focal points, convention, history etc. to solve equilibrium selection problems. An analogous issue arises in the macroeconomic literature under multiple rational expectations equilibria and sunspots, where again equilibria are a function of fundamentals *and* beliefs (Cass and Shell, 1983). Thus agents know *too little* to arrive at a unique equilibrium prescription.

On the other hand, even the basic concept of “unrefined” Nash equilibrium (and, similarly, the rational expectations hypothesis, when interpreted as a Nash equilibrium in the underlying expectations game) has been criticised as already assuming a degree of co-ordination in the behaviour of individual agents that is not implied by individual rationality alone, which would only suggest the weaker notion of *rationalisability* (Bernheim, 1984). From this perspective agents are assumed to know already *too much*. An example of a macroeconomic application drawing on rationalisability (loosely defined as compatibility with the data) is the work by Kurz (1994, 1996), which permits a diversity of rational beliefs. In other words, agents can start out with and can potentially retain different models of the world, given identical information. Unlike under standard rational expectations assumptions this opens up a separate channel through which communication can directly operate on the belief structure. The way this happens will depend on how information is interpreted (differently!) by different agents.

This line of reasoning can be taken further to question the *common knowledge* assumption underlying most traditional game theory, i.e. the assumption that players know the structure (or “rules”) of the game and know that other players know this structure, and know that they know that they know ... *ad infinitum* (Geanakoplos, 1992). Again the parallel in the macroeconomic literature is that rational (model-consistent) expectations are formed assuming knowledge of the true (or at least the same, shared) model of the economy. Relaxing the common knowledge assumption, i.e. introducing higher order uncertainty about what other agents know about the model, can paradoxically actually help to resolve multiplicity problems (Morris and Shin, 1998, Heinemann and Illing, 1999). In some sense, agents who know less may “know more”, i.e. have less difficulty in choosing and co-ordinating their actions.

What are the implications for the discussion of transparency? On the one hand, the challenge of achieving transparency seems to be even more daunting and of a different nature than thought previously. On the other hand socially determined behaviour may (and will have to!) come to the rescue in alleviating uncertainty, indeterminacy and unpredictability in human interaction. One possible way to define transparency, useful for the purpose of this paper, is thus as the *degree* of common knowledge or *common understanding* across agents (Morris and Shin, 1997). From this perspective the prime task for central bank communication policy would consist of making its view of the world commonly understood and to make information available in a form (or language) that is *shared* with the public and understood *across* different segments of the public. In order to minimise higher order uncertainty about how other agents interpret information this suggests that central banks should avoid using a language that is only understood by a subset of the (relevant) public or leaves doubts that it may not be understood in the same way.

If one wishes to retain the common knowledge assumption, transparency could alternatively be defined as the degree to which expectations are co-ordinated on a particular equilibrium in the presence of multiplicity. A further way of thinking of transparency is in terms of the prior beliefs that players are endowed with at the start of the game or the degree of convergence of beliefs in learning models. The traditional signalling models of Bayesian learning – which are used in the literature on monetary policy games – can be criticised as depicting a world where all learning is effectively “already over” at the beginning of the game (Binmore, 1992). Players already know

what is “learnable”, i.e. dispose of a complete description of the world and all possible contingencies. Moreover the common prior assumption widely imposed in game theory implies that agents essentially cannot agree to disagree (Aumann, 1976). Instead, one may wish to contemplate a less deterministic universe, which allows for more fundamental uncertainty about the future – such as unforeseeable contingencies (Kreps 1992) – and allows people to disagree and interpret even *identical* information differently.⁷ By contrast, the Bayesian view of the world (and rational learning models based on it) – just like subjective expected utility theory more generally – treats uncertainty about human behaviour the same way as uncertainty about nature (Battigalli, 1999). A view of transparency as a social phenomenon may therefore be difficult to reconcile with the Bayesian learning models dominant in the literature.

If one is not prepared to weaken the strong rationality assumptions underlying game theory a useful place to look for insights on communication more directly is the literature on *cheap talk*.⁸ In this setting the problem of multiplicity of equilibria multiplies, since communication (unlike in traditional signalling models) draws on costless (“cheap”), non-binding and non-verifiable messages. Thus it is even more difficult to discriminate between different types of senders and to sustain credible announcements. In particular “babbling equilibria”, where messages sent are completely uninformative, cannot be ruled out. Costless communication can nevertheless become informative if there is a sufficient degree of common interest among players. One general insight from the cheap talk literature suggests that more precise messages may be less credible. Instructively for our purpose the role of language itself can be analysed as a communication and co-ordination device. As Farrell (1993) has shown the use of language, because the literal meaning of words is “focal”, can help to reduce the number of equilibria. Language can play this co-ordination function because of its nature as a commonly accepted *convention*.⁹ From this perspective the notion of central banks’ monetary policy strategies and their modes of communication could be regarded as particular “languages” – both in terms of “conventions” and in the sense of conveying “signals” in cheap talk games.

The purpose of this section was not to show what *can* be learned from the literature usually referred to in discussions of monetary policy, but rather to point out what we *cannot* expect to learn from it and hence to look elsewhere. We have cast some doubts on the basic underlying assumptions employed in this branch of the literature which stand in the way of a fuller understanding of the nature of communication challenges that central banks face in the pursuit of transparency. The next section briefly maps out the nature of these communication challenges in the context of a central bank’s monetary policy strategy before section four goes on to provide a tentative conceptual framework to organise further thoughts on this issue.

The main note of caution to take away from our discussion of the literature concerns the nature of uncertainty facing both central banks and the public. This uncertainty is not captured by the standard assumption of asymmetric information given a known, shared model of the economy and common knowledge of that model. In particular, uncertainty not only (and probably not primarily) regards central bank objectives and any private information that central banks are assumed to have with respect to data on the state of the economy. What matters at least as much is uncertainty about the interpretation of information by the central bank and the public, about different views and models of the economy as well as uncertainty about the (strategic) behaviour, reactions and expectation formation of economic agents. In such a setting it is no

⁷ For experimental or empirical evidence on how different agents interpret identical information differently see, for example, Kandel and Zilberfarb (1999), Haruvy et al. (1999).

⁸ Farrell and Rabin (1996) provide an overview. The classic reference on imprecise communication is Crawford and Sobel (1982); applications to monetary policy are provided by Stein (1989), Garfinkel and Oh (1995).

⁹ The idea of language as a convention goes back to Lewis (1969). For an introduction see Young (1996). Blume et al. (1998) describe an experimental setting where meaning of messages can evolve endogenously. The common iterated knowledge assumptions required for a common language are explored by Shin and Williamson (1996).

longer obvious which approach to communication and the release of information is best suited to enhance genuine transparency and to provide clear guidance to expectations or – more modestly – to avoid that central bank pronouncements become themselves a source of additional uncertainty and volatility in the economy.

3 The twin roles of a monetary policy strategy: information efficiency and communication

There are several ways to define the meaning of a monetary policy strategy. In a narrow sense it simply reflects how policy-makers actually map information on the state and the working of the economy (data, models) into policy decisions in order to achieve given policy objectives. This mapping or “reaction function” is potentially very complex and thus it may not be possible to provide a unique and complete objective description. In this case a first source of friction, ambiguity and “non-transparency” arises as a wedge between the *actual* monetary policy executed by a central bank and any – necessarily incomplete and subjective – account of monetary policy as *perceived* by policy-makers themselves or by outside observers. This means that there need not be a unique, single “correct” way to represent the complex *actual* monetary policy mapping or decision rule.

