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Comment

Benjamin M. Friedman

In 2003, Milton Friedman famously concluded, "The use of quantity of money as a target has not been a success."[1] The object of this chapter by Beyer, Gaspar, Gerberding, and Issing is to present a counterexample to Friedman's proposition. The specific example the authors suggest is German monetary policy during the 1970s and 1980s. As the title suggests, the chapter reminds us that Germany, more so than most other countries (and certainly more so than the United States), avoided what became the high and chronic price inflation of those years. The chapter's central argument, which the authors advance through a combination of historical narrative, formal analysis, and empirical evidence, is that the key to Germany's suc-

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1. *Financial Times,* June 7, 2003, 12.

cess in this regard was the Bundesbank's adoption of numerical targets for money growth—exactly the policy strategy that Friedman later concluded had been unsuccessful.

It seems difficult to argue with the proposition that the German economy successfully avoided the worst of the 1970s to early 1980s inflation. As the authors' narrative nicely shows, German consumer price inflation topped out at about 7 percent in 1974 and at about the same rate again in 1982. In the United States, inflation on that basis went to 11 percent in 1974 and 13 percent in 1981. The experience in the United Kingdom was even worse.

The question, therefore, for purposes of providing a counterexample to Friedman's proposition, is what role the Bundesbank's money-targeting strategy played in achieving that success. The authors focus on the experience beginning in 1975, when the bank first announced a target for growth of the "central bank money stock." As is well known, the bank often failed to achieve its target. During the thirteen years when the target was for the central bank money stock—1975 to 1987, which is also when Germany's inflation experience differed most from that of other Western industrialized countries—the bank achieved its target in seven years but failed to do so in six. From 1988 through 1998, when the target was instead the M3 money stock (and also when inflation in Germany was not all that different from what other industrialized countries had), the bank achieved its target in six years and missed in five. Especially for the years in which the target was for central bank money, which is presumably more readily controllable than the more endogenous M3, this record naturally calls into question just how hard the Bundesbank was trying to achieve its money growth targets and, therefore, how much importance to assign them in accounting for Germany's relative success in containing inflation.

This chapter, like many of Otmar Issing's valuable contributions over the years, verbally narrates the history of Bundesbank monetary policy in a way that places the bank's money growth targets at the center of the story. Still, economists, like other social scientists, are trained not to accept, in the absence of other supporting evidence, the first-person accounts of government officials (and others too) who explain for the public record what they and their colleagues did and why. The chapter therefore also proceeds to more formal, empirically-based analysis.

The bulk of the empirical analysis that the authors carry out, however, does not constitute a test of the question at hand. Their empirical tests are mostly uninformative about what role the Bundesbank's money growth targets played in its actual monetary policymaking. They therefore have little or no light to shed on what contribution a policy strategy based on money growth targets made, or might have made, to Germany's inflation experience.

It is easiest to see why this is the case by considering the argument in a simplified form that parallels the more cumbersome formulations in the

chapter. The authors work with a standard three-equation representation of the economy consisting of an aggregate demand function,

$$x = f[i - (p - p_{-1})], \tag{1}$$

a Phillips curve, or aggregate supply relation,

$$p = g(x) + \mu, \tag{2}$$

and a money demand function,

$$m - p = h(x, i) + \varepsilon, \tag{3}$$

where the variables have the conventional symbols and μ and ε are disturbance terms. (The authors' equivalent equations are slightly more complicated, involving expectations in the usual way, and the rate of change rather than the level of prices; but these differences do not matter for understanding why the tests for which they present results do not bear on the Bundesbank's use of money growth targets or not. The authors do write their aggregate demand function as here, without any disturbance term, but this also does not matter.)

Using the standard quantity relation, the authors then posit that the Bundesbank established its target for money growth as (approximately) the sum of the targeted growth in output and prices. Again simplifying by ignoring the difference between levels and changes,

$$m^* = j(x^*, p^*). \tag{4}$$

The gap between actual and targeted money is therefore

$$m - m^* = p + h(x, i) + \varepsilon - j(x^*, p^*). \tag{5}$$

Rearranging, we have

$$m - m^* = k[(x - x^*), (p - p^*), i] + \varepsilon, \tag{5′}$$

which is a simplified form of the authors' equation (8).

