Monetary policy today: sixteen questions and about twelve answers

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> There have been three great inventions since the beginning of time: fire, the wheel, and central banking,
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> – Will Rogers

> Victorians heard with grave attention that the Bank Rate had been raised. They did not know what it meant. But they knew that it was an act of extreme wisdom.
>
> – John Kenneth Galbraith

My assignment is to survey the *main* questions swirling around monetary *policy today.* I emphasize three words in this sentence, each for a different reason. "Main" is because one person's side issue is another's main issue. So I had to be both selective and judgmental in compiling my list, else this paper would have been even longer than it is. "Policy" indicates that I have restricted myself to issues that are truly relevant to real-world policymakers, thus omitting many interesting but purely academic issues. "Today" means that I focus on current issues, thus passing over some illustrious past issues. All these omissions still leave a rather long list; so I will have to treat some issues quite briefly.

I have compiled a list like this once before. In December 1999, at what I believe was the first conference ever organized by the brand-new European Central Bank (ECB) in Frankfurt, I offered (over dinner, no less!) a list of 15 questions that would have to be answered by anyone starting a central bank from scratch

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at the time (Blinder, 2000). In this paper, I will declare two of my 15 Frankfurt issues largely resolved, and note that two others have dropped off the radar screen without being resolved. However, I will add five new issues. Thus the list of issues has grown longer, not shorter, since 1999. But do not mistake that for lack of progress. Both the art and science of monetary policy have advanced considerably since then.

Before proceeding further, let me mention some issues that I will *not* take up, for their omission is, in some sense, a measure of that progress. My Frankfurt list included the old debate over the choice between interest-rate targets and monetary-aggregate targets, which seems to have been resolved everywhere except in the ECB's rhetoric. It also included the issue of whether electronic money poses a threat to central banks, which was a hot issue then but seems to have faded from view.[2] Earlier discussions of central banking issues devoted a great deal of attention to the need for central bank independence.[3] But that debate is all but over, and I will simply *assume* that the central bank is independent.[4] Similarly, some earlier authors thought it necessary to defend the proposition that low inflation is a central goal of monetary policy, a proposition that no longer needs defense.[5] In addition, a huge amount of ink has been spilled on the time consistency debate and the so-called inflation bias[6] – another debate that I consider to be over, although others may disagree.

What, then, will I discuss? Part I, the longest part of the paper, takes up five critical questions regarding the *institutional design* of the monetary policy authority:

1 What is the proper objective function for monetary policy?
2 How transparent should the central bank be?
3 Should the central bank be an inflation targeter, as that term is commonly used nowadays?
4 Should monetary policy decisions be made by a single individual or by a committee – and, if the latter, what type of committee?
5 Should the central bank also regulate and/or supervise banks?

After that, I turn in Part II to *operating principles* for monetary policy, discussing six issues:

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[2] See, for example, the papers by Charles Goodhart, Charles Friedman, and Michael Woodford in the July 2000 special issue of the journal *International Finance.*

[3] See, for example, Fischer (1994).

[4] However, there are those who worry about fiscal dominance and/or budgetary independence of the central bank.

[5] Again, see Fischer (1994). However, the issue of whether monetary policy should target the *inflation rate* or the *price level* remains a live one. See Issue 15 below.

[6] The original sources were Kydland and Prescott (1977) and Barro and Gordon (1983).

6 Is the observed proclivity of central bankers to avoid policy reversals justifiable?
7 Does the revealed preference of central bankers for gradualism make sense?
8 Is "fine tuning" possible after all? And if so, should central bankers attempt to fine tune their economies?
9 Should central banks lead or follow the financial markets?
10 Should central banks in floating exchange rate regimes intervene in the foreign-exchange market?
11 Should central banks use derivatives in the conduct of monetary policy?

Finally, I briefly discuss five issues pertaining to the *transmission mechanism* for monetary policy in Part III:

12 Transmission through the term structure of interest rates
13 Transmission through the exchange rate
14 How should the central bank deal with asset-market bubbles?
15 How should the central bank deal with the zero lower bound on nominal interest rates?
16 Do the world's giant central banks have global responsibilities?

I The design and structure of the central bank

The first set of five issues pertains to how central banks should be designed and organized – to their "constitutions," so to speak.

Issue 1: What is the proper objective function for monetary policy?

My jumping-off point for this discussion is the loss function that has become ubiquitous in academic writings on monetary policy:

$$L = (\pi - \pi^*)^2 + \lambda(y - y^*)^2 \text{ or} \tag{1a}$$

$$L = (\pi - \pi^*)^2 + \lambda(u - u^*)^2, \tag{1b}$$

where L is the period loss, π is the inflation rate and π^* its target value, y is real output and y^* its "natural" or "equilibrium" or "potential" value, and u is the unemployment rate and u^* is the NAIRU. Two variants are given because some authors prefer to represent the central bank's real economic activity objective by the

output gap while others prefer the unemployment gap. I will return to this choice briefly below; but, for the most part, it is immaterial.

Nowadays, the live argument is over the size of λ, with some authors fretting that it not be set too large. It thus seems almost quaint to recall that Fischer (1994) went to great lengths to argue that $(\pi - \pi^*)^2$ should figure prominently in the loss functions of central banks – that is, that $\lambda < \infty$. No one needs to make that argument today.

Making (1) operational, even in a metaphorical sense, requires that the central bank choose three parameters: λ, π^*, and either y^* or u^*. Each raises important practical issues.

Let us start with π^*, where two main issues arise. The first is obvious and has been so extensively discussed that I will treat it briefly: What's the number? A consensus of sorts seems to have developed around an inflation target of 2% or so for advanced, industrial countries. Berg (2005) surveyed practices at 20 inflation-targeting central banks, eight of which are from rich countries, and every one of the eight uses either 2% or 2.5% as the midpoint of its target range. The ECB, of course, targets inflation "below, but close to, 2%," and the Federal Reserve's all-but-announced target is similar.[7] At 2% inflation, the price level doubles every 35 years. Why not set the target lower? The two main arguments are (a) that price indexes are biased upward and (b) that π^* should be set high enough to provide a reasonable cushion against deflation (see Issue 15 below). Neither seems controversial nowadays, so I move on to a question that is: What measure of inflation should be used?

One important choice is whether inflation should be measured by a "headline" or "core" concept,[8] that is, should it include or exclude energy prices?[9] I am firmly in the "core" camp for three related reasons. First, monetary policy is unlikely to have much leverage over energy (or food) prices; so it makes sense to focus the central bank's attention on the inflation it can actually do something about. Second, even if the bank's true concern is headline inflation – which is, after all, the inflation that consumers actually experience – it can probably forecast future headline inflation better by using current and lagged values of core inflation. Ricardo Reis and I (2005)

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[7] The Fed's preferred index of consumer prices is not the CPI, but rather the deflator for core personal consumption expenditures in the national income and product accounts, which normally runs below the core CPI measure. In its February 2006 monetary policy report, the FOMC implicitly set its target for core PCE inflation at 1.75-2%.

[8] This is not the only issue. For example, Mankiw and Reis (2003) argue for using wage increases rather than price increases. Strum (2006) argues for a PPI measure rather than a CPI measure. Reis (2005) explores the role of asset prices in the price index. Yet another issue is whether monetary policy should target inflation (the usual choice) or the price level. This last question is dealt with briefly under Issue 15 below.

[9] In most countries, "core" inflation also excludes food prices. (In Japan, the core consumer price index excludes fresh food but includes energy products.) However, food prices have not been an issue for more than 30 years, so I concentrate on energy.

demonstrate this conclusion statistically for the United States, and I suspect it holds in many countries. Third, I believe that concentrating on core inflation is likely to produce more sensible monetary policy in the face of oil shocks (see below).

Despite these powerful arguments, virtually all central banks and governments have opted for headline over core. The ECB, of course, is the most prominent example in this part of the world. But Berg's (2005) list shows that 18 of the 20 inflation-targeting central banks use a headline concept of inflation.

If the choice is controversial, it must be because of the third reason given earlier: the response to supply shocks. So let me briefly defend my position.[10] Consider, first, the case that is dominant in the data: a supply shock that raises the relative price of oil *temporarily.* In that case, oil prices are a source of *inflation* as they rise, but subsequently become a source of deflation as they fall – which happens automatically, with no need for central bank action. Given the long lags from monetary policy to inflation, there is essentially nothing the central bank can do to remove this bit of inflation volatility.

The other empirically relevant case is when oil prices rise to *permanently* higher levels. Then oil prices are an engine of inflation, but one that naturally peters out unless "second-round effects" on *core* inflation are large. The recent evidence suggests only minor second-round effects, perhaps due to central banks' greater determination to stop inflation in the 1990s and in this decade as compared to the 1970s (Hooker, 2002). Why? The presumed answer is better anchoring of inflationary expectations (Bernanke, 2006). In any case, returning to the main question, there is little that monetary policy can or should do to limit the "first-round effects" of an oil shock. For example, targeting *headline* inflation during a period of rising (falling) oil prices might make monetary policy excessively tight (loose). Hence my conclusion: Stick to core inflation.

The choice of a full-employment target (y^* or u^*) also merits some discussion. Let me first assume that the target is y^*, and then consider whether u^* might be the better choice.

The empirical literature contains at least three distinct ways to estimate y^*. The oldest is *potential GDP,* which can be defined as:

$$y^* = AF(L^*(1-u^*), K), \tag{2}$$

where F(.) is the aggregate production function, A is the Solow residual (in levels), L^* is the full-employment labor force (so $L^*(1-u^*)$ is the "natural" level of employment), and K is the capital stock. A second concept – which is closely related in principle, but is estimated very differently in practice – is the *natural rate* of output, defined as the level of production (= aggregate demand) at which

[10] I have dealt with this topic in more detail in Blinder and Reis (2005), especially pages 41-45.

the price level is neither accelerating nor decelerating. It is often "backed out" of an estimated Phillips curve using Okun's law, thereby making no direct use of time series data on either K or L (not to mention A). A third approach is to define y* as the "trend," which is then estimated in some mechanical way (e.g., by a Hodrick-Prescott filter).

In the context of an objective function like (1), which trades off output volatility against inflation volatility, the natural rate of output derived from a Phillips-curve framework (the second of the three concepts above) seems to be a sensible working definition of y*. Often, the empirical procedure begins with an estimate of u* from a statistical Phillips curve. Needless to say, that number cannot be known with precision. Most European countries, in fact, never had a widely-accepted estimate of the NAIRU; and the days when a 6% NAIRU was a consensus choice in the United States are long gone. So, at a minimum, estimates of u* must be treated as time-varying and having large standard errors (Staiger, Stock, and Watson, 2001).

Notice that, while academics seem to have a revealed preference for output gaps over unemployment gaps, a second empirical step is needed to move from the latter to the former – which adds an additional element of statistical uncertainty. That element is productivity, which translates labor input into output. At times when projecting (or even estimating) productivity is difficult, estimating the path of y* becomes extremely hazardous.[11] For this very practical reason, I have a mild preference for using an unemployment-gap concept rather than an output-gap concept. But I do not want to exaggerate the strength of this preference. As Blinder and Yellen (2001) and others have noted, an *unrecognized* acceleration (deceleration) of productivity growth can temporarily depress (raise) the NAIRU.

The next issue is the choice of the weight λ in (1). A higher value of λ connotes more concern with output or unemployment gaps, relative to inflation gaps, and vice-versa. It is tempting to identify λ with the coefficients α and β in a Taylor rule:

$$i = r^* + \pi + \alpha(\pi - \pi^*) + \beta(u^* - u), \tag{3}$$

where i is the nominal interest rate and r^* is the equilibrium real interest. But Svensson (1997) has shown that the mapping from λ to α and β is by no means straightforward. A higher λ need not even lead to a higher ratio β/α, for example. Nonetheless, Blinder and Reis (2005) estimate that Alan Greenspan had a much higher β/α than either Paul Volcker or the Bundesbank prior to the advent of the euro – a reflection, I believe, of his much higher λ. Furthermore, Rudebusch's

[11] Orphanides (2003) emphasizes this point.