The approach adopted in this paper therefore suggests a second, looser definition of a monetary policy strategy as a systematic framework for organising and structuring information and analysis rather than a specific monetary policy reaction function prescribing direct or “mechanical” links of policy decisions to particular economic variables. In this context a monetary policy strategy serves two twin purposes. *First*, it provides the internal framework for the “processing” and assessment of information and thus provides the basis for efficient decision-making. On this count a monetary policy strategy must aim at *information efficiency*.¹⁰ The *second* function of a monetary policy strategy is to provide a framework for communication (i.e. a vehicle for information transmission) both externally – in explaining monetary policy to the public – and internally (at least in the case of decision-making by a committee, but also in interaction between staff and policy-makers). As will be discussed in more detail in the next section the aim of clear and *effective communication* externally need not coincide with the requirements for information efficiency for internal decision making and internal communication.

Under either the narrow or the broad definition of a monetary policy strategy and with respect to both its information processing and its communication role, the ultimate requirement for a strategy is, of course, its “goal efficiency”. Thus a complete analysis would need to establish how information efficiency and effective communication in turn contribute to the final objective of monetary policy. As stressed before, this is *not* the focus of this paper. For our purposes we simply take the prerequisite of goal efficiency and the desirability of genuine transparency as given (or rather leave these important but separate issues to one side) by only looking at the “sub-problem” of *how* to achieve meaningful transparency. Alternatively one could also treat transparency as an objective in its own right.

Academic economists have tended to follow the narrow definition of a monetary policy strategy in the sense of optimal policy rules (expressed either in terms of the policy instruments or the final targets) derived in the Tinbergen-Theil tradition of optimal control. In such a perspective monetary policy essentially reduces to an engineering problem and transparency simply (and narrowly) requires policy-makers to reveal all the information they have including their policy

¹⁰ Note that we hesitate to use the label “full information approach” as a desirable feature of monetary policy because this terminology fails to reflect the need for clarity in balancing the marginal benefit of including additional information with the marginal cost of processing and interpreting that information in complex decision problems.

rule or policy reaction function. Practical policy-makers tend to argue that the monetary policy problem is so complex that it would be hopeless to even try to write down the decision problem and, even if that were possible, any resulting decision rule would be too complicated to be comprehensible (Blinder, 1997). Most would concur with John Vicker's (1998) dictum – in the context of the derivation of the UK Monetary Policy Committee's inflation forecast – that how this is done is “literally indescribable in detail”.

Such statements seem to lend support to our distinction between information efficiency in the monetary policy process and effective communication of that process (with the additional requirements of clarity, honesty and common understanding). This also suggests that *complete* transparency about the actual policy formation process, unlike in the economists' models, will be unattainable in practice. There are natural limits to (and subjectivity in) any description of the monetary policy process. Thus the complex process of actual policy-making – in which data, models, judgement, preferences, decision procedures are mapped into policy decisions – will necessarily remain something of a “black box” or at least a “grey box”. A complete “glass box” is not feasible and thus a need for communication in monetary policy remains.

Figure 1: Monetary policy strategy and communication

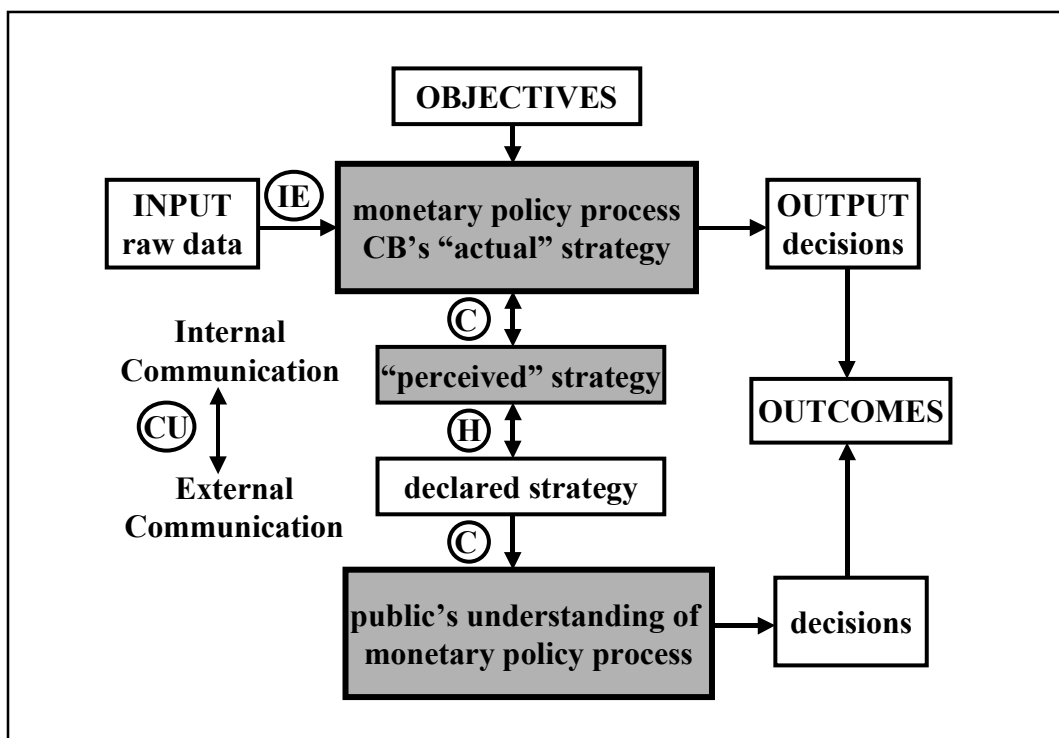


Figure 1 provides a stylised account of the different internal and external dimensions of a monetary policy strategy and how these can be related to the various notions of transparency to be discussed in greater detail in the subsequent section. The top panel – in horizontal direction – depicts the central bank internal activity of information processing, analysis and decision making. It describes the mapping from the data inputs to the monetary policy process and the central bank objectives into policy decisions as the output of that process. Note that all three individual elements – data input, decision output and official central bank objectives, if perhaps not true motivations of individual policy-makers – can be made publicly observable, verifiable and contractible without great difficulty and thus lend themselves as the basis for formal accountability. This is also true of the ultimate economic outcomes (depicted on the right-hand-

side) which will be codetermined by the decisions of other economic agents apart from the central bank.

The desirability of transparency (or rather openness) in these dimensions has been relatively uncontroversial in recent years. There remains some dispute about the degree of precision with which objectives should be defined and – as noted before – on the degree to which central banks dispose of some inherent information advantage on the state of the economy relative to the private sector. Arguably information asymmetries on this count are limited to start with, can easily be eliminated and conceivably could even go in the opposite direction (i.e. in some respects the private sector may have better information than the central bank).

By contrast the shaded “grey box” in between relates to everything in the monetary policy process, which cannot be conclusively verified or easily communicated. This concerns the interpretation of information, the thought processing and assessment undertaken in the mapping from inputs and objectives into decisions. As argued before this mapping – or the “actual” monetary policy strategy – cannot be made fully transparent or fully disentangled, but at most be approximated by some (simplified and subjective) description. A monetary policy strategy consists of such a simplified description. Inside the central bank it helps to structure and organise the actual information processing and decision making activity with a view to information efficiency as an optimal basis for policy-making. At the same time the strategy as “perceived” by the policy-makers acts as a framework for communication internally and – to the extent that a strategy is declared vis-à-vis the public – as a vehicle for explaining monetary policy externally.