What, then, did the Bundesbank do? According to the authors, "the primary objective of the Bundesbank council was to minimize deviations of inflation and money growth from target, while also seeking to stabilize output and the interest rate around their respective steady-state values." Hence, the bank's objective—expressed here for a single period, again for simplicity's sake—was to minimize

$$E\{V[(p - p^*)^2, (x - x^*)^2, (i - i_{-1})^2, (m - m^*)^2]\}, \tag{6}$$

which is a simplified form of the authors' equation (11). Differentiating this objective with respect to the policy instrument i would then lead to a policy reaction function of the familiar augmented Taylor-rule form

$$i = F[(p - p^*), (x - x^*), i_{-1}, (m - m^*)], \tag{7}$$

that is, a standard Taylor rule augmented by not only the interest-rate smoothing term but also the money targeting term.

As the authors point out, other researchers have estimated policy reaction functions of this general form for the Bundesbank, as well as many other central banks.[2] The test for the role of money targets in the setting of the policy interest rate then turns on the estimated coefficient on the $(m - m^*)$ term. (I have followed this procedure too. In a 1996 paper with Kenneth Kuttner, for example, we found a statistically significant response of the US federal funds rate to the deviation of M1 from target during 1981 to 1986 and to the deviation of M2 from target during 1980 to 1986, and on that basis we concluded that the Federal Reserve's monetary policy actually was targeting money growth, at least in part, during those years.[3])

Here, however, the authors take a different approach. By substituting the money demand function for m and the quantity relation for m^*, they eliminate both variables from the policy reaction function to get

$$(7') \qquad i = G[(p - p^*), (x - x^*), i_{-1}, \varepsilon],$$

where the coefficients on the first three terms are combinations of the coefficients in equations (1), (2), and (3), and ε is again the disturbance to the money demand equation. This is a simplified form of the authors' equation (10).

At first glance, this policy reaction function, (7′), may look like merely the familiar Taylor-rule function with interest-rate smoothing added—hence the term in i_{-1}—but without any reference to money growth targeting. But the two are not the same. The coefficients are different from the rule that would have resulted from simply differentiating a version of the objective in (6) from which the term in $(m - m^*)$ has been excluded. Because none of the coefficients would differ in sign, however, in the absence of very sharp priors on the magnitudes of the underlying structural values, it would be impossible to test the difference between the reaction function with and without money growth targeting on that basis alone. Fortunately, however, there is another difference. The reaction function derived from minimizing (6), the objective incorporating money growth targeting, also includes the money demand function disturbance, ε. The test for the presence of money growth targeting is therefore a test of the significance of the expected positive coefficient on ε.

What renders most of the authors' empirical tests for money growth targeting in this chapter uninformative about the Bundesbank's use (or nonuse) of money growth targets is that, instead of going ahead and estimating their equivalent of the interest rate reaction function as they have derived it—here the simplified (7′), in the chapter, their equation (10)—in all of

2. The most familiar example, which the authors also cite, is Clarida, Galí, and Gertler (1998).
3. See Friedman and Kuttner (1996).

the regressions that they show in the chapter they delete ε, the disturbance from the money demand function. Hence what they are estimating is merely a relationship between the policy interest rate and the variables that would be in a Taylor-rule reaction function (with interest-rate smoothing) anyway, with no specifically anchored reference to money growth targeting.

Their argument for excluding the money demand disturbance is that the central bank, for good reasons, wanted to accommodate movements in money growth that had nothing to do with output or prices and instead represented pure portfolio shifts. This argument may sound sensible as a matter of good monetary policy practice, but here its implications are deeply subversive of what the authors are trying to achieve. If the central bank knows the money demand function and is able to predict in advance the disturbance term and adjust its money growth target to allow for it, then what it is actually targeting is simply a combination of the variables, other than the interest rate itself, that appear on the right-hand side of the money demand function—in the authors' model, meaning output and prices. On this rendering, money growth targeting is not just observationally equivalent to following the usual Taylor rule, it is conceptually and functionally equivalent. In other words, under this procedure, the money growth target has no substantive content whatever, and the central bank never need pay attention to actual observations of realized money growth. Whether policymakers think they are targeting money growth along with prices and output or merely think they are targeting prices and output makes no difference.

And, of course, functional equivalence implies observational equivalence: the authors' estimates of the associated reaction function, with both m and m^* substituted out, *and with* ε *excluded*, provide no information about what role, if any, money growth targeting actually played in the Bundesbank's setting of the policy interest rate.