(2001) calculations of optimal α and β for a simple linear model of the U.S. economy under different choices of λ show substantial sensitivity of the ratio β/α to λ, and in the intuitive direction.[12]

Theoretical discussions of the loss function generally end about here. But central bankers should ponder two more issues. The first is the functional form. The quadratic, of course, is motivated solely by mathematical convenience and gives rise, among other things, to certainty equivalence. Never mind the specific quadratic shape; that's a quibble I do not want to raise. The more fundamental question is why low unemployment should be penalized as much as high unemployment – or, indeed, should be penalized *at all* (Cukierman, 2004). The main reason why central bankers worry about low unemployment is that tight markets produce rising inflation. But that should be taken care of by the first term in (1). If, speaking hypothetically, monetary policy could push u down further without pushing π up, why shouldn't it? The late 1990s in the United States is an historical case in point. Did America suffer some loss because the unemployment rate dropped as low at 3.9%?

One obvious answer is the standard micro-inefficiency argument: Deviations from the real competitive equilibrium *in either direction* impose welfare losses. But this argument is not terribly compelling if the real world is not perfectly competitive. For example, monopolistic competition models suggest that output is systematically too low, in which case raising it should yield efficiency *gains,* not losses. Furthermore, some of us believe that low unemployment yields notable social benefits that are at least partially non-economic in nature. Another possible answer, suggested by Cuckierman (2004), is that the inflation bias discussed by Kydland and Prescott (1977) returns if low unemployment is not penalized symmetrically. This may be the best rationale for doing so.

The other oft-forgotten issue in specifying the loss function is that every central bank has either statutory or tacit responsibility for maintaining financial stability. At certain critical times, this objective takes precedence over everything else. So financial stability seems far too important to be left out of the loss function. Researchers commonly model this third objective by adding a term like $\gamma(r_t - r_{t-1})^2$ to (1), on the theory that interest-rate volatility and financial-market instability are highly correlated. Such a crude proxy surely misses many important aspects of financial instability, however, especially during a banking or financial crisis, when financial stability may dominate the central bank's other concerns. So some other approach seems warranted. One posibility is a quasi-lexicographic ordering under wich the central bank minimizes (1) unless serious financial instability arises, in which case it turns its attention to the latter.

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[12] Specifically, when λ=1 (his base case), β/α=.58; if λ=4, β/α rises to .95; and if λ=0.25, β/α falls to .41. See Rudebusch (2001, Table 1, p. 206).

Issue 2: How transparent should the central bank be?

Much has been written on why central banks should be transparent, some of it by me.[13] In fact, there is by now a sizable scholarly literature on this topic, which I will not summarize here.[14] Instead, let me just remind readers that there are *two* main reasons to favor transparency. The one on which economists always focus is that greater openness should make monetary policy more effective by tightening the gears between central bank actions and market expectations. But there is another reason, one which real-world central bankers should never forget: democratic accountability.

One or both of these arguments appear to have persuaded most of the world's central bankers (and/or their governments), because there is an unmistakable trend in the direction of greater openness virtually all over the world. In a quotation from the 1980s of which I have long been fond, Karl Brunner (1981) wrote that:

> Central Banking [has been] traditionally surrounded by a peculiar mystique... The possession of wisdom, perception and relevant knowledge is naturally attributed to the management of Central Banks... The relevant knowledge seems automatically obtained with the appointment and could only be manifested to holders of the appropriate position. The mystique thrives on a pervasive impression that Central Banking is an esoteric art. Access to this art and its proper execution is confined to the initiated elite. The esoteric nature of the art is moreover revealed by an inherent impossibility to articulate its insights in explicit and intelligible words and sentences.

This was a caricature, of course, but it captured the underlying reality of the time. The received wisdom in central banking circles then was: Say as little as possible, and say it cryptically. But attitudes toward transparency have changed dramatically since then, and central banks around the world have opened up.

Although it is still more of a laggard than a leader in terms of transparency, the Federal Reserve is a case in point. Prior to February 1994, the FOMC did not even announce its interest rate decisions as it made them, preferring to let money market professionals figure them out by observing the Fed's open market operations. Highly stylized minutes of FOMC meetings were published at the time, but only after the *following* meeting. Contemporaneous statements after FOMC meetings, however, were rare (and extremely terse) until May 1999.

That is when the Fed made several major changes in its disclosure policies, changes that amounted to a quantum leap in the volume of useful information it

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[13] See, for example, Blinder *et al.* (2001) and Blinder (2004).

[14] For two recent overviews, see Geraats (2002) and Woodford (2005).

provided. First, the FOMC started announcing its "bias" (later changed to "balance of risks") immediately. Second, it began issuing statements after every meeting (whether or not there was a change in interest rates). And third, its statements became longer and more substantive. Here is one simple quantitative measure. In the three years 1996-1998 inclusive, the FOMC issued a total of *five* post-meeting statements, with an average of 58 substantive words per statement – thus *under 100 words per year!*[15] And the Fed said nothing at all after its first two meetings in 1999 (in February and March). But then it issued a statement after each of the remaining six FOMC meetings in 1999, averaging 135 words per statement – thus raising the annual rate to over 1,000 words. This pattern has prevailed (approximately) ever since.

The FOMC took another step toward greater transparency early in 2002, when it began announcing its vote immediately after each meeting, naming names. And finally, starting at the beginning of 2005, the Fed began releasing the minutes of each meeting with approximately a three-week delay – thus *before* the next meeting. None of these changes can be said to constitute a great leap forward. But together they add up to a huge increase in the amount of information released by the formerly-mum Fed – as I once called it, a quiet revolution (Blinder, 2004). And in my view and, much more important, in Chairman Ben Bernanke's view (Bernanke, 2004b), there is more to come.

People often ask if there are limits to (optimal) transparency.[16] My answer is to paraphrase Einstein: Every central bank should be as transparent as possible, but not more so.[17] By this I mean that the default option should be disclosure; a central bank should keep things secrets only when there are good reasons for doing so.[18] And good reasons do exist. For example, the central bank must preserve the confidentiality of proprietary information given to it by private banks – for example, in its role as bank supervisor. (See Issue 5 below.) Similarly, the central bank must maintain the confidentiality of certain information provided to it by governments, both domestic and foreign. I would also not want to open monetary policy meetings to the press, because that would likely destroy the deliberative process. Finally, the central bank cannot disclose information it doesn't have. This last "limit" to transparency may sound silly, but I will offer some concrete examples below. But

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[15] I include in this count only words pertaining either to the economic situation or to the policy decision, excluding standard boilerplate such as the opening sentence, which simply states what the FOMC did ("The Federal Open Market Committee decided today to…"), and the closing paragraphs that announce the vote and the discount rate recommendations of the district banks.

[16] See, for example, Mishkin (2004) and Cukierman (2006).

[17] Einstein said: "Everything should be made as simple as possible, but not simpler."

[18] In contrast, Mishkin (2004, p. 50), suggests that transparency is a good thing only to the extent that it "help(s) the central bank do its job." But, in private conversation, Mishkin has told me that he basically agrees with my position.

apart from such minor exceptions, all of which are non-controversial, I see few effective limits to transparency. More important, I know of no central banks that have bumped up against the constraint of maximal transparency, with the possible exceptions of the Bank of Norway and the Reserve Bank of New Zealand (RBNZ).

If central banks are not yet near their transparency constraints, what remains to be done? The answer, of course, varies by country. For example, the Federal Reserve will, I believe, soon begin announcing its inflation target, π^*, for the first time – something that many central banks have been doing for years. But I think it is a fair generalization to say that, with some notable exceptions, most central banks around the world still reveal rather little about their forecasts. This may be the next transparency frontier.

Of course, nothing in life is simple. Whenever a central bank forecasts more than, say, six months ahead, *future monetary policy* is among the crucial assumptions that must be built into the forecast. So what future monetary policy should be assumed? The debate to date seems to revolve around three main options:

1 unchanged monetary policy throughout the forecast period
2 the monetary policy path expected by the markets (and therefore embedded in, e.g., futures prices)
3 the central bank's (conditional) forecast of its own future behavior.

The current controversy is focused on option 3, which requires the central bank to reveal sensitive information. Until recently, the RBNZ was the only one brave enough to do this, but lately it has been joined by the Bank of Norway. In neither New Zealand nor Norway did revelation of this sensitive information provoke turmoil in the markets.[19] Some would argue that things might be different if the Fed or the ECB were to start projecting their own policy decisions, given the huge volumes of trading in dollar- and euro-denominated securities. But it is by no means obvious how *better* information on the central bank's intentions can do the markets any harm. My guess is that, after a short period of adjustment, releasing conditional forecasts of future monetary policy would reduce, not increase, market volatility. But many central bankers may disagree with my guess, for they are loath to take this step.

There is, however, another intensely practical issue that should not be ignored: Most central banks, certainly including the Fed, do not even *agree* upon long-term (conditional) forecasts of the path of their policy rate. In such cases, the failure to *announce* such a path cannot be viewed as a violation of transparency. Rather, it falls under the seemingly-obvious rubric mentioned earlier: You cannot reveal information you do not have. The broader question, then, is

[19] For the case of New Zealand, see Archer (2005).

whether central banks should (a) *formulate* (conditional) monetary policy plans running one or two years into the future and then (b) *announce* those plans as part of their forecasts. My own answers are yes and yes. But doing so clearly represents a major change in the way most central banks do business. Indeed, *formulating* such plans may be a much bigger change in the current *modus operandi* than *announcing* them once formulated. So option 3 above will probably remain on the "to do" list, and therefore on the list of current issues for central bankers, for quite a while.

What can be done in the interim? Many academics have been intensely critical of option 1 – making forecasts based on constant (policy) interest rates.[20] They point to three main problems: (a) it is logically inconsistent (because, e.g., actual market rates are not based on this assumption); (b) it is non-transparent (because, e.g., the central bank probably does not believe this assumption); and (c) it leads to dynamic instability for the reason first pointed out by Friedman (1968): Holding the nominal rate fixed in the face of changes in inflation moves the real rate in the wrong direction.[21]

I am less critical of the constant interest rate assumption that some of my colleagues – for two main reasons. First, dynamic instability is unlikely to be quantitatively important in forecasts that extend only a year or two into the future. Second, showing that constant interest rates lead to unsatisfactory outcomes serves a useful purpose by providing the predicate for changing monetary policy. Still, the critics' points are valid.

Option 2 above (using market expectations of future central bank policy) eliminates the inconsistency problem and reduces the non-transparency problem. But the instability problem remains because, in dynamic simulations, forecasts taken from *current* market prices will be exogenous rather than endogenous. Using such market-based forecasts also raises the "dog chasing its tail" danger that I mentioned in Blinder (1998) and that Bernanke and Woodford (1997) modeled theoretically.[22]

There is, however, a workable approach that can eliminate all three problems and yet does *not* require that MPC members agree *now* on an entire *path* of future policy decisions. The central bank staff can simply use an empirically-estimated reaction function to project the MPC's future behavior mechanically – *without* attributing those forecasts to the MPC itself. This approach should be roughly consistent with market prices because market participants would probably use something similar to forecast the central bank's behavior. It is also totally transparent, as long

[20] For recent comprehensive treatments, see Svensson (2006) and Woodford (2006).

[21] Purely forward-looking models with rational expectations telescope this dynamic instability back into the present, leading to the failure of such models to converge to *any* equilibrium.

[22] Woodford (1994) was an important precursor.

as the bank reveals the forecasting equation. And finally, it does not lead to dynamic instability as long as the inflation coefficient in the reaction function exceeds one.[23] I would therefore recommend this option to central banks for use right now.