The communication dimension of monetary policy is reflected in the central vertical dimension of *Figure 1*. A first thing to note is that policy-makers themselves – like the public – face a transparency problem. This applies both with respect to interpreting the wealth of information they are confronted with and with respect to their ability to describe in perfectly clear and precise terms how a particular decision was arrived at on the basis of the information at their disposal. Note also that there is symmetry: the public’s understanding of monetary policy constitutes a “grey box” just like the central bank’s decision making and private perception of the monetary policy strategy.

Figure 1 also illustrates the terminology on the various aspects of transparency adopted in this paper. With respect to its role in structuring and interpreting information and preparing policy decisions a monetary policy strategy must seek to satisfy the criterion of *information efficiency* (IE). With a view to effective communication a monetary policy strategy needs to provide a representation of the complex monetary policy process, which is honest and can be clearly and commonly understood. The need for *clarity* (C) arises symmetrically both for policy-makers’ and the public’s understanding of monetary policy process, even though what is required for clarity is likely to differ between different groups. *Honesty* (H) refers to the degree to which policy-makers’ own understanding and perception of their strategy corresponds to their publicly stated declarations. The ultimate measure of successful communication (and at the same time a precondition!) is the degree of *common understanding* (CU), i.e. how much the strategy is interpreted and understood in the same way by the central bank and the public.

As discussed in the next section, in the absence of a perfect common understanding of monetary policy openness will not be sufficient for transparency and trade-offs may arise between the requirements of clarity and honesty in communication and information efficiency in the conduct of monetary policy. In practice the borderlines of the “grey box” of the monetary policy process in *Figure 1* are somewhat fuzzy and can be moved in or out in particular dimensions. However, in the absence of complete transparency and common understanding to start with any partial extension of openness about selective information items within the “grey box” need not

necessarily advance the public's understanding of monetary policy *in toto* but could instead be misleading. This is somewhat akin to the general theory of the second best in the welfare analysis of general competitive equilibrium where removing a single distortion may reduce overall welfare in the presence of further distortions. Moreover, making individual and selective pieces within the "grey box" visible and observable – trying to move them outside the box and turning them into a vehicle for external communication – is also likely to affect the role of such information in the internal decision process (in the spirit of "Goodhart's law" on the break-down of the stability of monetary relationships once they become targeted).¹¹

4 A differentiated view of transparency: clarity, honesty and common understanding

4.1 Clarity and information efficiency: a simplicity theory of transparency

In a world where – unlike in most standard economic models – cognitive limits matter, more information and greater detail does not by itself translate into greater transparency and better understanding, nor does it necessarily lead to more efficient decision-making. The potential problem of information overload and the need to filter and select already arises at the level of individual agents, who can only intelligibly consider a subset of available information and must simplify and structure the information in a parsimonious form in order to make sense of it. The need for clarity becomes even greater when information needs to be communicated between different agents.

In making optimal use of available information each agent will rationally balance the benefits and costs associated with searching, processing and interpreting information (*information efficiency*). In particular the benefits of acquiring a broader information basis need to be weighed against the costs of greater complexity and reduced clarity. This determines the optimal volume, precision and degree of clarity in the presentation of information for any particular decision problem at hand. The cost of information processing should in general be increasing with the volume, complexity and degree of differentiation or heterogeneity in the presentation of information. We can think of such individual cost or production functions as describing how information needs to be transformed in order to become clear for the purposes of decision-making. Usually agents would find simple pieces of information easier to make sense of and more complex statements harder to decipher. For overall information efficiency the extension of the information base and the optimal level of clarity will obviously also depend on the valuation placed on the purpose for which the information is to be used.

The general principle of *information efficiency* is valid for central banks and different segments of the public alike but the cost and benefits as well as capabilities with respect to information processing activities will vary widely across different groups. The heterogeneity of agents with respect to their individual requirements for information efficiency and optimal levels of clarity raises particular problems when it comes to communication (or the transmission of information). However, the fact that the various types of consumers of central bank information have different demands and valuations with respect to the volume and clarity of information does not, by itself, provide a rationale for rationing the supply of that good. Restricting information would simply drive up the cost of the search and monitoring activities of those agents which value such

¹¹ For example economic forecasts, when unpublished, are more likely to be interpreted and used merely as an input into the decision process, while – when published – could be more prone to being seen and treated as an output or as a communication instrument that is influenced by the policy-process itself. Similarly, the publication of minutes or transcripts may lead to prepared statements as inputs into the actual decision process or to editing *ex post*, which may already reflect the outcome of discussions.

information most (e.g. central bank watchers). This would impose a dead-weight loss on society and may also introduce additional and undesirable information asymmetries (giving rise to “informational rents” for the leaders in the central bank watching industry).

The picture might change if we consider the possibility that (over some ranges) information could be a “bad” rather than a “good”. Or to be more precise: the cost of information processing could itself be a function of the sheer amount and complexity of information available. If the central bank increases the latter, there will be some agents who will value that extra information. However, a negative externality may be conferred on those agents with more limited information processing abilities and needs, who may find it more difficult to extract the simpler type of information they are interested in.¹² In this case central banks in their information policy would need to balance the different needs of their various and heterogeneous “receiver” groups in order to optimise some aggregate or average level of clarity.

As long as information is treated as a homogenous good the central bank simply needs to make the maximum possible amount of information available (or the “optimally” restricted one, in the presence of externalities) and leave it up to optimising agents to pick out what they need. In that setting the same information may not be equally clear to all audience groups, but this would be due to different costs and benefits of processing information (and thus need not be sub-optimal).

By contrast when information is regarded as a differentiated good it could be tailored to specific target groups. In other words the central bank could make itself equally clear to different audiences but this would involve sending different messages (or information that is packaged differently). This poses a number of risks. If all information is *public* and unless the various “communication markets” are strictly segmented (but perhaps these markets cannot be clearly defined in the first place), receivers will be confronted with multiple messages and may have greater difficulties extracting and interpreting the pieces of information relevant for themselves. To avoid confusion from multiple public messages the central bank could, instead, deliberately channel *private* information to different groups.¹³ This, however, would create additional information asymmetries of different audiences vis-à-vis the central bank but also among those groups. The problem is not simply that agents would not know what other information the central bank has disclosed privately but they also would not know what others know (undermining common knowledge).

Up to now we have still assumed that agents are rational and optimise their use of information, albeit subject to additional (information) constraints or taking account of information processing costs. By contrast, under bounded rationality agents will at most behave “intendedly rational but limitedly so” (Simon, 1982), or display procedural rationality, satisfice, follow rules of thumb or use other simplified algorithms – short of optimal – in their decisions and in their information processing strategies. Following simple, non-optimal, rules relieves agents of computational costs and may render their behaviour more predictable to themselves and others.¹⁴

Simple rule-driven behaviour, on the one hand, could thus be regarded as an additional source of “clarity” in the way individuals react to information. It can facilitate communication through simple messages that can be understood without much need for additional explanation. Clarity of communication will, however, depend on a shared psychological, social and cultural context. Therefore the challenges for clarity that arise from differentiated information and heterogeneous

¹² An example of such an externality is modelled in the paper by Rudin (1987) cited previously.

¹³ Farrell and Gibbons (1989) explore how private and public signals affect the credibility of communication in the presence of multiple audiences.

¹⁴ For an overview of bounded rationality in macroeconomics see Sargent (1993); simple rules in monetary policy are also likely to be more robust in the face of model uncertainty (Levin et al., 1998) apart from being easier to learn by private agents (Tetlow et al., 1999).