In the version of the chapter that the authors presented at the conference, they appeared to recognize this problem, although they did not articulate it in any clear way. What they instead emphasized, and continue to emphasize in the revised version of the chapter published in this volume, is that the equation they estimate—their equation (10) without the $\Delta\varepsilon$ term—has a particular functional form that is more complex than the simplified version I have shown here for illustrative purposes. According to the authors, "the interest rate rule of a central bank that targets money growth differs from a standard Taylor rule in that it implies a response to the deviation of actual output growth from potential output growth (which is equivalent to targeting the change in the output gap), as well as an additional response to the lagged interest rate and to money demand shocks." But the response to lagged interest rates is a reflection of interest-rate smoothing, not money growth targeting. And in their empirical tests, they omit the money demand shocks. They are therefore left arguing that the presence in their estimated

equation of a term in *the change of* the output gap, in addition to the level of the output gap, is evidence of money growth targeting.

This argument is not persuasive. More than half a century ago, A. W. Phillips (the same Phillips who later invented what we now call the Phillips curve) showed that adding the change in a targeted variable to the policymaker's reaction function would deliver improved results in a wide variety of dynamic systems.[4] (In addition, Phillips showed that, in some cases, adding the integral of the targeted variable to the reaction function also might result in further improvement.) Phillips would surely have been startled to be told that he was somehow advocating money growth targets—nearly a decade before the publication of Friedman and Schwartz's history, indeed, even before publication of Friedman's seminal "Restatement" of the quantity theory of money.[5] Conversely, surely most advocates of money targeting, in the decades since then, would be reluctant to accept that, all along, all they were suggesting was merely that the central bank include an additional term—in output!—in its interest rate setting rule.

The omission of the $\Delta\varepsilon$ term from the estimated form of the authors' equation (10) is, of course, remediable. The authors kindly shared their data with me, and so I did this myself in advance of the conference. Because the authors did not include $\Delta\varepsilon$ in their estimated equation, they had no need for an empirical estimate of the disturbance to money demand and therefore no need to bother estimating a money demand function. After a minimum of experimentation with the German data, which I had never used before, I settled on this specification:

$$(8) \qquad \Delta m - \Delta p = a + b_1\Delta x + b_2\Delta i + b_3(\Delta m - \Delta p)_{-1} + b_4(\Delta m - \Delta p)_{-2}.$$

The results, with $\bar{R}^2 = .86$ for 1972 to 1997, were not bad (see table 6C.1). I then subtracted the fitted from the actual value of m to derive the ε series I needed to estimate the authors' interest rate reaction function (10).

The results were not encouraging (see table 6C.2). The $\Delta\varepsilon$ term was significant for the 1977–1987 sample, though not for 1987–1997, nor for the full 1977–1997 sample. But the sign in each case was negative. In other words, the larger the realized disturbance to money demand, the *lower* the Bundesbank set the interest rate. If the estimated equation included actual money growth, this is what one would hope to see: for given observed money growth, the more that growth represents merely the disturbance to money demand the less the central bank should react to it. But the point is that the authors' interest rate reaction function does *not* include actual money or money growth, and so what is being estimated is *not* the response to the money demand disturbance given observed money growth. One can imagine policymakers' simply ignoring this component of money growth (if they are

4. See Phillips (1954).
5. See Friedman and Schwartz (1963) and Friedman (1956).

Table 6C.1 **Estimates of money demand function**

	Dependent variable $\Delta m - \Delta p$
Sample	1972–1997
Dependent variable lag 1	1.32 (0.08)***
Dependent variable lag 2	–0.44 (0.08)***
Δx	0.02 (0.04)
Δi	–0.38 (0.13)***
R^2	0.86

***Significant at the 1 percent level.

Table 6C.2 **Estimates of equation (10) including $\Delta\varepsilon$**

	Dependent variable i		
Sample	1977–1997	1977–1987	1987–1997
$\pi - \pi^*$	1.87 (0.34)***	1.96 (0.12)***	–0.49 (1.05)
x	–0.05 (0.23)	–1.73 (0.20)***	1.72 (0.61)***
Δx	1.95 (0.73)***	–1.89 (0.30)	–1.18 (0.47)**
$\Delta\varepsilon$	–0.32 (0.32)	–1.51 (0.22)***	–0.54 (0.33)
ρ_1	1.01 (0.06)***	1.13 (0.11)***	1.68 (0.09)***
ρ_2	–0.11 (0.07)	–0.39 (0.11)***	–0.55 (0.05)***
R^2	0.93	0.77	0.96
J-stat.	0.14	0.18	0.22

***Significant at the 1 percent level.
**Significant at the 5 percent level.

able to identify it) along the lines of the authors' explanation for why they excluded the money demand disturbance from their estimated equation in the first place. To repeat, that logic makes money growth targeting conceptually, functionally, and observationally equivalent to following a Taylor rule with no reference to money growth targets at all. But there is no reason that this component of money growth should enter the interest rate reaction function with a negative sign. And, indeed, the indicated sign in the authors' derivation of equation (10) is positive.