Issue 3: Should a central bank adopt formal inflation targeting?

Recent years have witnessed a notable trend toward a style of monetary policy-making that originated in New Zealand in 1990: inflation targeting. As noted earlier, Berg (2005) counted 20 inflation targeters, and other observers would add a few more central banks to his list. In addition, the ECB can be considered a closet inflation targeter, and both the Fed and the BOJ are actively considering whether to join the ranks.

While much has been written about inflation targeting, I can be brief given what I have already written about transparency (Issue 2) and the central bank's objective function (Issue 1) – because the essence of inflation targeting is announcing a numerical value for π^* and being transparent about it.

Svensson (2005) has argued that transparency should extend to the announcement of the numerical value of λ, the relative weight on the output (or unemployment) gap. But that is another one of those pieces of information that central banks cannot reveal because they do not have it. Most of us, I believe, would have trouble pinning down our own individual λ's.[24] For a monetary policy *committee,* the problem is compounded by having to reach a *group* decision on λ – especially when membership in the committee changes over time.[25]

This discussion does, however, raise an interesting transparency point. All inflation targeting central banks are "flexible" inflation targeters – meaning that they have $\lambda>0$. Why, then, should their policy be called as "inflation targeting" as opposed to, say, "unemployment targeting"? Equation (1) looks pretty symmetric to me. One possible answer is deliberate obfuscation, which Mishkin (2004) argues is quite prevalent. A second possible answer is that π^* is a *choice variable* whereas u^* (or y^*) is a datum that is *given* to the central bank (Svensson (1999), page 626). To me, that answer is unsatisfactory, however, because proper division of labor dictates that the government should select π^* (perhaps in consultation with the bank) and then hand it to the MPC as a datum.[26] The fact that π^* is given by law whereas u^* is given by "nature" should be irrelevant to the central bank, which should simply

[23] For this reason, the Bank of England staff fomerly used a Taylor rule in long-run simulations.

[24] In fairness to Svensson, this would probably be done by examining alternative optimal paths generated by the bank staff for different choices of λ. It is not impossible.

[25] Svensson has suggested voting, with the median voter's preferences prevailing.

[26] One important caveat: π^* should not be chosen so frequently that it becomes a political variable. I like to think of it as being chosen at the "constitutional" stage.

take both targets as given and set about minimizing (1) like a bunch of good Keynesian dentists.

Thus, when we translate equations (which only the experts understand) into words, objective functions like (1) seem more consistent with the Federal Reserve's dual mandate than with, say, the ECB's hierarchical goal or the rhetoric of many inflation targeting banks, as Meyer (2006) points out. Calling the minimization of (1) "inflation targeting" therefore seems to be a step away from transparency.

Transparent or not, central banks (or their governments) still need to decide whether to join the ranks of the inflation targeters.[27] Historically, most (but not all) nations that have adopted inflation targeting did so under duress. Either their monetary policy had failed, leaving inflation too high (e.g., New Zealand), or they were forced to change their monetary policy regime owing to, say, the collapse of a fixed exchange rate (e.g., the UK, Brazil).

But the past need not be prologue. Recent converts to inflation targeting, such as Norway (and, one might say, the United States), have moved in that direction voluntarily – presumably because they were persuaded that the benefits outweigh the costs. What are the benefits? The most obvious answer is lower inflation, though here the reverse causation problem is severe. (Countries that want to reduce inflation are more likely to adopt IT.[28]) Successful inflation targeting should also make inflation less volatile, as Vega and Winkelried (2005) find, and should anchor expectations at or very close to π^*. That nominal anchor, in turn, can give the central bank greater flexibility to respond to short-run exigencies such as high unemployment or oil shocks.

Issue 4: Should monetary policy be made by an individual or a committee?

In yet another "quiet revolution," more and more central banks have begun making monetary policy decisions by committee. Fry *et al.*'s (2000) survey of practices at 88 central banks (about half the total) found that 79 made monetary policy decisions by committee while only nine left those decisions to a single individual. Thus governments around the world have revealed a clear preference for decisionmaking by committee. This phenomenon raises two questions: Why have nations switched from individuals to committees? And is this trend desirable?

The "why" question can be approached in two ways. First, as an *empirical* or *historical* matter, I believe that the main factor underlying the worldwide

[27] As my colleague Lars Svensson likes to point out, no central bank that has made this choice has subsequently abandoned inflation targeting. That is certainly suggestive.

[28] See Ball and Sheridan (2005) and Willard (2006).

trend toward monetary policy committees (MPCs) was the perceived success of the Federal Reserve and the Bundesbank, both of which had long made decisions (at least putatively) by committee. Imitation is, after all, the sincerest form of flattery. In addition, there is no reason to have a monetary policy committee when the central bank is simply taking orders from its government. So the trend toward central bank independence opened the door to committee decisionmaking.

Second, what are some of the *conceptual* or *theoretical* reasons why a central bank might prefer a committee to an individual? Since I have treated this subject at length elsewhere, and because it was recently the topic of an excellent symposium at another European central bank,[29] I can again be brief. In Blinder (2004, Chapter 2), I summarized the main arguments for preferring committee to individual decisionmaking under the following four rubrics:

1 *Pooling:* A committee pools the disparate knowledge of its individual members.
2 *Diversity:* Members of a committee bring different decisionmaking heuristics to a complex problem.
3 *Checks and balances:* Committees are less likely to adopt extreme or idiosyncratic positions.
4 *Reduced volatility:* Owing to "averaging" (which need not be interpreted literally), the decisions of a group are likely to be less volatile.

Perusing these four virtues, only the last might conceivably be turned around and viewed as a vice instead – because one person's low volatility is another's excessive inertia. But Sibert (2005) has pointed to another possible downside of group decisionmaking: that it might devolve into "groupthink," which is really a polite word for not thinking at all, but merely following the crowd.[30]

Empirical evidence – much of it from psychology – points modestly toward the superiority of group over individual decisionmaking, though the evidence is certainly not dispositive and, of course, does not come from studies of monetary policy.[31] This last point is one of the considerations that led John Morgan and me (2005) to design and carry out a laboratory experiment in which students made synthetic monetary policy decisions both as individuals and as

[29] De Nederlandsche Bank held a workshop entitled "Central Banking by Committee" in Amsterdam on November 28, 2005.

[30] Sibert (2005) also devotes a great deal of attention to evidence for free riding and/or social loafing in committees. But I cannot believe this is important on MPCs, where (unlike faculty committees, say) the group decision is the most important task each committee member has.

[31] Kerr *et al.* (1996) is a metastudy of the experimental literature in psychology; they concluded that there is no general answer to the question. See Blinder (2004) for a summary of the economic literature, much of it theoretical. Sibert (2005) offers evidence that questions the superiority of group decisionmaking.

part of five-person groups.[32] It was not surprising, given the literature, that we found that groups outperformed individuals by a modest margin. It was, however, surprising that we found that groups were *not* more inertial – in sharp contrast to 4 above.

Morgan and I are currently working on a sequel to our original experiment, designed to shed light on two further issues. First, do large groups (for us, n=8) outperform small groups (n=4), or vice-versa? This issue is germane to the design of monetary policy committees which, in the real world, range in size from three to 19 members. Second, do groups with designated leaders outperform groups without leaders? This issue is particularly important because all real-world MPCs – indeed, I am tempted to say all real committees – have leaders.

In designing an MPC, size is not the only consideration. Blinder *et al.* (2001) first introduced the following typology, which was further developed in Blinder (2004). Committees can either be *individualistic,* meaning that they make decisions by true majority rule with each member voting for his or her own preferred policy – as at the Bank of England, for example; or they can be collegial, meaning that they agree in advance to submerge individual differences in order to reach a group consensus – as at the Fed or the ECB. Collegial committees can be further divided into those that are *genuinely collegial,* meaning that the chairman seeks the committee's consensus and then persuades recalcitrant members to go along (e.g., the ECB Governing Council), or *autocratically collegial,* meaning that the chairman more or less dictates the "consensus" to the other members (e.g., the FOMC under Alan Greenspan).

I argued in Blinder (2004) that autocratically-collegial committees are liable to behave too much like individual decisionmakers, thereby leaving most of the benefits of group decisionmaking on the table. This logic seems to point toward either genuinely collegial or individualistic monetary policy committees. I argued in Blinder (2005), incidentally, that the most appropriate communication strategy for a central bank hinges sensitively on the type of MPC that it selects, which links Issues 2 and 4. But, I have neither the time nor the space to go into that linkage here.

Issue 5: Should central banks also be bank supervisors?

One noteworthy recent departure from traditional central banking practice is the trend toward taking central banks out of the business of bank supervision and regulation. This new division of labor has occurred in varying degrees (in some places completely) in the UK, Germany, and Japan, to name just a few

[32] This work was subsequently replicated by researchers at the Bank of England. See Lombardelli *et al.* (2005). Our choice of five-person groups was made long before we heard Sibert's (2005) claim that five is the optimal group size!

major countries.[33] And it is highly controversial, with reasonable arguments on both sides.[34] While there are other aspects, the essence of the debate, it seems to me, boils down to whether *economies of scope* or *conflicts of interest* are the dominant effects when monetary policy (sometimes called "macro prudential" policy) and bank supervision ("micro prudential" policy) are consolidated in the same authority.[35]

The (tacit) traditional view emphasizes economies of scope, which imply that the two functions are best performed by the same institution. Why might that be so? Unlike the case with private businesses, the economies-of-scope issue does *not* turn on cost savings; central banks do not save money by using the same staff for bank supervision and monetary policy. Rather, the main issue is whether there are quantitatively meaningful *complementarities* between the central bank's macro-prudential and micro-prudential responsibilities. The Federal Reserve's former Vice Chairman Roger Ferguson (2000, p. 301), believes there are: "I think the Fed's monetary policy is better because of its supervisory responsibilities, and its supervision and regulation are better because of its stabilization responsibilities."

For example, having supervisory authority over commercial banks gives the central bank unique access to timely information on the health and operation of the banking system – information that might be relevant, for example, to making judgments about the credit channel of monetary transmission.[36] Such information becomes obviously important at certain critical junctures; the global financial crisis in the summer and fall of 1998 was one dramatic case in point. More generally, there is at least some evidence that supervisory information enhances the Fed's ability to forecast the economy (Peek *et al.*, 1999).

Looking for complementarities in the other direction, having responsibility for monetary policy might force the bank supervisor to internalize the potential macroeconomic consequences of its actions. To cite a prominent U.S. example, bank supervisors were heavily criticized in the early 1990s for exacerbating the "credit crunch," which in turn hampered recovery from the 1990-1991 recession.[37] More generally, it has been suggested that micro-prudential policies can exacerbate business cycles by, for example, forcing banks to rebuild capital during a cyclical downturn.[38] Recently, bank supervisors have been taking this long-neglected issue seriously (White, 2006).

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[33] See Freytag and Masciandaro (2005, p. 2) for a more complete list.

[34] For a comprehensive look at the arguments *pro* and *con,* see Goodhart (2000).

[35] Among the other aspects is the question of whether assigning supervisory power to the central bank concentrates too much power in one agency.

[36] The Federal Reserve has made this argument many times. See, for example, Meyer (1999) or Ferguson (2000).

[37] Among many sources that could be cited, see Bernanke and Lown (1991).

[38] See Kashyap and Stein (2004) and several of the references cited there.

But there are also arguments on the other side. The very things I just cited as potential economies of scope can be viewed as potential sources of conflict of interest instead. For example, should a supervisor allow sick banks to continue to operate just because macroeconomic conditions are weak? I have just suggested why the answer might be yes. But there is a legitimate worry that a central bank's concern with macroeconomic management might cloud its supervisory judgment, thereby imperiling safety and soundness.