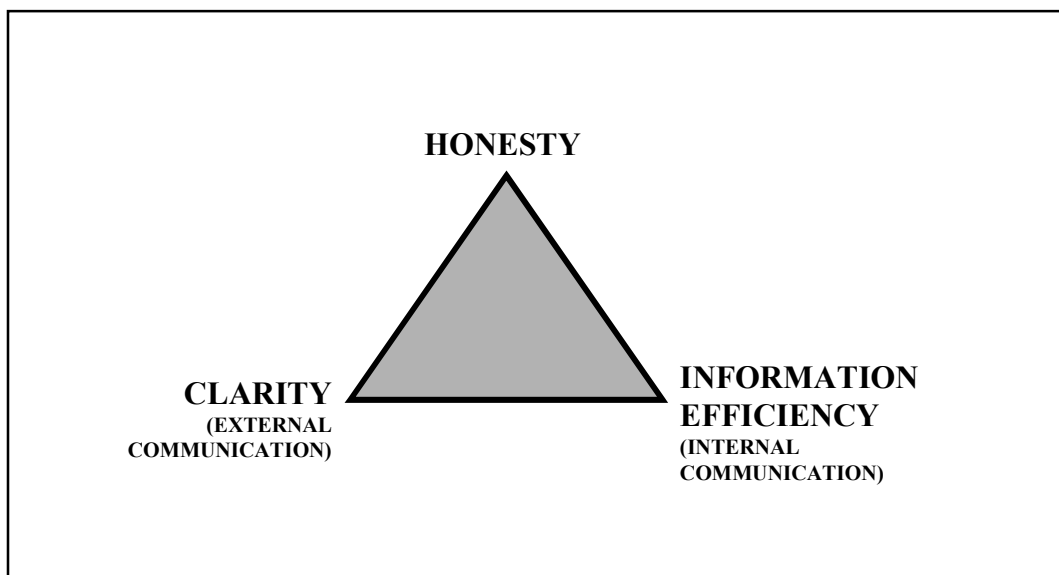
audiences identified in this subsection could, on the other hand, be magnified if a shared cultural basis for common understanding cannot be taken for granted (cf. section 4.3). Finally, the recognition of bounded rationality makes it even harder to appeal to any general intuition on the welfare implications of central banks' communication policies.

4.2 Honesty: a correspondence theory of transparency

When information processing is costly (and even more so in the presence of bounded rationality) information needs to be simplified, condensed and structured in order to become clear and comprehensible both internally and for the purpose of external communication. There is no unique way of going about this and the appropriate mode of representation and the optimal degree of clarity will in general differ across different external target audiences and for internal needs. The question of optimal information processing inside any multi-agent firm – like a central bank – is already tied up with issues of information transmission (communication). For the purpose of this section we abstract from this complication in order to focus on external communication. Thus with respect to the discussion of the role of a monetary policy strategy “information efficiency” and “internal communication” are used interchangeably in this section.

The aspect of *honesty* in transparency can then be defined as the degree to which the representation of information employed in *external* communication corresponds to the actual structuring of information adopted *internally*. That external communication – to the extent possible – faithfully reflects the internal framework for structuring and interpreting information would seem one of the foremost requirements for genuine transparency. On this count there is a presumption for conveying information in the same format as used internally. Conflicts may, however, arise between internal and external communication needs. To uphold the closest possible correspondence in such circumstances one or the other will have to give, thereby potentially compromising either internal information efficiency or the effectiveness and clarity of external communication (or a combination of both). A monetary policy strategy that is to serve the twin purposes of providing a single framework both for internal decision making and for external communication thus faces the potential trade-offs captured by *Figure 2*.

Figure 2: The transparency triangle of monetary policy strategy



Calls for greater “transparency” expressed by central bank observers are not only directed at greater openness and the release of particular items of information. Just as frequent are demands for more transparency in the sense of greater clarity. This is particularly the case in the debate over alternative monetary policy strategies. Here critics usually have the narrow definition of a monetary policy strategy in mind. Seeking to understand and predict central bank behaviour observers are looking for simple reaction functions, i.e. decision rules linked to a limited number of variables, which trigger predictable interest rate adjustments. Central banks could in principle heed such requests for clarity in three ways.

First, they could communicate in such simple terms and just pretend to also act this way, but continue to follow a fully information-efficient approach for internal decision making. Such a situation would correspond to a point close to the bottom leg of the triangle in *Figure 2*. This would violate the honesty dimension of transparency but combine clear external communication with efficient decision-making. However, there is a question whether any substantial gap between internal and external communication is sustainable over time.

Second, central banks could in fact adopt and follow simple policy rules and thus sacrifice and subordinate information efficiency to the communication needs of monetary policy. In this case (corresponding to the left leg of the triangle in *Figure 2*) the monetary policy strategy would be honest and clear but result in sub-optimal policy choices. Such a sacrifice is often considered worthwhile if there are large enough credibility gains from committing to simple rules (which themselves are related to the communication properties of such rules, such as the ability to monitor deviations).¹⁵

The *third* possibility is to reject calls for simplicity in both external communication and the actual conduct of monetary policy (in the extreme one may even discard any systematic monetary policy strategy as an undue simplification altogether). This makes clarity much more difficult to achieve and it may also mean renouncing any potential credibility effects that rule-driven behaviour (or any constraints from rule-driven communication) may impose on internal decision making (in terms of continuity, discipline, consistency over time). This third scenario corresponds to the right leg of the *transparency triangle* in *Figure 2*.

Central banks in their choice of monetary policy strategies are located at different points in the honesty-clarity-efficiency triangle visualising potential trade-offs between three of the principal *desiderata* of transparency and potential tensions between the twin (internal and external) roles of a monetary policy strategy. Note that these trade-offs can be attenuated to the extent that policy-makers and the various relevant segment of the public share an identical, common understanding of monetary policy as discussed in section 4.3. Note also that these trade-offs become less stark if a monetary policy strategy is seen more as a loose framework for analysis rather than as a mechanistic reaction function. Then clarity and information efficiency can perhaps be reconciled more easily.

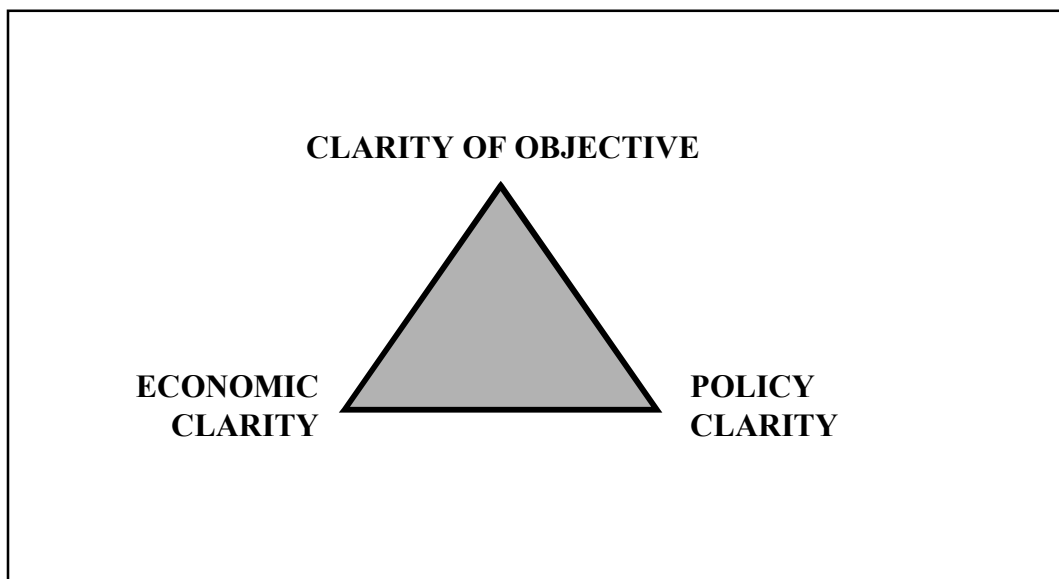
However, most central bank watchers are – understandably – primarily interested in clarity and predictability of policy moves and thus tend to look for some ready-made and simple policy “reaction function”. In the presence of uncertainty and in the absence of simple mechanistic rules a central bank will never be able to provide complete clarity about its reaction function. At most it may be able to highlight selective elements of such a reaction function. In addition, different

