

## *Discussion*

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*Victoria Miller*

In discussions of monetary policy, credibility is a concept that often comes up. We know that policies are likely to be more successful when they are credible, and that credibility helps reduce many of the inefficiencies associated with unanticipated events. The use of credibility as a workable tool for policy remains, however, problematic: Not only is credibility unobserved, it is often not well defined. Thus, Johnson's efforts to measure this concept merit special attention.

When a central bank has an explicit—that is, publicly known—inflation target, credibility seems, at least, easy enough to define. It would be something like “the belief that inflation will equal the target” (this is what Johnson actually tests). But when there is no explicit inflation target, then how is one to define credibility (let alone measure it)? Does the concept become meaningless? Not necessarily. I think that everyone would agree that the Bundesbank has a credible policy of low inflation even though it has no explicit inflation target. Nevertheless, how one goes about defining credibility in such a case is difficult to answer.

Even when it is easier to define—in the case of a well-known target, for instance—credibility is still difficult to measure. This is because “credibility” is “what people believe.” It is therefore not necessarily observed. One must proxy these beliefs in some way. Johnson uses survey data to this end. In what follows, I quickly summarize what Johnson does, provide some general comments, and suggest an alternative test, which, while perhaps impossible to carry out yet, because of data limitations, should be possible in the future.

### How Johnson Tests for Credibility

To see what Johnson does, allow me first to adopt a bit of notation. Let us first write  $F_t^i$ , forecaster  $i$ 's inflation prediction for period  $t$ , as

$$F_t^i = \pi^e + \Delta\pi_t^e + e_t^i, \quad (1)$$

where  $\pi^e$  is the part of the forecast common to all forecasters and all periods in the sample,  $\Delta\pi_t^e$  is the part of the forecast common to all forecasters but not to all periods, and  $e_t^i$  is the part that is unique to forecaster  $i$ .

$T_t$ , the period  $t$  inflation target, and  $\pi_t$ , the actual rate of inflation for period  $t$ , are then expressed as

$$T_t = T + \Delta T_t, \text{ and} \quad (2)$$

$$\pi_t = \pi + \Delta\pi_t, \quad (3)$$

where  $x$  is the average value of the variable  $x_t$  for all periods in the sample, and  $\Delta x_t$  is the deviation from average for period  $t$ .

Now, taking a few differences we have

$$F_t^i - T_t = \pi^e - T + \Delta\pi_t^e - \Delta T_t + e_t^i, \quad (4)$$

or in Johnson's notation,

$$F_t^i - T_t = C + g_t + e_t^i; \quad (4')$$

and

$$F_t^i - \pi_t = \pi^e - \pi + \Delta\pi_t^e - \Delta\pi_t + e_t^i, \quad (5)$$

or in Johnson's notation,

$$\begin{aligned} F_t^i - \pi_t &= C - B + g_t - b_t + e_t^i \\ &= E + u_t + e_t^i. \end{aligned} \quad (5')$$

Johnson uses equation (4') to test credibility in a regime of inflation targeting, and equation (5') to test "monetary success" in countries without inflation targets and across targeting regimes. According to Johnson, if the inflation-target regime is credible, then  $C$  and the variance of  $g_t$  should be zero. In other words, the target should be believed on average, and period-specific disbelief must not be too great. Monetary policy is deemed to be a "success" if  $E$  and the variance of  $u_t$  are zero. That is, the average forecast error is zero, and period-specific forecast errors are not too great.

Using these tests, Johnson concludes that (1) targets were not instantly credible—that is, unanticipated disinflation occurred during the early 1990s in both targeting and non-targeting countries; and (2) although forecasters were better able to predict inflation after inflation targets had been adopted, we cannot conclude that this was *because* targets had been adopted, because the phenomenon is also present in countries without targets.

## General Comments on the Paper

I have six general comments to make on the paper, some of which are in the form of questions.

### 1. *Credibility is not an absolute.*

Johnson's tests allow us to either accept or reject the null hypothesis of credibility. (To be fair, this is probably the best one can do with only a few years of data.) But credibility is not a dichotomous variable—something that we either have or have not. Rather credibility is something *relative* that improves or worsens over time. I believe that Johnson is aware of this and so concludes that his findings show that targets were not “instantly credible.” Indeed, I find it not surprising that expectations did not immediately respond to the adoption of targets. What is more interesting, however, is whether credibility improves throughout the period of inflation targets, as we would hope. That is, do inflation forecasts become better faster after the adoption of targets? And do expectations adapt faster to future target changes? Such tests may have to await the passage of time and the arrival of additional data. Johnson's analysis can then be applied in a rolling fashion to see whether credibility does improve over time.