Another set of issues arises from the increasing complexity of financial institutions. A modern universal bank is also an investment bank, a stock brokerage, a funds manager, and an insurance company, to name just a few. The lines that separate one type of financial activity from another are getting blurrier and blurrier all the time, and the activities themselves are growing more complex. For a central bank to monitor all these disparate activities, it needs staff with expertise in securities and insurance (and other things) as well as in banking. It may also find itself bumping heads with the nation's securities and insurance regulators, thereby creating either overlapping jurisdictions or, what is worse, gaps in supervision. Bringing some order to this potential jumble makes it difficult to apply the otherwise-appealing principle of "functional regulation," whereby the banking supervisor watches over banking activities (even if done at Wal-Mart or Merrill Lynch), the securities supervisor polices securities activities (even if done at the Bank of America), and so on. A potentially cleaner approach is to create one financial "super regulator" that can watch over all financial activities at a given institution at once.

Where do I come out on this debate? A bit wishy-washy, I'm afraid, and about where I was when I compiled my 1999 Frankfurt list. There I wrote (Blinder, 2000, p. 69):

> Proprietary information that the central bank receives in bank examinations is of some, limited use in formulating monetary policy – and is on rare occasions very important. So, on balance, it is probably better to have it than not. On the other hand, a bank supervisor may sometimes have to be a protector of banks and sometimes a stern disciplinarian – and either stance may conflict with monetary policy.

I am persuaded that nations should leave at least *some* supervisory responsibility with the central bank. It alone has the broad macroeconomic and even international perspective that is crucial from time to time. It alone has the ultimate responsibility for both macroeconomic and financial stability. And it alone has the resources to serve as lender of last resort should the need arise. Given all that, it seems unwise to deprive the central bank of supervisory information that might be relevant to performing its job. And I do not believe that getting that information secondhand is quite as good as getting it firsthand.

But that does not imply that the central bank must be the sole or even the dominant bank supervisor, especially in countries with hundreds or thousands of non-universal banks. Central bank involvement in bank supervision needs to be thought of as lying along a continuum, not as a "zero-one" variable. The U.S., with four different federal bank regulatory agencies (and 50 more in the states), is a clear example.[39] The Fed should be able to access all the information it needs for monetary policy purposes by serving as the "umbrella supervisor" of all large bank holding companies. And it should be in a good position to monitor systemic risk as long as it has a window into every large financial institution. Neither role requires the Fed to be the primary supervisor of hundreds of small banks – as it is today. In this regard, it is striking that, for example, the Bank of England, which has been entirely excluded from the supervisory arena, has not protested that this exclusion has damaged its ability to conduct monetary policy.

In any case, regardless of my own views, this is surely a live issue that must be addressed by central banks and governments all over the world.

II Operating principles for monetary policy

I turn next to a set of six questions related to how central banks should conduct monetary policy

Issue 6: Should central banks be so averse to policy reversals?

As a broad generalization, the practice of monetary policy seems to be growing closer and closer to the way macroeconomists conceptualize it. Increasingly, central bankers utilize staff analyses, even quite complicated analyses, and think about policy options in the way that technical economists do (e.g., via expectational effects, output gaps, Phillips curves, and the like). In fact, and in contrast to past practice, many central bankers these days even are economists. The current heads of the Federal Reserve System, the Bank of England, and the Bank of Israel, for example, are all former academic stars. Yet economic analysis and central banking practice appear to diverge sharply in at least one prominent respect. The matter is what I call *reversal aversion* – the unwillingness of central bankers to reverse direction.

Consider the problem of minimizing the expected discounted present value of a loss function like (1) subject to a dynamic, stochastic model of the economy. Various aspects of the model, including both the shocks and the coefficients, are liable to be changing all the time, which means that the optimal path of the policy

[39] Not that I would recommend this crazy-quilt structure to any other country!

instrument is also changing all the time. Suppose the central bank's policy rate has been rising for several meetings, in an attempt to restrain aggregate demand. Now suppose an external shock *reduces* aggregate demand sharply. There is then a reasonable chance that the central bank's *optimal* policy rate would decline even though it has recently been rising.

Although the basic logic of optimization suggests that such *policy reversals* should not be uncommon, central bankers seem to avoid them like the plague. For example, suppose we use the arbitrary but reasonable definition that a policy reversal is a change in direction within three months. Then the allegedly activist British MPC has had only one policy reversal out of 32 interest rate changes in its brief history (which began only in mid 1997).[40] The Swedish Riskbank began using the repo rate as its central policy tool in mid 1994, and since then it has changed the rate 66 times.[41] Only two of these were policy reversals, one coming just after the September 2001 terrorist attacks in the United States. The history of the Greenspan Fed was longer (18½ years) but similar: It shows just three reversals out of 98 policy moves, two of which were associated with the 1987 stock market crash. So reversals are rare. The question is why. And the further question is: Are central banks right to avoid them so assiduously?

As just noted, simple versions of optimization theory say no. There is nothing particularly strange about a sequence of optimal choices that, say, first rises and then falls. Remember Keynes's classic retort to being chided for changing his mind: "When I learn new facts, sir, I change my opinion. What do you do?" So, if it is rational to avoid reversals, what factors might standard optimization theory be missing?

One is the dual problem of simultaneous optimization and (re)estimation in a world of pervasive uncertainty. Statistical devices such as Kalman filters (which are just an example) will give rise, e.g., to forecasts and parameter estimates that evolve slowly as new information is received. Policy based on such forecasts and estimates would also evolve slowly.

Another factor is surely central bankers' concern with their *credibility.* If citizens, and perhaps even markets, do not understand the underlying model, do not observe the shocks very well, or do not understand the logic of optimization in the face of "news," they might misinterpret a sequence in which interest rates first rise and then fall as *prima facie* evidence that the bank had erred.[42] That belief, in turn, might undermine the bank's credibility or, in an extreme case, even threaten its independence. At minimum, a quick policy reversal poses a major communication problem. Central banks worry about the loss of credibility a great deal. To cite just

[40] Widening the window to four months would add two more reversals. The count in this paragraph were all current through the end of March 2006.

[41] This count is a bit skewed by 25 changes in 1996, mostly of them small.

[42] This point is emphasized by Goodhart (2004).

one example, Alan Greenspan told the FOMC in July 1996 that, "If we are perceived to have tightened and then have been compelled by market forces to quickly reverse, our reputation for professionalism will suffer a severe blow."[43] Hundreds of similar statements must have been made by central bankers all over the world.

A second factor leading to reversal aversion may be concern with *financial market stability.* Frequent policy reversals by the central bank might induce unwanted volatility in financial markets as traders felt they were being whipsawed. And a third factor, of course, is the natural unwillingness to be seen as admitting error. So, on balance, the observed aversion to policy reversals is understandable – whether or not it is optimal.

There is, however, a downside to refusing to reverse course. Remember that a central bank that will not change its policy stance even though it is optimal to do so will from time to time find itself falling "behind the curve" – and will subsequently have to play catch-up. That in itself can cause turbulence in financial markets. More important, falling "behind the curve" presumably means either that the inflationary cat gets out of the bag or that the economy suffers a longer slump than is necessary.

Thus reversal aversion is of a different character from the other issues on my list. In the main, I have chosen matters that are currently controversial. This one apparently is not; virtually all central banks seem to exhibit strong aversion to policy reversals. The operational question here is: *Should* the advisability of reversal aversion be a subject of active debate? And my answer is yes.

Issue 7: Is the preference for gradualism rational?

To a greater or lesser degree, central banks around the world also seem to exhibit a strong revealed preference for *gradualism,* that is, for tightening or easing in a series of small steps rather than making fewer, larger rate changes. Econometrically, this means, for example, that when Taylor rules like (3) are estimated on real data they always need to include the lagged dependent variable, viz:

$$i = r^* + \pi + a(\pi - \pi^*) + b(u^* - u) + \theta i_{-1} + \varepsilon. \qquad (4)$$

This equation is typically derived by appending a partial adjustment mechanism,

$$i = \theta i_{-1} + (1-\theta) i^* , \qquad (5)$$

to the specification of the *desired* funds rate, i*, given by (3). Since a typical estimate of θ is 0.8 or more in quarterly data (Rudebusch, 2005), the implied adjustment is very slow.

[43] Quoted by Meyer (2004), p. 56.

TABLE 1 **FREQUENCY DISTRIBUTIONS OF POLICY RATE CHANGES**

Rate change	Federal Reserve (a)	Bank of England (b)	Sveriges Riskbank (c)
Below 25 bps	17	0	32
Exactly 25 bps	61	28	27
26-49 bps	3	0	2
Exactly 50 bps	17	4	5
Above 50 bps	1	0	0
TOTAL	**99**	**32**	**66**

a. August 1987 through March 2006.
b. May 1997 through March 2006.
c. June 1994 through March 2006.

Table 1 displays the observed distributions of the interest rate changes actually promulgated by the three central banks mentioned in the previous section: the Federal Reserve, the Bank of England, and the Swedish Riksbank. The strong preference for small changes is evident at all three banks: The fraction of all rates changes that is 25 basis points or less is 79% for the Fed, 88% for the BoE, and 89% for the Riksbank. To put some perspective on this, remember that Willem Buiter, a member of the Bank of England's original MPC, once famously derided a 25 basis point rate change as "chicken feed," presumably because it is unlikely that 25 basis points would ever be enough to push "actual" to "desired" anything.

What the table does *not* show is the huge amount of serial correlation in the data. The Fed is a nice example. It cut rates 24 times between June 1989 and September 1992, and then raised rates seven times between February 1994 and February 1995. Later, it raised rates six times between June 1999 and May 2000, and subsequently cut rates 13 times between January 2001 and June 2003. From June 2004 through June 2006, it raised rates by 25 basis points at 17 consecutive FOMC meetings. None of these episodes was interrupted by even a single move in the opposite direction. If Newton had observed such data, he might have concluded that a central bank in motion tends to stay in motion in the same direction. Why is that?

One reason is *option value.* In a world of constant change, pervasive uncertainty, *and* a strong aversion to policy reversals, a central bank may assign a high value to "keeping its options open" – literally. One way to accomplish that is to move interest rates more gradually than suggested by simple optimization theory (without learning or adjustment costs) – so that you can always stop without having to reverse direction. Notice the crucial role of reversal aversion in this argument. Changing policy *now,* rather than waiting for later, forecloses options *only* if you have reversal aversion – for otherwise, you can quickly undo whatever you have just done. (Analogously, a stock option, once exercised, is gone.) So central

bankers' intense aversion to policy reversals is probably one significant factor contributing to monetary policy gradualism.

Whether the gradualism induced by reversal aversion should be decried or applauded is, of course, a matter of debate. Standard optimization theory is often interpreted as saying that the policy instrument should follow something close to a random walk because the central bank should move its policy rate only in response to new information. For example, William Poole (2003, pp. 5-6), a current member of the FOMC who was formerly an academic economist, wrote:[44]

> In my view of the world, future policy actions are almost entirely contingent on the arrival of new information… Given information available at the time of a meeting, I believe that the standing assumption should be that the policy action at the meeting is expected to position the stance of policy appropriately.

But the Greenspan Fed often did not behave this way, and one major reason, I believe, was Greenspan's devotion to keeping his options open. He always wanted to maintain the flexibility to stop at any moment without having to reverse course (Blinder and Reis, 2005). One way to accomplish that is to move cautiously when you move.

A second plausible reason for gradualism is serially-correlated shocks and/or gradual updating of forecasts and parameter estimates, which would keep the central bank moving in the same direction over a series of meetings. Rudebusch (2005) points out that econometricians cannot readily distinguish between partial adjustment and serially-correlated errors. So, rather than observing what appears to be central bank inertia, we might just be observing non-inertial responses to serially-correlated shocks and changing information. Indeed, Goodhart (2004) suggests that serially-correlated forecast errors explain what appears to be gradualism at the British MPC, and Sack (2000) found that serially-correlated shocks help explain the FOMC's observed (and seemingly inertial) reaction function.