¹⁵ This trade-off between clarity/simplicity and information efficiency is mirrored in the familiar credibility-flexibility trade-off discussed in the time inconsistency literature. The widely held view that transparency in the context of inflation targeting allows for “constrained discretion” and can help achieve superior credibility while preserving flexibility (c.f. Briault et al., 1996, King, 1997, Bernanke et al., 1999, Kuttner and Posen, 1999) is only partially convincing once it is recognised that discretionary decisions or very complex rules are inherently difficult to communicate and to make “transparent”.

segments of the public tend to focus on different elements in such a reaction function as well as looking at different time horizons. For example, traders in the financial markets may mainly seek clarity on what will happen to interest rates over a few days or weeks. Analysts will seek to understand how the central bank reacts to incoming data and how it revises expectations about the economic outlook over a somewhat longer time horizon. Wage setters will look for reassurance on whether the central bank can deliver on its price stability objective over the lifetime of wage contracts. Bond markets will assess the central bank's credibility at still longer horizons.

Both for the monetary policy strategy and for any additional communication efforts it may not be possible to be equally clear and precise about all elements in the monetary policy process. Thus choices need to be made. Efforts at clarity could primarily focus on the central bank's assessment of the economic situation (*economic clarity* on the data "input" into the policy process, in the earlier terminology used in *Figure 1*). Alternatively it could aim directly at the implications and outlook for interest rate adjustments (*policy clarity* on the decision "output" of the monetary policy process). Finally its communication could concentrate on stressing the commitment to deliver on the central bank's goal (*clarity of objective*). Several trade-offs can arise, which are depicted in the *clarity triangle* of *Figure 3*.

Figure 3: The clarity triangle



If communication primarily seeks predictability and clarity on the future path of interest rates directly this may compromise the ability of the central bank to react to new information in the manner appropriate for best achieving its objectives at all times. If the central bank concentrates communication on its best assessment of the outlook for the economy, including on variables for which it carries policy responsibility, then possible deviations from target values may be perceived as indicating a lack of ability or commitment of the central bank in delivering on its objective. Conversely a mere re-iteration of policy objectives may lack also credibility unless the public can be convinced that policy decisions are based on the appropriate judgement of the economic situation.¹⁶

¹⁶ An example of such potential trade-offs is the communication role of published inflation forecasts which may be used as a device to summarise information for the sake of economic clarity, as signals for future policy intentions or as devices to anchor inflation expectations at the target. Forecasts – whether conditional or unconditional – are unlikely to be equally effective and credible with respect to all three of these roles at the same time.

Monetary policy strategies can be classified depending on which elements of the clarity triangle they emphasise most. Direct inflation targeting tends to focus communication efforts primarily on the relation between the final goal variable and the policy instrument while monetary targeting links policy to a particular intermediate variable in order to simplify communication about the reaction function. More eclectic or so-called “multi-indicator” approaches tend to be more ad hoc in linking policy to particular economic variables. This tends to put a greater communication premium on guiding short term rate expectations, especially when long-term objectives are not defined clearly. Alternatively, a monetary policy strategy could focus communication mainly on the link between economic indicators and the ultimate objective without necessarily linking policy choices to specific individual indicators or to the final objective in any mechanistic way. This latter approach implies a rejection of the “reaction function view” of monetary policy and is most compatible with the view of a monetary policy strategy as a framework for analysis. It is also probably most challenging with respect to clarity in communication.

4.3 Common understanding: a co-ordination theory of transparency

The picture of trade-offs between clarity, honesty and information efficiency in the preceding subsection is perhaps too pessimistic. A monetary policy strategy that is founded on clear rules (even simple ones) need not necessarily either lose credibility, when such rules are not always followed in practice, or compromise policy efficiency, when they are adhered to. Rules need not necessarily be seen as rigid reaction functions. Instead – especially when cognitive limits are recognised – they can also be regarded primarily as benchmarks for structuring and assessing information and as a framework for reasoning, in line with our broad definition of a monetary policy strategy. They also provide points of reference around which communication can be structured. Thus rules not only relieve of computational complexity and provide yardsticks for individual decision making. They also have a co-ordinating role in organising public discourse. To perform this function the meaning of such rules and the communication associated with them must be *commonly* shared and understood. In this important sense transparency is a relative and not an absolute property. It depends just as much on the receiver-audience as it depends on the sender. Ultimately, transparency rests on the degree of common understanding between the two and is thus a social phenomenon.

This may explain why there seems to be considerable differentiation in terms of monetary policy strategies across central banks, despite a significantly greater degree of consensus about how monetary policy is conducted in practice (at least in the main industrial countries and in the absence of external anchors). This consensus also seems to be confirmed by empirical studies that attempt to characterise central bank behaviour *ex post*. In other words: central banks seem to look at broadly similar information, while the manner in which they present and communicate this information varies to a much greater extent. From this perspective a monetary policy strategy is like a language. Like a language it provides tools and a frame for reasoning, and a vehicle for communication. Comparing the transparency of different approaches to monetary policy – from this perspective – makes as little sense as to argue that French was a “better” language than English (or vice versa). This does not mean that one could not nevertheless rank alternative strategies with respect to ultimate goal efficiency, nor that one could not judge whether a strategy is an adequate response to particular institutional and historical circumstances. All it means is that any absolute ranking in terms of transparency, which abstracts from such factors, is not possible.

In terms of monetary policy strategies adopted by central banks the language analogy holds two lessons. First, what matters is not so much the particular language chosen, but that both sender and receiver speak the “same language”. Second, a language has to be learned and the co-ordination benefits (and public good properties) from a language derive from the consistent use

of terms over time and across situations. Once learned, a monetary policy strategy economises on the need for additional explanations and at the same time lends coherence to these explanations. It is clear that there are considerable switching and learning costs involved in adopting a new language. This provides a strong case for continuity and careful, evolutionary steps when modifications in the strategy become necessary unless a “new language” is needed to signal a clear break with the past. Finally institutions have to develop their own specific language and corporate culture to serve their particular internal and external co-ordination needs (Kreps, 1990).

The need for *common understanding* may also explain central bankers’ characteristically cautious and often apparently vague use of language in several ways:

First, this use of language may (as explained in the previous subsection) simply be an honest reflection of the complexity and uncertainty underlying monetary policy making, which cannot be conveyed in very precise terms (especially to a fragmented audience). Aiming for a greater degree of precision, both in the monetary policy strategy and the use of language, in this view, would amount to spurious accuracy and could therefore be misleading. In other words, central bankers do not make very precise statements simply because they cannot reasonably be more precise than they are.

Second, there is an issue of credibility. The more precise statements are, the more likely and the more easily they can reveal themselves as mistaken *ex post* and thus also the less credible they become *ex ante* (as in the cheap talk literature). The effects of clarity in the sense of precision on credibility can thus be double-faced. On the one hand precision should sharpen *ex ante* performance incentives, focus attention, enhance the monitoring ability of the public and thus support credibility. On the other hand, credibility can suffer *ex post* if the conditional nature of announcements and the degree of uncertainty underlying them is not properly and *commonly* understood. Credibility could thus first increase with the degree of clarity/precision in policy announcements but may suffer as that precision becomes unattainable or spurious.