In the postconference revision published in this volume, the authors report that they then tried the same exercise, relying on the residuals from a money demand equation that Beyer had estimated some years earlier, and found a significant positive coefficient.[6] This regression (which they do not show) is potentially informative about the Bundesbank's use of money growth targets. Given the contrast to the negative coefficient that I found, however, the result is at best fragile. It hinges not just on whether Beyer's money

6. See Beyer (1998).

demand function is superior to the one I used—which would not be at all surprising—but whether the corresponding residuals were (approximately) the residuals on which the Bundesbank relied in real time.

With this one exception, then, the tests that the authors carry out in this chapter are uninformative about the role that money growth targets played in German monetary policy during the years in question (and my attempt to redo their empirical analysis in a way that could have been informative proved unfruitful). This does not necessarily mean, of course, that money growth targets did not play a role. As Clarida, Galí, and Gertler (1998), among others, have shown, estimating an interest rate reaction function like (7) instead of the equivalent to (7′)—that is, before substituting out m and m^*—does indicate a positive response of i to $(m - m^*)$. (I confirmed this as well, again using the authors' data set.) But that alternative form of analysis is not what this chapter does. And, in any case, the finding of a significant response of i to $(m - m^*)$ is not the same as showing that that response was important to the success of German monetary policy in containing inflation.

I would like to conclude by returning to where this discussion began: that it seems difficult to argue with the proposition that German monetary policy in the 1970s and early 1980s was a success. What criterion should we use for judging success in this example? To be sure, Germany did experience significantly less inflation than other Western industrialized countries during this period. But is that all that matters?

Years ago, not long before the beginning of the period under examination in this chapter, a familiar and interesting question was why European unemployment rates, and the German unemployment rate in particular, were always so much lower than ours in the United States. Several decades later, after the period under study here had ended—and right up until the 2007 to 2009 financial crisis hit—an equally familiar and interesting question was why European unemployment rates, including Germany's, were always so much *higher* than ours. Importantly, the difference was not that the average US unemployment rate had declined; ours remained more or less what it had been. Rather, most European countries' average unemployment rates, including Germany's, became far higher. As a result, the productive capacity of Germany and other European countries remained for decades well below what it would otherwise have been. As Laurence Ball, for example, has shown, the anti-inflationary policies of the 1970s and early 1980s, tried out in the context of European labor market institutions, were an important part of how that transition from low average unemployment to high average unemployment, with consequent loss of productive capacity, happened.[7] Instead of focusing only on inflation rates, maybe assessments of whether German monetary policy was really a success should take such matters into account as well.

7. See Ball (1997).

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Discussion

The discussion began with Allan Meltzer questioning why Germany had lower inflation that the United States. First, as Issing pointed out, there was political support for attacking inflation rather than economic stabilization. President Richard Nixon used to say that no one ever lost an election because of inflation. Second, and very importantly, the Bundesbank had strategies that aimed specifically at sustaining a low inflation rate. The Federal Reserve was dominated by a Phillips curve that was not well estimated, and people that relied on it forgot that most of the points used to estimate it came from the time of the gold standard. Third, the Bundesbank made a commitment that the public believed that they and the Swiss National Bank were the dominant anti-inflationists. This is critical, and the political part is missing from most of our models of US policy. Optimal monetary policy is not possible unless the Congress and the Federal Reserve are willing to go along with it. The Congress had a mandate that it sent to the Federal Reserve to perform. The chairman of the Federal Reserve is aware of this and frightened of Congress.

Lars Svensson thought of the Bundesbank's legacy as its commitment to price stability, and not to monetary targeting as the authors suggest. There is conflict between achieving the inflation target and the money growth target. Issing and his colleagues chose an inflation target, and in the end Svensson believed that money is more of a smokescreen. The Bundesbank was thus just an early flexible inflation targeter. On a more technical note, Svensson