A third possible explanation of gradualism derives from what I have labeled "Brainard conservatism" (Blinder, 1998). In a seminal paper, William Brainard (1967) suggested that, unlike additive uncertainty, multiplicative uncertainty should induce a policymaker to move his instrument less than he would under certainty equivalence. Even in Brainard's original paper, this was not a tight deduction, but rather a result that held for certain (plausible?) parameter values – basically that covariances were not too large. Subsequent research has verified the fragility of Brainard's result in a variety of more complex settings. There is no Brainard conservatism *theorem*.[45] Yet I still believe what I wrote in Blinder

[44] I have a hard time squaring this quotation with moving the Federal funds rate by 25 basis points at 16 consecutive meetings. I suspect Poole does, too.

[45] This was clear already in Chow (1975), Chapter 10. See also Rudebusch (2001) and many other sources.

(1998, p.12): "My intuition tells me that this finding is more general – or at least more wise – in the real world than the mathematics will support."[46] Notice that if a wise central banker is conservative in the Brainard sense, he will normally move the policy rate too *little* to put it where he thinks it should be. He will therefore have to move rates again and again – presumably in the same direction.

A fourth motive for gradualism is the desire to smooth interest rates. As I noted earlier, central bankers often associate interest-rate volatility with financial-market instability, perhaps because rate changes lead to asset revaluations. Hence a concern with financial stability can rationalize adding a term like $\gamma(i_t - i_{t-1})^2$ to the central bank's loss function. If that is done, the lagged interest rate is carried naturally into the monetary policy reaction function, without any need to posit the existence of adjustment costs. In fact, Rudebusch (2001) finds that positing a substantial value of γ helps explain the Fed's observed – and quite inertial – reaction function.

Woodford (2003) has constructed a rather different explanation for gradualism based on the importance of pre-commitment. He uses a specific forward-looking model based on Calvo (1983) pricing, in which only some prices are free to adjust each period. In that setting, he argues that, *if* the central bank can *precommit* to a future path of interest rates, then firms that are free to set prices now will expect rates to keep moving in the same direction. They will therefore adjust their prices by more, thereby compensating for those who cannot adjust their prices at all. This is beneficial in Woodford's model because faster price adjustment keeps the economy closer to its full-information equilibrium. While Woodford's paper is frequently cited by academics, I am skeptical that this specific mechanism influences real-world central bank thinking very much. Nonetheless, the basic idea that expected gradual adjustment of *short* rates can lead to strong reactions of *long* rates is probably quite general (Bernanke, 2004a).

In short, we have a plethora of explanations for why gradualism might be rational. I have mentioned five: option value, serially-correlated shocks, Brainard conservatism, the desire to smooth (market) interest rates, and expectational effects on long-term rates. Any one of them will do. The question is: Which are the operative reasons?

Issue 8: Is monetary fine tuning possible? Desirable?

Were it not for the success of Alan Greenspan as Chairman of the Federal Reserve, the next issue would not be on my list at all. "Fine tuning" sounds like an archaic phrase left over from the 1960s. Ever since the 1970s, it has been

[46] Simulations by Onatski and Williams (2003) suggest this as well.

used more often in a pejorative sense than in a prescriptive one, as when my colleague Lars Svensson (2001, p.1) warned that "the complex transmission mechanism of monetary policy, the varying lags and strength of the effects through different channels, unpredictable shocks and inherent uncertainty combine to prevent the use of monetary policy for fine-tuning." In other words: *Do not attempt this at home.*

But Alan Greenspan did, and he succeeded. It is worth asking how. More germane to this paper, it is worth asking whether other central bankers should try to fine tune their own economies. But what, precisely, does that mean? Blinder and Reis (2005), who focus on this question, suggest two aspects:

(a) pursuing an activist stabilization policy that strives to keep inflation and unemployment close to their targets. With a reaction function like a Taylor rule, that would mean utilizing relatively high values of α and β.
(b) adjusting the central bank's policy instrument(s) frequently in pursuit of that goal. Note that, as just argued, frequent adjustment presumably means that the typical interest rate change will be small.

But fine tuning certainly does *not* mean:

(c) achieving or expecting to achieve perfection.

We have already noted that most central banks practice (b). What about (a)? I am tempted to answer with Bobby Kennedy's famous rhetorical question: *Why not?* Consistent with (c), no basketball player expects to hit 100% of his shots – and none does. Nonetheless, the objective is always the same: to toss the ball in the center of the basket, in line with (a). Archers behave similarly when they aim their arrows. Indeed, what else should they do? The real fine-tuning issue, it seems to me, is how hard to try.

If there is an argument against trying too hard, that is, against reacting strongly to output and inflation gaps, it must revolve around the dangers of oversteering and, therefore, of accidentally *destabilizing* the economy. How realistic is that danger? Rudebusch's (2001) analysis of optimal versus actual policy in a simple linear model of the U.S. economy points strongly toward the opposite conclusion: that the Fed's α and β are too *small.* On the other hand, some of the simulation findings in Rotemberg and Woodford (1997), Levin, Wieland, and Williams (1999), and Orphanides and Williams (2005) suggest that the Greenspan Fed reacted too strongly to unemployment or output gaps (but not to inflation gaps). The issue seems open. It also strikes me as an important practical issue for central bankers to resolve.

Issue 9: Central banks and financial markets: Who leads and who follows?

In Blinder (1998, pp. 59-62), I argued that central banks should guard their independence from financial markets as zealously as they guard their independence from politics,[47] an argument I picked up in much greater detail in Blinder (2004, Chapter 3). But other than the theoretical paper by Bernanke and Woodford (1997), I have seen almost no scholarly attention to this matter. To frame the issue, consider two stereotypes:

- *Old-Fashioned Central Bank* sees itself as a sometimes-stern disciplinarian that lords it over the unruly, and sometimes downright foolish, financial markets. It sees itself both as the adult at the party and as the boss. It therefore expects the markets to follow its lead, even though it knows they will not always oblige.
- *New-Fangled Central Bank,* by contrast, is deeply respectful of markets. It sees itself as more of a student of the financial markets than as a teacher, and it respects the markets for their power and wisdom. It routinely uses asset prices to "read" what the markets expect it to do, and it is loath to deviate much from that expectation.

As a broad generalization, my claim is that Old-Fashioned Central Bank is giving way to New-Fangled Central Bank in the real world. In part, such a movement is inevitable and appropriate – after all, Old-Fashioned Central Bank is a bit of a throwback. But I worry a bit that the shift may be going too far.

Why might this be of concern? One reason is the dog-chasing-its-tail problem mentioned by Blinder (1998) and modeled formally by Bernanke and Woodford (1997). When central banks follow market forecasts, which are in turn based on forecasts of the central bank's own behavior, the result can be either dynamic instability or a failure of equilibrium to exist, depending on whether the model is backward or forward looking. In the real world, this problem would likely manifest itself in a monetary policy that tends to overshoot in both directions, just as speculative markets do.

Finally, there is the related matter of time horizons. Economic models normally pretend that financial markets are populated by coolly-rational, farsighted investors with long (if not infinite) time horizons. But this benign view of markets contrasts sharply with what people in the trenches see every day on trading floors. As Fischer Black slyly put it, financial markets look much more efficient from the banks of the Charles than from the banks of the Hudson. On

[47] A version of these lectures was first given in 1995, while I was Vice Chairman of the Federal Reserve Board.

the banks of the Hudson and in other financial centers where prices are actually made, you find hordes of young traders who are susceptible to fads, herding, and occasional hysteria. These people tend to have incredibly short time horizons, extending at most to the end of the current pay period and maybe only to the end of the trading day.

Notice the great irony here. One of the main reasons why central banks should be independent of politics is that politicians have notoriously short time horizons, extending at most to the next election. Well, the next election is usually much further away than the close of the trading day. Wouldn't it be a shame if central bankers, in an effort to be "modern", escaped from the control of shortsighted politicians only to put themselves under the thumb of even more shortsighted traders?

To be sure, central banks cannot cut themselves off from the markets – and should not try. Markets are not only the main transmission mechanism for monetary policy but also invaluable sources of information. They need to be respected, though perhaps more for their power than for their wisdom.[48] One way to conceptualize my basic point is to contrast the two different meanings of the English verb *to listen.* Should central bankers listen to the markets? Yes, in the sense that we should all listen to news broadcasts; but *not* in the sense that children should listen to their mothers.

Issue 10: Should central banks intervene in foreign exchange markets?

One arena in which the preeminence of market judgments over central bank judgments clearly holds sway is the prevailing attitude toward foreign exchange intervention. Let me break this issue into two closely-linked questions:

1 Do central banks have the power to move exchange rates with *sterilized* intervention?[49]
2 If so, should they use that power?

Question 2, of course, comes straight from the previous issue. If markets always get the exchange rate right, there is certainly no reason for central banks to intervene. So let's at least entertain the possibility that markets sometimes get exchange rates badly wrong. If you reject this possibility, you can skip straight to the next section. But you must also explain the value of the dollar in early 1985 – and perhaps today as well.

Current thinking in academic and, even more so, in central banking circles runs strongly against foreign exchange intervention – mostly answering "no" to both ques-

[48] On this, see Issues 12 and 13 below.

[49] The power of unsterilized intervention is not at issue. This section pertains only to sterilized intervention.

tions. Regarding Question 1, the empirical evidence has long been read to say that central banks have little ability to move exchange rates, except perhaps fleetingly, without changing their monetary policies. But more recent academic studies, using better data, suggest a bit more scope for unsterilized intervention (Sarno and Taylor, 2001).

The negative consensus always struck me as a bit peculiar, anyway. Why are central banks unable to move currency rates when shifts in private-sector supply and demand move them all the time, and by large amounts? No one thinks that private currency traders are powerless to move exchange rates. Why do they lose this power if they go to work for the public sector? I believe the answer must be quantitative rather than qualitative: Private sector traders regularly buy and sell currencies in far greater volume than central banks do. So, to me, the real question is more normative than positive: *Should* a central bank buy or sell the (possibly large) amount of foreign currency required to move its exchange rate?

A negative answer is certainly tenable. Especially in the case of a major, actively-traded currency like the dollar, euro, or yen, the requisite volume of transactions might be gigantic – which would put the central bank at risk of large capital losses if it is wrong. In such cases, the central bank had better be very sure (a) that it is right and (b) that the exchange rate goal is important enough to justify taking the risk. (And if the exchange rate goal is that important, maybe it should use unsterilized intervention anyway.) Such massive foreign exchange interventions may also have to be asymmetric. While a central bank can always supply as much domestic currency as needed to hold its exchange rate down,[50] it may not have enough foreign exchange reserves to prop its exchange rate up.

For the most part, I accept this consensus: Outguessing markets is a hazardous business. But, in my view, we must allow for some exceptions.[51] For example, there are times when currency misalignments are glaringly obvious, even if the "right" exchange rate is not. The dollar in early 1985 (far too high), the dollar again in the spring of 1995 (too low), and the euro in the spring of 2001 (too low) are cases that quickly spring to mind. While neither the timing nor the amount of the market's eventual correction could have been known in advance, it was not hard to recognize that exchange rates were misaligned; and the eventual direction of change was obvious. In cases like that, chances are good that many market participants are aware of the same facts as the central banks, and so are holding their positions nervously. That should make it possible for a large (and hopefully concerted) intervention by central banks to push the forex market in the direction in which it was destined to go anyway.

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[50] Assuming it can sterilize the foreign currency inflows.