### 2. *There are different types of credibility.*

Allow me to make a distinction that, while Johnson alludes to it briefly, is important in practice and worth emphasizing here. Johnson assumes that two criteria must be met for an inflation target to be “credible.” They are that agents believe (1) that the central bank will try to hit its target, and (2) that the central bank is able to control inflation. The first criterion is what I call “credibility of intent.” It is what we are trying to influence by adopting an inflation target. The second I call “credibility of ability.” It is determined largely by institutional factors and might be affected only indirectly by the adoption of targets.

Obviously, for an inflation target to be credible we need some degree of both types of credibility: If we have credibility of *intent* but no credibility of *ability*, then the adoption of an inflation target will have no effect on

expectations (however, neither would we need to adopt any target to signal our commitment). Moreover, if we have credibility of *ability* but not of *intent*, then obviously the target will not be effective.

The reason I think it useful to make the distinction, however, is that we can use the fact that credibility of ability is imperfect to develop an alternative test of credibility (assuming data availability) that also would allow us to detect changes in the state of credibility.

An inflation forecast error indicates that one of two things occurred: Either (1) agents were wrong about the central bank's intentions, or (2) inflation differed from the central bank's target because of some exogenous event—that is, the central bank's ability is not perfect. When there is no credible inflation target, a forecast error will likely be taken to indicate both. Thus, past errors will provide information about the central bank's target and thus affect inflation predictions in the future.

If, however, an inflation target is credible, then the expected rate of inflation will equal the target rate and be unaffected by past forecast errors. This suggests that we can run the following regression:

$$F_t^i = \alpha + \beta(F_{t-1}^i - \pi_{t-1}) + \varepsilon_t^i.$$

If the target is “credible,” then  $\alpha$  will equal the target and  $\beta$  will equal zero. Notice that with this framework we can also test for changes in credibility by testing for changes in  $\alpha$  and  $\beta$ .

Because Johnson's sample contains only a few years of data and because forecasters enter and leave the sample at different times, such a panel framework is probably not immediately possible with his sample. We can, however, omit the  $i$  superscript and estimate the above regression using surveys of groups of forecasters, such as the Livingston survey or that of the University of Michigan Survey Research Center (SRC) for the United States, or some other measure of expected inflation. Such a regression would yield interesting insights into credibility trends.

3. *The variance of  $e_t^i$ , the forecaster-specific error, should be incorporated into the test of credibility.*

Johnson says that an inflation target is credible if  $C$  and the variance of  $g$  are zero. The forecaster-specific disbelief, however, should be incorporated into the test. To see why, suppose that there are two periods, two forecasters, and a target of 2.0 per cent. If one forecaster believes that inflation will be 0 per cent for the two periods while the other believes that it will be 4.0 per cent, then a test that looks only at  $C$  and  $V(g)$  will conclude that the target is “credible.” This is debatable, however, since nobody believes the target.

4. *How does the choice of the target level affect credibility?*

Johnson does not address the question of how the target level affects credibility but I believe it is important in any discussion of credibility and targets. Suppose that the central bank chooses a target of 2 per cent and inflation turns out to be 4 per cent. That is an error of 100 per cent, or 2 percentage points. Now compare that scenario with one in which the target is 10 per cent and inflation turns out to be 13 per cent. In this case there is a 30 per cent error, or 3 percentage points. Which error is less damaging to credibility? In the first scenario, agents lose less on contracts. However the error is larger in percentage terms. Can we say anything about the ability of central banks to hit their targets and the kind of targets they should choose? Does “credibility of ability” affect the choice of target?

5. *While “monetary success” will reduce the mean and variance of forecast errors, the reduction of these two moments cannot be taken as an indication of success or credibility.*

Johnson finds that the mean and variance of inflation forecast errors fall after the adoption of inflation targets for inflation-targeting countries, and in general, for all countries after 1991. While this may indicate that policymakers have become more efficient at forming expectations and delivering a rate of inflation consistent with those expectations, it may also reflect the fact that it has become more difficult to fool the market. Another possible explanation may be a change in the structure of the economy so that expectations have a greater influence on actual inflation.

6. *What is the effect of choosing the midpoint of the bands as “the target”?*

Johnson uses the midpoint of the inflation control band as the target in his tests. This may, however, bias his results if the authorities are not really aiming for the midpoint. To see this, suppose that the band is constant, and so in Johnson’s tests a constant value will be taken as “the target.” If the true objective of the central bank actually falls over time (within the band) and exactly equals the group forecast, then the target will be perfectly credible. But Johnson’s tests will indicate that credibility is imperfect because the variance of the forecast error will be non-zero. Any potential bias and the reasonableness of the midpoint as target should be addressed.

## **Conclusions**

Johnson uses survey data to test whether inflation targets were credible in six countries. He finds that targets were not immediately credible. However, what is more interesting and fair to ask for targeting countries is whether credibility in the targets increased after the adoption of

targets. Unfortunately, this is a question that can be answered only with more data, and it will have to await the passage of time. In the meantime, Johnson provides a useful framework that can be applied in a rolling fashion to analyse such changes as more data become available.