Third, the notion of transparency as *common understanding* not only refers to information and modes of interpretation shared between the central bank and the public. Communication takes place not between two monolithic players but between multiple senders (in particular when policy is decided by committee)¹⁷ and multiple receivers. In such a setting central bank announcements also perform additional internal and external co-ordination functions. Compared with a single actor, decision making by committee raises additional challenges for communication policy, which must balance the need to take account (and exploit the benefits) of diversity of individual views with the necessity to project a clear and coherent picture both internally and externally. *Ceteris paribus* one would expect decision making to be less predictable in a committee than for a unitary actor and any form of pre-commitment more difficult to sustain. Moreover, to the extent that communication policy focuses on a consensus view, this is probably more difficult to agree upon and present in very precise terms. On the other hand, if a common culture and a consensus driven approach to decision-making emerge endogenously in a committee (perhaps driven by internal and external communication needs), this should help to enhance its predictability.

Fourth, probably the single most important argument for the exercise of caution and restraint in central bank communication has to do with its effect on expectation formation by the public and financial markets in particular. In assessing the impact of central bank policy on market prices

¹⁷ For a first attempt to model collective reputation in a group of individual decision-makers see Sibert (1999).

market participants not only have to solve a signal extraction problem with respect to the central bank's intentions and the expected economic consequences of policy moves. They will, perhaps even more importantly, have to make correct inferences about how other market participants interpret such information.¹⁸ This feature of financial markets can give rise to multiple expectational equilibria due to informational cascades, fads and fashions, herding behaviour etc.¹⁹ In such a setting markets may be excessively sensitive and overreact to certain information. Central bank statements will be scrutinised for any phrase or signal, which could be used as focal points to co-ordinate financial market expectations in one way or the other, conceivably independently of any inherent information content. More precise central bank announcements or the mere mentioning of particular catch-words, may then provide easier targets for such "speculative" reactions and thus introduce extra volatility and uncertainty in the markets.

Fifth, circumstances can arise in such a setting, where policymakers and markets do not share the same view. Then policymakers need to preserve the freedom to disagree with the markets' assessment and – in some cases at least – such divergence would then require policy makers to upset expectations. As Alan Blinder (1997) has put it: central bank independence vis-à-vis the markets is at least as important as independence from the political process. The fundamental problem behind the fear of "becoming prisoner to the markets" arises whenever monetary policy reacts in a systematic way to market expectations (or variables containing such expectations), whether validating or upstaging such expectations. Then circularity and multiple equilibria can arise as in Bernanke and Woodford (1998). The co-ordination task of communication policy under such circumstances would thus be to solve an equilibrium selection problem or – preferably – to conduct and communicate policy in a way that pre-empts diverging expectations (and the potential for multiple equilibria) from emerging in the first place.

What can we make of all this? It would seem that central bank communication must aim at being understood clearly but – paradoxically – this may at times imply avoiding being "too clear" or "spuriously precise". It must send clear messages that help agents to co-ordinate and stabilise expectations, but, at the same time, avoid precise and/or contradictory messages, which also co-ordinate expectations, but in a destabilising way. It must aim at getting the "full message" across, the "whole picture". This includes conveying a sense of the complexity and the uncertainty confronting monetary policy-making. It also implies that communication would need to aim at an even-handed distribution of clarity across different elements in the monetary policy process. Any description of monetary policy involves some degree of simplification but if it becomes excessively "simplistic" – or if clarity is achieved only in selective dimensions – it may turn out to be misleading and thus conflict with the requirement of honesty.

Such questions cannot be addressed in a meaningful way in the context of models, in which the public is uniform and assumed to always process and interpret information in a uniquely "correct" way, where communication functions without any friction and policy-makers and the public share a common and complete understanding of the monetary policy process.

¹⁸ For an analysis of aggregate economic effects that can arise from informationally dispersed markets see Bomfin (1996).

¹⁹ An introduction is provided in Bikhchandani et al. (1998); a classic reference on herd behaviour is Banerjee (1992). See Froot et al. (1992) for an application to short-run speculation in financial markets.

5 Concluding remarks

The modest task of this paper was to try to develop a perspective – one could say a “vocabulary” or a language – in which central banks’ communication challenges can be discussed in a meaningful way. The term “transparency” as commonly used is vague and often contradictory. In the policy debate it has become a catch-all phrase which means a lot of different things. Clarifying these different meanings and drawing out the potential contradictions has been the principal motivation for writing this paper. The academic literature on transparency in monetary policy making has, of course, given precision to the term “transparency”, which is identified narrowly with the release of information or the inverse of noise and uncertainty within a particular class of models. These models already presuppose an extraordinary degree of transparency and common understanding to start with. Thus any communication issues that may arise in the absence of common knowledge of the true model and in the absence of perfect and uniform information processing and information transmission capabilities are essentially assumed away.

This paper proposed a broader definition of transparency – as a measure of genuine understanding and successful communication – in order to distinguish different, potentially conflicting, aspects of it. The aspect of *clarity* suggests that information needs to be simplified, structured, and interpreted in order to be understood. The problem of clarity in sorting through and filtering information is a task that faces the central bank and its public alike. However the needs for efficiency in internal information processing within institutions like a central bank and the requirements for effective external communication need not coincide. Successful communication therefore involves more than just *openness* or the indiscriminate release of all information. *Honesty* calls for the framework used for explaining monetary policy to correspond to that adopted for the structuring of information in internal decision-making. *Common understanding* points to the need that both the “sender” and the “receiver” in the monetary policy game share a common mode of interpretation.

The differentiated view of transparency suggested in this paper should help to make more sense of the persistent controversy over ECB transparency and throw some light on the particular communication challenges the ECB faces in virtue of being both a *new* and a *supranational* institution, which needs to make itself understood vis-à-vis a fragmented set of audiences in a multi-cultural environment. Applying the conceptual framework put forward in this paper to the specific circumstances of the ECB (or other central banks), the choice of monetary policy strategy and the use of other specific communication instruments (such as press conferences) is left for future work.

Ultimately, the purpose of this paper has been no more – and no less – than simply to illustrate the point made by confronting the young with the late Wittgenstein. The paper makes the point drawing on the language of economics. As a result the point is perhaps rather less obvious than it would have been using alternative languages of philosophy, sociology or other behavioural or social sciences. In light of the academic debate over the role of transparency in monetary policy it seems nevertheless a point worth making to economists. Transparency ultimately is about understanding and it has to do with language. The early Wittgenstein believed in the unicity and precision of language grounded in logic. The language he sought to establish was to provide complete clarity and do away with metaphysics once and for all. The late Wittgenstein accepted the multiplicity of meaning and of language. This implies that – unlike in economists’ models – there are many roads to transparency. None of them is easy. And there is as much scope for disagreement on how to promote transparency as there is dispute about what Wittgenstein really meant.