[51] Below, under Issue 14, I outline the conditions necessary to make it sensible for a central bank to try to "burst" an asset-market bubble. Here I am, in essence, claiming that these conditions are occasionally met in the case of exchange rates.

But Question 2 remains. Is the exchange rate a sufficiently important relative price that the central bank should (a) temporarily take its eye off its true targets (inflation and unemployment) and (b) accept the risk inherent in large-scale currency speculation? My own answer is: normally no, but sometimes yes. For example, there are rare times when exchange rates are so misaligned that they distort trade patterns so much, or interfere so much with demand management, that it becomes rational for the central bank to intervene in large volume. Another possibility, which is exemplified by China today and perhaps by Japan in 2003-2004, is that a nation might believe that its vital interests are best served by a lower exchange rate than the free market would deliver – and be willing to pay the price to achieve it.

I realize that I am delivering this paper in a euro-zone country with no exchange rate to worry about. But the ECB may have to deal with the exchange rate issue once again when the markets not only correct the current overvaluation of the dollar but probably overshoot. And, of course, the belief that recent months have constituted one of those rare moments when concerted intervention makes sense is what underlies recent suggestions for a "new Plaza accord" (Cline, 2005). So I would like to resurrect the intervention issue, which has been dead and buried for too long, and commend it to the attention of central bankers.

Issue 11: Should monetary policy use the derivatives markets?

I noted earlier that financial markets are big, powerful, and innovative. Nothing illustrates these traits more dramatically than the explosive growth of the markets for derivatives. Derivatives pose many interesting and difficult issues for supervisors and regulators but, in keeping with my assignment, I confine myself to their potential role in monetary policymaking,[52] which comes in three parts:

1 as a source of market information
2 as part of the monetary transmission mechanism
3 as possible assets for open-market operation.

The first two are uncontroversial. Given the liquidity and volume of trading in, say, interest rate swaps, central banks would be foolish to ignore the signals emanating from those markets – and they don't. Similarly, the most dramatic early influences of a central bank's policy moves, or even of expectations of policy moves, may well be registered in the markets for derivatives such as interest rate futures.

[52] For this reason, I restrict myself to fixed-income derivatives, such as swaps.

Since these markets, in turn, are linked to the interest rates that matter for real economic decisions, such as those on home mortgages and business loans, they are a key component of the monetary transmission mechanism. I don't think anyone doubts either of these propositions.

But the third potential role for derivatives is highly speculative at this point; I do not know of a single central bank that conducts open-market operations in derivatives.[53] I raise the possibility as an issue for the future. Why?

One reason is the sheer size and growing importance of some of these markets, which means they are terrifically deep and liquid. It has often been said that the Federal Reserve conducts open market operations in the U.S. Treasury bill market because that is the deepest, most liquid market in the world; and similar statements are made about other central banks. Well, that may no longer be true. And even if it is true today, it may not be true tomorrow, given the rapid expansion of the derivatives markets. Central banks of the future may discover that they can get faster, more reliable execution in the swaps market, for example.

Another reason stems from the juxtaposition of rapid growth of the derivatives markets against slow growth of central bank balance sheets. Some observers feel that the markets are already so large and innovative that central banks have a hard time moving even short-term interest rates via conventional open-market operations.[54] One obvious answer, of course, is to conduct ever-larger openmarket operations – which is where the size of central bank balance sheets comes in. If, for example, currency shrinks relative to GDP while fixed-income markets grow, central banks may find their portfolios of T-bills shrinking relative to the size of the open-market operations needed to move markets.[55] If and when this happens, *leverage* may be the answer; and that, of course, is where derivatives come in. Market participants routinely use derivatives to create huge amounts of leverage, and thus effectively to control large volumes of securities with relatively little capital. Why can't central banks, who are certainly higher-rated counterparties, do the same? It's something to think about.

Of course, central banks will want to move into this domain cautiously, if at all. They are stodgy to begin with, appropriately so in my view; and derivatives have a vaguely disreputable public image. But most of the "accidents" in the de-

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[53] I ignore the Bank of Thailand's use of foreign exchange derivatives in 1997 because that seems to have been motivated by a desire to conceal its true reserve position, not as a way to conduct monetary policy. The Bank of Mexico deals in options on the peso to influence (not peg) its exchange rate – though transparently. Finally, as part of its efforts to guard against financial disruption at the end of the millennium, the Federal Reserve sold call options on repos in October-December 1999. (See Drossos and Hilton (2000).) I am grateful to Steve Cecchetti for calling these last two cases to my attention.

[54] I am, personally, rather skeptical of this argument. But one hears it all the time.

[55] Note the parallelism to the previous issue about exchange rate intervention.

rivatives markets, not to mention the frauds, have taken place in "exotics," not in plain-vanilla interest rate swaps, which are simple, transparent, and either are or can be traded on organized exchanges. And it is, of course, in plain vanillas that any sensible central bank would operate. For this reason, I believe that conducting open-market operations in swaps would confer a side benefit by steering markets away from exotics toward more plain vanilla swaps. Indeed, were I of a mind to predict the *future* of central banking, as opposed to just analyzing the *present,* I'd be tempted to forecast appearances by central banks in the swaps markets. But for now, it is just something to think about.

III The transmission mechanism for monetary policy

I turn, finally and more briefly, to five controversial and/or poorly understood aspects of the transmission mechanism for monetary policy.

Issue 12: Transmission via the term structure of interest rates

The simplest version of the monetary transmission mechanism traces the central bank's influence from overnight rates (which it controls) to longer-term interest rates and thereby on to aggregate demand. The link from short rates to long rates is normally based on the *expectations theory of the term structure* of interest rates, which states that intermediate- and long-term rates are the appropriate weighted averages of expected future short rates.

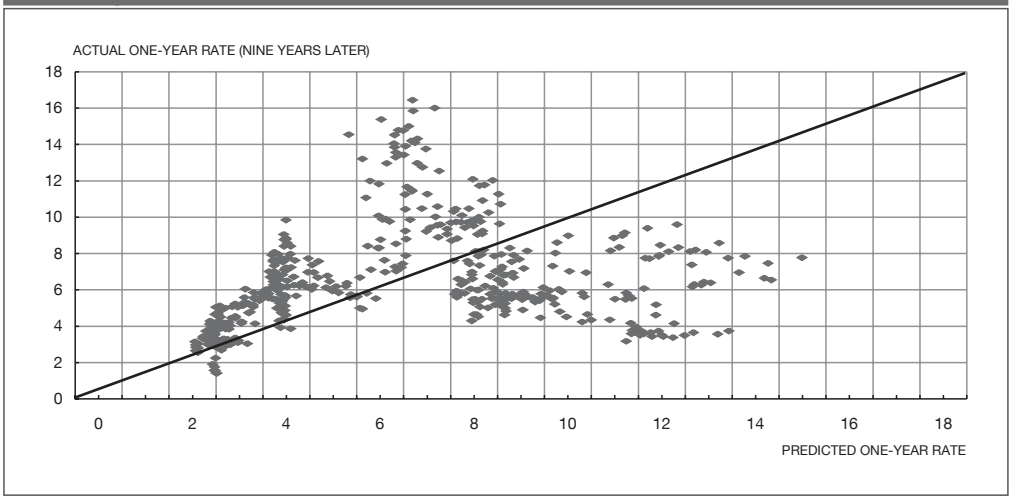
There is a catch, however. It has been known for years that the expectations theory fails virtually every empirical test miserably, at least when expectations are rational.[56] A one-sentence synopsis of this literature is that long rates are terrible (and biased) predictors of future short rates. To show just one example, I reproduce below a graph from Blinder (2004, p. 78). It shows, on the horizontal axis, the one-year U.S. Treasury bond rate expected to hold nine years ahead *according to the yield curve* and, on the vertical axis, the *actual* one-year rate nine years later. There is hardly any correlation between the two.[57]

Just why this is so remains a major intellectual puzzle. To blame the puzzle on time-varying term premia is just to give it a name – like blaming ma-

[56] Among the many references that could be cited, see Campbell (1995). Chow (1989) suggests that the theory fares better under the assumption of adaptive expectations.

[57] The straight line drawn in the graph is *not* the best-fitting regression line. It is a line with a freely-estimated intercept (to allow for a constant risk premium) and a slope of 1.0, which is the slope implied by theory. The slope of the actual regression line (not shown) is only 0.27. The underlying data are for U.S. zero-coupon bonds, monthly from December 1949 through February 1991.

FIGURE 1 **ACTUAL INTEREST RATES AND PREDICTIONS FROM THE TERM STRUCTURE**



chine malfunctions on "gremlins." In Blinder (2004, Chapter 3), I suggested (but certainly did not prove) that the expectations theory fails because long rates are far more sensitive to short rates than "rational" pricing models predict. This hypothesis may or may not be correct. My main purpose in calling attention to the term structure puzzle here is not to resolve it, but rather to urge central bank research departments to give it high priority. It may be the piece of the monetary transmission mechanism about which we are most in the dark.

This issue relates, by the way, to Issue 9. If markets are so bad at forecasting future short-term interest rates, why should we give so much deference to their forecasts of anything else – including future central bank policy?

Issue 13: Transmission via exchange rates: uncovered interest-rate parity

The mention of unresolved puzzles and terrible forecasts leads naturally to the next issue: the equally-embarrassing failure of *uncovered interest-rate parity.* If one-year interest rates are 5% in the United States and 3% in Germany, the market is implicitly forecasting a 2% depreciation of the dollar against the euro over the coming year. And a similar forecast is implied by every other pair of international interest rates over any horizon. Thought of in terms of monetary policy, when divergent central bank policies engineer international interest rate differentials, those differentials are supposed to first *forecast* and then *become* exchange rate movements. Unfortunately, on average they do not. Not only are

uncovered interest-rate parity relationships *terrible* forecasters of future exchange rate movements, they often get the sign wrong.[58]

This is a serious matter. In the usual story of the role of exchange rates in monetary transmission, a country that *raises* its interest rates experiences a currency *appreciation.* The theory of uncovered interest parity explains that this happens in order to induce (rational) expectations that the currency will subsequently *depreciate* back to its original (real) exchange rate. Thus a tightening of monetary policy is supposed to lead to a quick appreciation followed by a depreciation. Nice and logical. But, empirically, it does not happen. How, then, does monetary policy influence exchange rates? A good question. And until it gets a good answer, central bankers are operating in a dense fog. So this issue also ranks high on the research agenda – and high on the list of reasons not to place excessive trust in market forecasts.

Issue 14: How should central banks react to asset-price bubbles?

Asset prices are an important part of the monetary policy transmission mechanism. Other things equal, when stock or home prices rise, a central bank that is targeting, say, a weighted average of the inflation and output gaps will raise interest rates because wealth effects might otherwise drive aggregate demand up too fast. This is old hat, uncontroversial, and a standard part of monetary policy practice.

But should central banks react to asset-market bubbles *per se,* meaning *over and above* the amount implied by the link from asset prices to wealth to aggregate demand? In the loss function context, that would mean adding some asset prices (e.g., stock prices) as a third argument of the loss function. In the Taylor rule context, it would mean adding those prices as another term in the equation, as Cecchetti *et al.* (2000) explicitly recommend, so that the central bank would then raise interest rates as stock prices go up even *if y and π were both on target.*[59] Both the current and previous chairmen of the Federal Reserve are on record as opposing this idea (Bernanke and Gertler (1999), Greenspan (2002)), as am I (Blinder and Reis, 2005, pages 64-70). Since so much ink has been spilled on this issue, I can be very terse in outlining the *pros* and *cons.*

Proponents of bubble bursting argue that:

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[58] Among the many sources that could be cited, see Wadhwani (1999) and Meredith and Chinn (2004).

[59] Cecchetti *et al.* (2000) explicitly state that the central bank should *not* have a target price for the stock market, but should just "lean against the wind." Thus stock prices enter the Taylor rule with a positive coefficient, but there is no target level for stock prices.

