

Central Bank Credibility

by Paul Gomme

Nobel prize winners Edward Prescott and Finn Kydland introduced the idea of a “time inconsistency problem” into the macroeconomics lexicon to represent the fact that policymakers sometimes have an incentive to say one thing, but later do something else. One solution to the time inconsistency problem is for policymakers to develop a reputation for credibility recognizing that the long-term benefits of having reputation exceed the short-run costs.

To understand why a monetary policymaker would be concerned about credibility, think back to a time when the Federal Reserve arguably had damaged its credibility. At the close of the 1970s, inflation ran in the double digits. The public may well have concluded that the central bank was either unwilling or unable to maintain low, stable inflation rates. Against this backdrop, in the early 1980s the Federal Reserve ran tight monetary policy. While it successfully brought inflation down to around 3 percent, the gain was associated with two recessions. But, in the process, monetary policymakers regained their reputation for delivering low inflation.

Although many people credit Alan Greenspan with ushering in a new era of low inflation, they do not realize the extent of his contributions. Before he took office, much of the initial work of taming inflation had been initiated, but during his tenure the Federal Reserve reduced inflation further and maintained it, built credibility, and successfully managed inflation expectations. Greenspan has described his contribution as recognizing changes in the U.S. economy and the ways in which these changes could be best used to maintain low inflation. Others have pointed to the role of clear communication and the greater transparency of the Federal Open

Market Committee (FOMC)—the policymaking arm of the Federal Reserve—in conditioning expectations regarding future policy actions. Current policymakers often emphasize the importance of credibility and cite the key role it has played over the past 25 years in keeping the economy on a steady and expanding course.

Why should credibility matter so much? After all, credibility concerns people’s beliefs about what policymakers will do in the future, not their appraisal of what policymakers have delivered so far. And thinking back on our battle with inflation in the 1980s, we might wonder whether the Federal Reserve’s credibility (or lack of it) was involved in the length of time it took to tame inflation or what it cost the U.S. economy.

To answer these questions constructively requires that we think systematically about the factors involved. Notions like “credibility”—which, like most abstract concepts, is somewhat nebulous—must be defined precisely. In this *Economic Commentary* we will construct a simple model so we can study these questions systematically, and we will use it to gain some insight into the importance of credibility to monetary policy.

■ Key Elements of a Model of Credibility

In general, central bankers care about inflation and unemployment. The objectives set for the FOMC by Congress, for example, are to promote “the goals of maximum employment, stable prices, and moderate long-term interest rates.” But one of the fundamental problems of central banking is that, in the short term, there is a trade-off between (unanticipated) inflation and unemployment: Temporarily lower unemployment can be gained at the cost of permanently higher inflation. What to do about this trade-off

Major League Baseball Commissioner Bud Selig announced he would crack down on steroid use in baseball, hoping to stop players from doping. He was forced to discipline stars like Rafael Palmeiro, possibly hurting the game immediately, in order to develop a reputation for being tough on steroids. The Federal Reserve System has worked hard over the past few decades not only to lower inflation and keep it low, but also to convince the public that it is dedicated to delivering low inflation over the long haul. This *Commentary* explains why credibility is so important to monetary policymakers.

is only one of the many things that central bankers might have a difference of opinion about, and one of the things that can lead to different monetary policies and different economic outcomes.

Over time, the Federal Reserve System has delivered quite different inflation rates, and the variation of rates across countries is even more pronounced. While it may be possible that the differences in long-run inflation performance are the result of good or bad luck, it is also possible that they result from the decisions central bankers and their governments have made. They might have placed more importance on inflation relative to unemployment, or their underlying inflation targets might have changed, or they may have differed with respect to the weight they placed on current outcomes relative to future ones. But the details of central bank preferences are not important for our current purposes; what is important is that central banks tend to deliver different

FIGURE 1 INFLATION, 1960–PRESENT



SOURCES: U.S. Department of Labor, Bureau of Labor Statistics; and the Federal Reserve Bank of Cleveland.