References

- Aumann, R.** (1976). "Agreeing to Disagree". *The Annals of Statistics* 4, 1236-1239.
- Banerjee, A.** (1992). "A Simple Model of Herd Behaviour". *Quarterly Journal of Economics* 108, 767-817.
- Barro, R.** and **D. Gordon** (1983). "A Positive Theory of Monetary Policy in a Natural Rate Model". *Journal of Political Economy* 91, 585-610.
- Battigalli, P.** (1999). "Rationalizability in Incomplete Information Games". European University Institute Working Paper ECO 99/17.
- Beetsma, R.** and **H. Jensen** (1998). "Inflation Targets and Contracts with Uncertain Central Bank Preferences". *Journal of Money, Credit and Banking* 30, 384-403.
- Bernanke, B., Laubach, T., Mishkin, F.** and **A. Posen** (1999). *Inflation Targeting: Lessons from the International Experience*. Princeton: Princeton University Press.
- Bernanke, B.,** and **Woodford, M.** (1998). "Inflation Forecasts and Monetary Policy". *Journal of Money, Credit and Banking* 29, 653-684.
- Bernheim, D.** (1984). "Rationalizable Strategic Behavior". *Econometrica* 52, 1007-1028.
- Bernheim, D.** and **M. Whinston** (1998). "Incomplete Contracts and Strategic Ambiguity". *American Economic Review* 88, 902-932.
- Bikhchandani, S., D. Hirshleifer** and **I. Welch** (1998). "Learning from the Behavior of Others: Conformity, Fads, and Informational Cascades". *Journal of Economic Perspectives* 12 (3), 151-170.
- Binmore, K.** (1992). "De-Bayesing Game Theory". In Binmore, K., A. Kirman and P. Tani (eds.). *Frontiers of Game Theory*. Cambridge, MA: MIT Press, 321-339.
- Blinder, A.** (1997). "What Central Bankers Could Learn from Academics – and Vice Versa". *Journal of Economic Perspectives* 11 (2), 3-19.
- Blume, A., De Jong, D., Kim, Y-G.** and **G. Sprinkle** (1998). "Experimental Evidence on the Evolution of Meaning of Messages in Sender-Receiver Games". *American Economic Review* 88, 1323-1340.
- Bomfin, A.** (1996). "Forecasting the Forecasts of Others: Expectational Heterogeneity and Aggregate Dynamics". Finance and Economics Discussion Series 1996-41, Federal Reserve Board, Washington, D.C.
- Briault, C., Haldane, A.,** and **King, M.** (1996). "Independence and Accountability". Bank of England Working Paper No. 49.
- Buiter, W.** (1999). "Alice in Euroland". *Journal of Common Market Studies* 37, 181-209.
- Cass, D.** and **K. Shell** (1983). "Do Sunspots Matter?" *Journal of Political Economy* 91, 193-227.

- Crawford, V.** and **J. Sobel** (1982). "Strategic Information Transmission". *Econometrica* 50, 1431-1451.
- Cukierman, A.** (1992). *Central Bank Strategy, Credibility and Independence – Theory and Evidence*. MIT Press: Cambridge MA.
- Cukierman, A.** (1999). "Accountability, Credibility, Transparency and Stabilization Policy in the Eurosystem". Mimeo, Tel-Aviv University, September 1999.
- Cukierman, A.** (2000). "Establishing a Reputation for Dependability by Means of Inflation Targets". *Economics of Governance* (forthcoming).
- Cukierman, A.** and **A. Meltzer** (1986). "A Theory of Ambiguity, Credibility and Independence under Discretion and Asymmetric Information". *Econometrica* 54, 1099-1128.
- Cukierman, A.** and **N. Liviatan** (1991). "Optimal Accomodation by Strong Policy-Makers under Incomplete Information". *Journal of Monetary Economics* 27, 99-127.
- Dotsey, M.** (1987). "Monetary Policy, Secrecy and Federal Funds Rate Behavior". *Journal of Monetary Economics* 20, 463-474.
- Eijffinger, S., Hoeberichts, M.** and **E. Schaling** (1997). "Why Money Talks and Wealth Whispers: Monetary Uncertainty and Mystique". CentER Discussion Paper 9747, *Journal of Money, Credit and Banking* (forthcoming).
- Eijffinger, S., Hoeberichts, M.** and **E. Schaling** (1998). "A Theory of Central Bank Accountability". CentER Discussion Paper 98103.
- EMU Monitor** (1998). *Press Statement No. 1*, 9 July 1998 (available from <http://www.zei.de>)
- Farrell, J.** (1989). "Cheap Talk with Two Audiences". *American Economic Review* 79, 1214-1223.
- Farrell, J.** (1993). "Meaning and Credibility in Cheap-Talk Games". *Games and Economic Behavior* 5, 514-531.
- Farrell, J.** and **R. Gibbons** (1989). "Cheap Talk With Two Audiences". *American Economic Review* 79, 1214-1223.
- Farrell, J.** and **M. Rabin** (1996). "Cheap Talk ". *Journal of Economic Perspectives* 10 (3), 103-118.
- Faust, J.** and **L. Svensson** (1998). "Transparency and Credibility: Monetary Policy with Unobservable Goals". NBER Working Paper 6452.
- Faust, J.** and **L. Svensson** (1999): "The Equilibrium Degree of Transparency and Control in Monetary Policy". NBER Working Paper 7152.
- Froot, K., D. Scharfstein** and **J. Stein** (1992). "Herd on the Street: Informational Inefficiencies in a Market with Short-term Speculation". *Journal of Finance* 47, 1461-1484.
- Garfinkel, M.** and **S. Oh** (1995). "When and How Much to Talk: Credibility and Flexibility in Monetary Policy with Private Information". *Journal of Monetary Economics* 35, 341-357.

- Geanakoplos, J.** (1992). "Common Knowledge". *Journal of Economic Perspectives* 6, 53-82.
- Geraats, P.** (2000). "Why Adopt Transparency? The Publication of Central Bank Forecasts". Mimeo, University of California at Berkeley.
- Gersbach, H.** (1998). "On the Negative Social Value of Central Bank' Transparency". Mimeo, University of Heidelberg, November 1998.
- Goodfriend, M.** (1986). "Monetary Mystique: Secrecy and Central Banking". *Journal of Monetary Economics* 17, 63-92.
- Green, J.** and **J-J. Laffont** (1986). "Partially verifiable Information and Mechanisms Design". *Review of Economic Studies* 53, 447-456.
- Haruvy, E., Stahl, D.** and **P. Wilson** (1999). "Evidence for Optimistic and Pessimistic Behavior in Normal Form Games". *Economic Letters* 63, 255-259.
- Heinemann, F.** and **G. Illing** (1999). "Speculative Attacks: Unique Sunspot Equilibrium and Transparency". Working Paper 97, Economics Department, Universität Frankfurt.
- Illing, G.** (1998). "Gradualism vs Cold Turkey – How to Establish Credibility for the ECB". Working Paper 92, Economics Department, Universität Frankfurt.
- Issing, O.** (1999). "The Eurosystem: Transparent and Accountable or 'Willem in Euroland'". *Journal of Common Market Studies* 37, 503-519.
- Jensen, H.** (2000). "Optimal Degrees of Transparency in Monetary Policymaking". Mimeo, University of Copenhagen, February 2000.
- Kandel, E.** and **B-Z. Zilberfarb** (1999). "Differential Interpretation of Information in Inflation Forecasts". *Review of Economic Studies* 81, 217-226.
- King, M.** (1997). "Changes in UK Monetary Policy: Rules and Discretion in Practice". *Journal of Monetary Economics* 39, 83-87.
- Kreps, D.** (1989). "Out-of-equilibrium Beliefs and Out-of-equilibrium Behaviour". In Hahn, F. (ed.) *The Economics of Missing Markets, Information, and Games*. Oxford: Clarendon Press, 7-45.
- Kreps, D.** (1990). "Corporate Culture and Economic Theory". In Alt, J. and K. Shepsle (eds.) *Perspectives on Positive Political Economy*. Cambridge, MA: MIT Press, 258-281.
- Kreps, D.** (1992). "Static Choice in the Presence of Unforeseen Contingencies". In Dasgupta, P. et al. (eds.) *Economic Analysis of Markets and Games*. Cambridge: Cambridge University Press, 90-143.
- Kurz, M.** (1994). "On the Structure and Diversity of Rational Beliefs". *Economic Theory* 4, 877-900.
- Kurz, M.** (1996). "Rational Beliefs and Endogenous Uncertainty". *Economic Theory* 8, 383-397.
- Kuttner, K.** and **A. Posen** (1999). "Does Talk Matter After All? Inflation Targeting and Central Bank Behavior". Center for Financial Studies Working Paper 1999/04, Frankfurt.