- the central bank has a clear responsibility to preserve financial stability, which is threatened by asset bubbles.
- *sizable* bubbles can, in fact, be detected by applying U.S. Supreme Court Justice Potter Stewart's famous test for pornography: "You know it when you see it." Furthermore, they can be recognized *early enough* to do something about them.
- bubbles lead to misallocations of resources (e.g., the Internet craze) and also damage conventional macroeconomic stability (e.g., when a slump follows a stock market crash).
- the central bank has instruments at its disposal that can deflate bubbles without doing undue harm to its primary goals, inflation and unemployment.

This last argument is usually tacit, not explicit, but it is essential. Without it, bubble-bursting may do more harm than good, even if all the rest is right.

Opponents of bubble-bursting concede that bubbles do happen, do cause resource misallocations, and are sometimes recognizable. But they argue that:

- financial stability can be maintained by what Reis and I (2005) called the "mop up after" strategy.
- bubbles generally become "obvious" only after they have inflated quite far, and attempts to identify them earlier would likely produce many false positives.
- the central bank is not responsible bad private investment decisions, and the macroeconomy is best managed by focusing monetary policy on inflation and unemployment.
- the central bank has no instruments suitable for targeting specifically at bubbles. Raising interest rates enough to burst a bubble would likely burst the economy as well.

I find the second set of arguments far more compelling and, in support, I offer the following quick reflections on the greatest bubble in history: the U.S. stock market bubble of 1998-2000.[60] The idea is that, if the case for bursting bubbles didn't apply then, it may never apply.

First, the stock market bubble was recognizable, but only rather late in the game; and acting too early could have been disastrous. For example, even during its worst months after the crash, the market never returned to where it was on the day in December 1996 that Alan Greenspan declared it to be "irrationally exuberant." Should the Fed have tightened in 1996 and squelched the ensuing

[60] Similar facts apply to Europe and Japan. The tech-stock bubble was a worldwide phenomenon.

boom? My answer is no. Second, the "mop up after" strategy worked extraordinarily well even in this extreme stress test; not a single sizable bank or brokerage firm went bankrupt. Third, despite the fact that a staggering $8 trillion in wealth was vaporized, the post-bubble recession was so small that it disappears in annual data. Finally, if the specific concern was tech stocks, what instrument could (or should) the Fed have used to target this idiosyncratic sector?

While my personal opinion is clear, the main point is that real-world central bankers need to make a decision on this issue.

Issue 15: Dealing with the zero lower bound on nominal interest rates

While central banks control the (very) short-term *nominal* interest rate, most economists believe that it is *real* interest rates that influence economic activity.[61] In a deep slump, the central bank would like to make real short rates negative. But this is impossible if the inflation rate is zero or negative, because nominal interest rates cannot fall below zero. For decades, most economists viewed this issue as a theoretical curiosum of no practical importance. But Japan has taught us otherwise.[62]

What to do? First, prevention is clearly better than cure. Bernanke, Reinhart and Sack (2004) creatively examined various unconventional monetary policies – things that a central bank confronted by the zero lower bound might try – and I would add exchange-rate intervention to their list. I think it is fair to say that such a central bank would not be powerless. That's the good news. However, the unconventional policies are likely to be far weaker than conventional interest-rate policy. That's the bad news. So it is certainly better not to flirt with zero.

Inflation targeting, or rather *successful* inflation targeting, should help. By posting a target, π^*, that is safely above zero, and then achieving it, a central bank can avoid confronting the zero lower bound. At worst, it can always push the short-term real interest rate down to $-\pi^*$, which is why π^* should be bounded away from zero. Of course, with shocks and control errors, even an inflation targeting central bank might find itself below π^*, or even below zero. However, should this happen, a credible commitment to the positive inflation target should keep the current *expected* inflation rate above the current *actual* inflation rate, leaving $r^e = i - \pi^e$ well below $r = i - \pi$.

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[61] The truth is not as one-sided as economists often pretend. For example, the front-loading of *real* mortgage payments in a conventional (nominal) fixed rate mortgage makes the *nominal* rate matter quite a lot to capital-constrained home buyers.

[62] When the core CPI inflation rate in the United States dipped to 1.3% in August 2001, the Fed voiced concerns about deflation and the zero lower bound. See Bernanke (2003). All the time of this conference, with *core* HICP inflation at 1.4%, the ECB should have been just as concerned.

Targeting the *price level,* rather than the *inflation rate,* provides even greater protection against getting trapped by the zero lower bound. Credible inflation targeting should engender expectations that π, which could go negative for a time, will converge upward to π^*. But credible price *level* targeting should engender expectations that π will actually overshoot π^* for a while in order to get the price level, p_t, back to its target path – thereby pushing π^e higher sooner. For this reason, the earlier verdict that inflation targeting is superior to price level targeting (Fischer, 1994) may need to be revisited for a world of very low inflation. Note, by the way, that adopting a price level target does not imply that the average inflation rate must be zero. The desired price level path can be defined to rise over time at some pre-determined inflation rate: $p_t^* = p_0(1+\pi^*)^t$.

Issue 16: Do the giant central banks have global responsibilities?

There is one last question that most central banks can answer quickly (and in the negative) but that giants like the Federal Reserve and the ECB (and perhaps the Bank of Japan and, one day, the People's Bank of China) must wrestle with: Should a central bank consider the welfare of other countries in making its *domestic* monetary policy decisions? Or, put slightly differently, do the Fed and ECB bear some responsibility for the health of the *world* economy?

Before addressing this question, let me make an important conceptual distinction analogous to the one made under Issue 14 (bubbles). In an interrelated world, what happens in Country B will reverberate somewhat on Country A. For that reason, the central bank of Country A must and will take events in Country B into account in formulating its own domestic monetary policy. To cite just one obvious example, forecasts of foreign economies are needed to generate a forecast of your own net exports. The question for this section is a different one: Should the central bank's objective function have some foreign (or world) variables in it? Or, put more concretely, might there be times when the Fed or the ECB should tighten or ease even though their own domestic economies are not calling for such action?

The case of the "25 basis points that saved the world" – the Fed's rate cut in September 1998, at a time when the U.S. economy was booming – brought this issue into bold relief. While Alan Greenspan was careful to justify the cut by fretting about possible infection from abroad, many observers at the time thought the Fed was doing its part to "save the world."

The question is a vexing one, and one major reason is legal. The Fed was created and derives its mandate from acts of the U.S. Congress; the ECB derives its authority and mandate from the Maastricht Treaty. In both of these cases, and in all others of which I know, the central bank's legal mandate pertains

exclusively to the domestic economy. Other than worrying about possible reverberations from various Country B's, what right, then, does either the Fed or the ECB have to take actions designed to help other countries? And if such actions run counter to domestic needs, has the central bank actually violated the law? These are serious issues.

But, on the other hand, an elephant walking through the jungle must take care where it steps. The European and American (and perhaps also the Japanese) economies are so large, and so important to both real and financial activity throughout the world, that it can be argued that good international citizenship gives them special responsibilities. That is why I raise the question, but do not answer it.

IV Monetary policy in the 21st century

With 16 different issues, it would be foolish to try to summarize all the arguments. Instead, let me use this concluding section to provoke discussion by offering overly-crisp and excessively definitive answers to the 16 questions posed in this paper – leaving out the nuances and counter-arguments.

Organizational structure

1 Monetary policy should target a *core,* not headline, measure of inflation and set the inflation target well above zero – say, at 2%.
2 Most central banks need to become more transparent in several dimensions. One is their forecasts, including conditional forecasts of their own behavior. However, a mechanical reaction function might do as an interim solution.
3 Inflation targeters should be more transparent about having an output or unemployment stabilization objective.
4 Monetary policy is best made by committees, but autocratically-collegial committees may not exploit the advantages of group decisionmaking sufficiently.
5 Nations should not exclude their central banks from bank supervision.

Operating principles

6 Central banks need to question their reasons for such extreme aversion to policy reversals.
7 On the other hand, we have, if anything, too many good explanations for the preference for gradualism.
8 Instead of scoffing at "fine tuning," perhaps some central banks should raise their aspiration levels.
9 Central banks should lead the markets rather than follow them.

10 There may be more scope for unsterilized foreign exchange intervention than current central bank rhetoric and practice admit.
11 Some central banks should begin thinking about conducting at least some of their open-market operations in derivatives.

Monetary transmission

12 Figuring out why the expectations theory of the term structure fails so badly is an urgent research priority for central banks.
13 So is the abject failure of uncovered interest parity.
14 Central banks should not use monetary policy to burst asset market bubbles.
15 Central banks should have contingency plans for dealing with the zero lower bound on nominal interest rates.
16 As the world continues to integrate economically, the ECB and the Fed (and eventually also the PBoC) may implicitly have to assume more global responsibilities.

Finally, I confidently predict that, five or ten years from now, some other scholar will have no trouble at all in formulating a list of 16 or more unresolved monetary policy issues. I just hope some of them are different from mine.

References

ARCHER, DAVID (2005). "Central-Bank Communications and the Publication of Interest Rate Projections," paper presented at Sveriges Riksbank conference, "Inflation Targeting: Implementation, Communication, and Effectiveness," Stockholm, June.

BALL, LAURENCE and NIAMH SHERIDAN (2005). "Does Inflation Targeting Matter?" in Ben Bernanke and Michael Woodford, eds., *The Inflation-Targeting Debate,* University of Chicago Press, 249-276.

BARRO, ROBERT and DAVID GORDON (1983). "A Positive Theory of Monetary Policy in a Natural Rate Model," *Journal of Political Economy* 91 (4, August): 589-610.

BERG, CLAES (2005). "Experience of Inflation-targeting in 20 Countries," Bank of Sweden *Economic Review* 1: 20-47.

BERNANKE, BEN (2003). "An Unwelcome Fall in Inflation?" speech delivered at University of California, San Diego, July 23.

BERNANKE, BEN (2004a). "Gradualism," Remarks delivered at Federal Reserve Bank of San Francisco (Seattle Branch), May 20, 2004.

BERNANKE, BEN (2004b). "Central Bank Talk and Monetary Policy," speech before the Japan Society, New York, October 7.

BERNANKE, BEN (2006). "The Benefits of Price Stability," speech delivered at Princeton University, February 24.

BERNANKE, BEN and MARK GERTLER (1999). "Monetary Policy and Asset Price Volatility," in *New Challenges for Monetary Policy,* Federal Reserve Bank of Kansas City symposium, Jackson Hole, Wyoming, August 26-28.

BERNANKE, BEN and CARLA LOWN (1991). "The Credit Crunch," *Brookings Papers on Economic Activity* 2: 204-239.

BERNANKE, BEN; VINCENT REINHART, and BRIAN SACK (2004). "An Empirical Assessment of Monetary Policy Alternatives at the Zero Bound," *Brookings Papers on Economic Activity* 2: 1-78.

BERNANKE, BEN and MICHAEL WOODFORD (1997). "Inflation Forecasts and Monetary Policy," *Journal of Money, Credit, and Banking* 29 (4, November): 653-684.

BLINDER, ALAN (1998). *Central Banking in Theory and Practice.* Cambridge: MIT Press.

BLINDER, ALAN (2000). "Critical Issues for Modern Central Bankers," in European Central Bank, *Monetary Policymaking under Uncertainty,* 64-74.

BLINDER, ALAN (2004). *The Quiet Revolution: Central Banking Goes Modern,* New Haven: Yale University Press.

BLINDER, ALAN (2005). "Monetary Policy by Committee: Why and How?" prepared for workshop at De Nederlandsche Bank, November 28.

BLINDER, ALAN; CHARLES GOODHART, PHILIPPE HILDEBRAND, DAVID LIPTON, and CHARLES WYPLOSZ (2001). *How Do Central Banks Talk?* Geneva Reports on the World Economy, vol. 3. Geneva: International Center for Monetary and Banking Studies; London: Centre for Economic Policy Research.

BLINDER, ALAN and JOHN MORGAN (2005). "Are Two Heads Better than One? Monetary Policy by Committee," *Journal of Money, Credit, and Banking* 37 (5, October): 789-812.

BLINDER, ALAN and RICARDO REIS (2005). "Understanding the Greenspan Standard," in *The Greenspan Era: Lessons for the Future,* Federal Reserve Bank of Kansas City symposium, Jackson Hole, Wyoming, August 25-27.

BLINDER, ALAN and JANET YELLEN (2001). *The Fabulous Decade: Macroeconomic Lessons from the 1990s.* New York: Century Foundation Press.

BRAINARD, WILLIAM (1967). "Uncertainty and the Effectiveness of Policy," *American Economic Review* 57 (2, May): 411-425.

BRUNNER, KARL (1981). "The Art of Central Banking," Center for Research in Government Policy and Business working paper GPB 81-6, Graduate School of Management, University of Rochester.

CALVO, GUILLERMO (1983). "Staggered Prices in a Utility-Maximizing Framework," *Journal of Monetary Economics* 12 (3, September): 383-398.

CAMPBELL, JOHN (1995). "Some Lessons from the Yield Curve," *Journal of Economic Perspectives* 9 (3, Summer): 129-152.

CECCHETTI, STEPHEN; HANS GENBERG, JOHN LIPSKY, and SUSHIL WADHWANI (2000). *Asset Prices and Central Bank Policy,* Geneva Reports on the World Economy, vol. 2. Geneva: International Center for Monetary and Banking Studies; London: Centre for Economic Policy Research.

CHOW, GREGORY (1975). *Analysis and Control of Dynamic Economic Systems,* New York: Wiley.

CHOW, GREGORY (1989). "Rational versus Adaptive Expectations in Present Value Models," *Review of Economics and Statistics* 71 (3, August): 376-384.

CLINE, WILLIAM (2005). "The Case for a New Plaza Agreement," Policy Brief 05-4, Institute for International Economics, December.

CUKIERMAN, ALEX (2004). "Nonlinearities in Taylor Rules – Causes, Consequences and Evidence," keynote lecture at Central Bank of Uruguay, August.

CUKIERMAN, ALEX (2006). "Central Bank Independence and Monetary Policymaking Institutions – Past, Present, and Future," February 2006, forthcoming in *Economia Chileana.*

CUKIERMAN, ALEX (2005). "The Limits of Transparency," paper presented to the meetings of the American Economic Association, January 2006.

DROSSOS, EVANGELINE and SPENCE HILTON (2000). "The Federal Reserve's Contingency Financing Plan for the Century Date Change," Federal Reserve Bank of New York *Current Issues in Economics and Finance* 6 (15, December): 1-6.

FERGUSON, ROGER (2000). "Alternative Approaches to Financial Supervision and Regulation," *Journal of Financial Services Research* 17: 297-303.

FISCHER, STANLEY (1994). "Modern Central Banking," in F. Capie, C. Goodhart, S. Fischer, and N. Schnadt, *The Future of Central Banking,* Cambridge University Press.

FREYTAG, ANDREAS and DONATO MASCIANDARO (2005). "Financial Supervision Fragmentation and Central Bank Independence: The Two Sides of the Same Coin?" working paper 14/2005, Friedrich-Schiller-University, Jena.

FRIEDMAN, MILTON (1968). "The Role of Monetary Policy," *American Economic Review* 58 (1, March): 1-17.

FRY, MAXWELL; DEANNE JULIUS, LAVAN MAHADEVA, SANDRA ROGER, and GABRIEL STERNE (2000). "Key Issues in the Choice of a Monetary Policy Framework," in Lavan Mahadeva and Gabriel Sterne, eds., *Monetary Policy Frameworks in a Global Context,* New York: Routledge Publishers.

GERAATS, PETRA (2002). "Central Bank Transparency," Economic Journal 112 (483, November): 532-565.

GOODHART, CHARLES (2000). "The Organizational Structure of Bank Supervision," Financial Stability Institute occasional paper 1, Basle, November.

GOODHART, CHARLES (2004). "Gradualism in the Adjustment of Official Interest Rates: Some Partial Explanations," Financial Markets Group special paper 157, London School of Economics, May.

GREENSPAN, ALAN (2002). "Opening Remarks," in *Rethinking Stabilization Policy,* Federal Reserve Bank of Kansas City symposium, Jackson Hole, Wyoming, August 29-31.

HOOKER, MARK (2002). "Are Oil Shocks Inflationary? Asymmetric and Nonlinear Specifications versus Changes in Regime," *Journal of Money, Credit, and Banking* 34 (2, May): 540-561.

KASHYAP, ANIL and JEREMY STEIN (2004). "Cyclical Implications of the Basle II Capital Standards," Federal Reserve Bank of Chicago *Economic Perspectives* 28 (1, January): 18-31.

KERR, NORBERT; ROBERT MACCOUN, and GEOFFREY KRAMER (1996). "Bias in Judgment: Comparing Individuals and Groups," *Psychological Review* 103(4, March): 687-719.

KYDLAND, FINN and EDWARD PRESCOTT (1977). "Rules Rather than Discretion: The Inconsistency of Optimal Plans," *Journal of Political Economy* 85 (3, June): 473-492.

LEVIN, ANDREW; VOLKER WIELAND, and JOHN WILLIAMS (1999). "Robustness of Simple Monetary Policy Rules under Model Uncertainty," in John B. Taylor, ed., *Monetary Policy Rules,* National Bureau of Economic Research Conference report, University of Chicago Press.

LOMBARDELLI, CLARE; JAMES PROUDMAN, and JAMES TALBOT (2005). "Committees versus Individuals: An Experimental Analysis of Monetary Policy Decision-Making," *International Journal of Central Banking* 1 (1, May): 181-205.

MANKIW, N. GREGORY and RICARDO REIS (2003). "What Measure of Inflation Should a Central Bank Target?" *Journal of the European Economic Association* 1 (5, September): 1058-1086.

MEREDITH, GUY and MENZIE CHINN (2004). "Monetary Policy and Long-Horizon Uncovered Interest Rate Parity," *IMF Staff Papers* 51 (3): 400-430.

MEYER, LAURENCE (1999). "Financial Modernization: The Issues," speech delivered at Washington University, March 12.

MEYER, LAURENCE (2004). *A Term at the Fed: an Insider's View,* New York: Harper Business.

MEYER, LAURENCE (2006). "Coming Soon: An Inflation Target for the FOMC," in Bank of Canada, *Inflation Targeting: Problems and Opportunities.*

MISHKIN, FREDERIC (2004). "Can Central Bank Transparency Go too Far?" in Reserve Bank of Australia, *The Future of Inflation Targeting,* 48-65.

ONATSKI, ALEXEI and NOAH WILLIAMS (2003). "Modeling Model Uncertainty," *Journal of the European Economic Association* 1 (5, September): 1087-1122.

ORPHANIDES, ATHANASIOS (2003). "The Quest for Prosperity without Inflation," *Journal of Monetary Economics* 50 (3, April): 633-663.

ORPHANIDES, ATHANASIOS and JOHN WILLIAMS (2005). "Robust Monetary Policy with Imperfect Knowledge," Board of Governors of the Federal Reserve System; Federal Reserve Bank of San Francisco. Mimeo.

PEEK, JOE, ERIC ROSENGREN, and GEOFFREY TOOOTELL (1999). "Is Bank Supervision Central to Central Banking?" *Quarterly Journal of Economics* 114 (2, May): 629-653.

POOLE, WILLIAM (2003). "Fed Transparency: How, Not Whether," Federal Reserve Bank of St. Louis *Review* 85 (6, November/December): 1-8.

REIS, RICARDO (2005). "Toward a Dynamic Price Index," working paper, Princeton University, April.

ROTEMBERG, JULIO and MICHAEL WOODFORD (1997). "An Optimization-Based Econometric Framework for the Evaluation of Monetary Policy," *NBER Macroeconomics Annual* 12: 297-346.

RUDEBUSCH, GLENN (2001). "Is the Fed Too Timid?: Monetary Policy in an Uncertain World," *Review of Economics and Statistics* 83 (2, May): 203-217.

RUDEBUSCH, GLENN (2005). "Monetary Policy Inertia: Fact or Fiction?" paper presented at Sveriges Riksbank conference, "Inflation Targeting: Implementation, Communication, and Effectiveness," Stockholm, June.

SACK, BRAIN (2000). "Does the Fed Act Gradually? A VAR Analysis," *Journal of Monetary Economics* 46 (1, August): 229-256.

SARNO, LUCIO and MARK P. TAYLOR (2001). "Official Intervention in the Foreign Exchange Market: Is It Effective and, If So, How Does It Work?" *Journal of Economic Literature* 39 (3, September): 839-868.

SIBERT, ANNE (2005). "Central Banking by Committee," paper presented at De Nederlandsche Bank, Amsterdam, November 2005.

STAIGER, DOUGLAS; JAMES STOCK, and MARK WATSON (2001). "Prices, Wages, and the U.S. NAIRU in the 1990s," in Alan Krueger and Robert Solow, eds., *The Roaring Nineties: Can Full Employment Be Sustained.* New York: Russell Sage Foundation; Century Foundation Press, 3-60.

STRUM, BRAD (2005). "Discretionary Monetary Policy in a Sticky-Price Input/Output Economy," working paper, Princeton University.

SVENSSON, LARS (1997). "Inflation Forecast Targeting: Implementing and Monitoring Inflation Targets," *European Economic Review* 41 (6, June): 1111-1146.

SVENSSON, LARS (1999). "Inflation Targeting as a Monetary Policy Rule," *Journal of Monetary Economics* 43 (3, June): 607-654.

SVENSSON, LARS (2001). "Independent Review of Monetary Policy in New Zealand: Report to the Minister of Finance," Institute for International Economic Studies working paper, Stockholm University.

SVENSSON, LARS (2005). "Optimal Inflation Targeting: Further Developments of Inflation Targeting," paper presented at Sveriges Riksbank conference, "Inflation Targeting: Implementation, Communication, and Effectiveness," Stockholm, June.

SVENSSON, LARS (2006). "The Instrument-Rate Projection under Inflation Targeting: The Norwegian Example," in Bank of Canada, *Inflation Targeting: Problems and Opportunities,* February.

VEGA, MARCO and DIEGO WINKELRIED (2005). "Inflation Targeting and Inflation Behavior: A Successful Story?" *International Journal of Central Banking* 1 (3, December): 153-175.

WADHWANI, SUSHIL (1999). "Currency Puzzles," speech delivered to the London School of Economics, September 16. London: Bank of England.

WHITE, WILLIAM (2006). "Procyclicality in the Financial System: Do We Need a New Macrofinancial Stabilization Framework?" BIS working paper 193, Basle, January.

WILLARD, LUKE (2006). "Does Inflation Targeting Matter?: A Reassessment," CEPS working paper 120, Princeton University, February.

WOODFORD, MICHAEL (1994). "Nonstandard Indicators for Monetary Policy," in N. Gregory Mankiw (ed.), *Monetary Policy* (University of Chicago Press for NBER), pp. 95-115.

WOODFORD, MICHAEL (2003). "Optimal Monetary Policy Inertia," *Review of Economic Studies* 70, pp. 861-886.

WOODFORD, MICHAEL (2005). "Central Bank Communication and Policy Effectiveness," in *The Greenspan Era: Lessons for the Future,* Federal Reserve Bank of Kansas City symposium, Jackson Hole, Wyoming, August 25-27.

WOODFORD, MICHAEL (2006). "Comment," in Bank of Canada, *Inflation Targeting: Problems and Opportunities,* February.