- Laubach, T.** (1999). "Signalling with Monetary and Inflation Targets". Center for Financial Studies Working Paper 1999/05, Frankfurt.
- Levin, A., Wieland, V. and J. Williams** (1998). "Robustness of Simple Policy Rules under Model Uncertainty". NBER Working Paper 6570.
- Lewis, D.** (1969). *Convention: A Philosophical Study*. Oxford: Basil Blackwell.
- Mayes, D. and J. Tarkka** (1999). "The Value of Publishing Official Central Bank Forecasts". Bank of Finland Discussion Paper 22/99.
- Morris, S. and H.S. Shin** (1997). "Approximate Common Knowledge and Coordination: Some Lessons from Game Theory". *Journal of Logic, Language and Information* 6, 171-190.
- Morris, S. and H.S. Shin** (1998). "Unique Equilibrium in a Model of Self-Fulfilling Currency Attacks". *American Economic Review* 88, 587-597.
- Muscattelli, A.** (1999). "Optimal Inflation Contracts and Inflation Targets under Uncertainty: Why We Might Need Conservative Central Bankers?" *Economica* 66, 241-254.
- Nolan, C. and E. Schaling** (1996). "Monetary Policy Uncertainty and Central Bank Accountability". Bank of England Working Paper 54.
- Padoa-Schioppa, T.** (2000). "An Institutional Glossary of the Eurosystem". Article prepared for the conference on "The Constitution of the Eurosystem: The Views of the EP and the ECB", 8 March 2000. ZEI Policy Paper (forthcoming), Center for European Integration Studies, Bonn.
- Persson, T. and G. Tabellini** (1993). "Designing Institutions for Monetary Stability". *Carnegie-Rochester Conference Series on Public Policy* 39, 53-84.
- Laubach, T.** (1999). "Signalling with Monetary and Inflation Targets". Center for Financial Studies Working Paper 1999/05, Frankfurt.
- Remsperger, H. and A. Worms** (1999). "Transparency in Monetary Policy". Center for Financial Studies Working Paper 1999/16, Frankfurt.
- Rudin, J.** (1987). "Central Bank Secrecy, 'Fed Watching', and the Predictability of Interest Rates". *Journal of Monetary Economics* 22, 317-334.
- Sargent, T.** (1993). *Bounded Rationality in Macroeconomics*. Oxford: Clarendon Press.
- Schaling, E., Hoeberichts, M. and S. Eijffinger** (1998). "Incentive Contracts for Central Bankers under Uncertainty: Walsh-Svensson Non-equivalence Revisited", CentER Discussion Paper 9811.
- H.S. Shin and T. Williamson** (1996). "How much Common Belief is Necessary for a Convention?" *Games and Economic Behavior* 13, 252-268.
- Sibert, A.** (1999). "Central Bank Decision Making: Reputation, Accountability and Inflation Biases". Mimeo, Birkbeck College, London, June 1999.

- Simon, H.** (1982). *Models of Bounded Rationality*. Cambridge, MA: MIT Press.
- Stein, J.** (1989). "Cheap Talk and the Fed: A Theory of Imprecise Policy Announcements." *American Economic Review* 79, 32-42.
- Svensson, L.** (1999): "Monetary Policy Issues for the Eurosystem". *Carnegie-Rochester Conference Series on Public Policy* 51, 79-136.
- Tabellini, G.** (1987). "Secrecy of Monetary Policy and the Variability of Interest Rates". *Journal of Money, Credit and Banking* 19, 425-436.
- Tetlow, R.** and **P. von zur Muehlen** (1999). "Simplicity versus Optimality: The Choice of Monetary Policy Rules when Agents must Learn". Finance and Economics Discussion Paper 1999-10. Federal Reserve Board, Washington D.C.
- Vickers, J.** (1998): "Inflation Targeting in Practice: the UK Experience". *Bank of England Quarterly Bulletin* 38 (4), 368-375.
- Walsh, C.** (1995). "Optimal Contracts for Central Bankers". *American Economic Review* 85, 150-167.
- Walsh, C.** (1999). "Announcements, Inflation Targeting and Central Bank Incentives" *Economica* 66, 255-269.
- Young, P.** (1996). "The Economics of Conventions". *Journal of Economic Perspectives* 10, 105-122.

European Central Bank Working Paper Series

- 1 "A global hazard index for the world foreign exchange markets" by V. Brousseau and F. Scacciavillani, May 1999.
- 2 "What does the single monetary policy do? A SVAR benchmark for the European Central Bank" by C. Monticelli and O. Tristani, May 1999.
- 3 "Fiscal policy effectiveness and neutrality results in a non-Ricardian world" by C. Detken, May 1999.
- 4 "From the ERM to the euro: new evidence on economic and policy convergence among EU countries" by I. Angeloni and L. Dedola, May 1999.
- 5 "Core inflation: a review of some conceptual issues" by M. Wynne, May 1999.
- 6 "The demand for M3 in the euro area" by G. Coenen and J.-L. Vega, September 1999.
- 7 "A cross-country comparison of market structures in European banking" by O. de Bandt and E. P. Davis, September 1999.
- 8 "Inflation zone targeting" by A. Orphanides and V. Wieland, October 1999.
- 9 "Asymptotic confidence bands for the estimated autocovariance and autocorrelation functions of vector autoregressive models" by G. Coenen, January 2000.
- 10 "On the effectiveness of sterilized foreign exchange intervention" by R. Fatum, February 2000.
- 11 "Is the yield curve a useful information variable for the Eurosystem?" by J. M. Berk and P. van Bergeijk, February 2000.
- 12 "Indicator variables for optimal policy" by L. E. O. Svensson and M. Woodford, February 2000.
- 13 "Monetary policy with uncertain parameters" by U. Söderström, February 2000.
- 14 "Assessing nominal income rules for monetary policy with model and data uncertainty" by G. D. Rudebusch, February 2000.
- 15 "The quest for prosperity without inflation" by Athanasios Orphanides, March 2000.
- 16 "Estimating the implied distribution of the future short term interest rate using the Longstaff-Schwartz model" by Peter Hördahl, March 2000.
- 17 "Alternative measures of the NAIRU in the euro area: estimates and assessment" by Silvia Fabiani and Ricardo Mestre, March 2000.
- 18 "House prices and the macroeconomy in Europe: Results from a structural VAR analysis" by Matteo Iacoviello, April 2000.

- 19 “The Euro and international capital markets” by Carsten Detken and Philipp Hartmann, April 2000.
- 20 “Convergence of fiscal policies in the euro area” by O. de Bandt and F. P. Mongelli, May 2000.
- 21 “Firm size and monetary policy transmission: evidence from German business survey data” by M. Ehrmann, May 2000.
- 22 “Regulating access to international large value payment systems” by C. Holthausen and T. Rønde, June 2000.
- 23 “Escaping Nash inflation” by I-K. Cho and T. J. Sargent, June 2000.
- 24 “What horizon for price stability” by F. Smets, July 2000.
- 25 “Caution and conservatism in the making of monetary policy” by P. Schellekens, July 2000.
- 26 “Which kind of transparency? On the need for clarity in monetary policy-making” by B. Winkler, August 2000.