FIGURE 2 INFLATION EXPECTATIONS*



*Inflation expectations are derived from the spread between the yields on 10-year Treasury notes and 10-year Treasury inflation-protected securities. SOURCE: Bloomberg Financial Services.

inflation rates over time. For clarity of presentation, suppose that central banks come in one of two types: ones that deliver low (2 percent) inflation in the long term; and ones that deliver high inflation (10 percent) in the long term. These types are not immutable. From time to time, a central bank that typically delivers low inflation may become one that typically delivers high inflation, or vice versa. In the model considered here, the public knows that such changes can occur and further knows the probabilities of such transformations. Since changes in central-bank type are presumably rare events, the probability of a transition in the model is low.

Central banks have imperfect control over inflation, especially in the short term. This imperfect control results from a variety of factors, like the long and variable lags between the use of a monetary policy instrument and its effect on the inflation rate, and the presence of other factors that affect inflation, such as energy price shocks. If the central bank's type (high or low inflation) is unobservable by the public, then announcements by a central bank of its type are inherently not credible and will be viewed by the public with skepticism. In the model, both types of central bank would like the public to believe that it intends to deliver low inflation. We can imagine a number of reasons policymakers at a high-inflation central bank might in reality want the public to think the central bank is a low-inflation type; for example, they might want to

exploit the inflation-unemployment trade-off to their advantage, surprising the public with higher-than-expected inflation in order to temporarily lower the unemployment rate, and so on.

Since the central bank cannot perfectly control inflation, observing the current inflation rate provides the public with a noisy signal of the central bank's long-run inflation intentions. Today's inflation may be high because the central bank intends it to be high or because chance factors have pushed up the inflation rate under a low-inflation central bank. The upshot is that the public needs to make some sort of guess with regards to the central bank's type, and it needs some means to revise this guess as new inflation rates are observed.

■ Bayes's Rule

The public's problem in the model is to assign a probability (today) to the central bank of its being a low-inflation type. (Since there are only two types of central bank, the remaining probability is necessarily assigned to it being a high-inflation type.) For the moment, take as given the probability that the public assigned to the central bank in the previous period (last month, quarter, year, whatever) of its being a low-inflation bank. When the public observes a new inflation rate, how should it update this probability? It turns out that the optimal way to do so can be expressed by a rule known as Bayes's rule—Bayes's rule is a mathematical description of how beliefs are best

modified when new information is acquired. In the current context, Bayes's rule would say that the public ought to take the likelihood that a low-inflation central bank produced the current inflation and divide it by the sum of that likelihood and the likelihood that a high-inflation central bank produced the current inflation. The result gives the probability that the central bank is of the low-inflation type today.

To apply Bayes's rule, the public must be aware of several things: first, the possibility that the central bank may have changed its type; second, the prior probability that the central bank was a low-inflation bank; third, inflation dynamics. This last item means that the public knows how inflation will behave over time under either type of central bank, with alternative long-run inflation targets, given history and various macroeconomic developments unrelated to monetary policy. What ends up mattering is the deviation of actual inflation from what was expected (the "surprise") under different central bank inflation targets.

The analysis so far suggests the following definition: A central bank has credibility (as being tough on inflation) when the public assigns a high probability (certainly over 50 percent) that the central bank is a low-inflation type. A central bank is, then, losing credibility when this probability is falling.

■ The Disinflation of the 1980s

Consider once more the situation in the late 1970s. Inflation trended up through the decade, with rises and falls associated with changes in energy prices. View this history through the lens of Bayes's rule. By the end of the 1970s, the public will have seen enough high inflation rates to set close to zero the probability that the Federal Reserve was a low-inflation central bank. That is, given enough time, the public eventually makes the correct inference regarding the central bank's type. Observing subsequent high inflation rates tended to reinforce this "belief" that the Federal Reserve was a high-inflation type, since high inflation rates are more likely to be seen under this type of central bank. In other words, the Fed lacked credibility.

Now, suppose that the Fed decided to change its type, but was unable to directly communicate this change of intent to the public. We would not expect to immediately see inflation fall to the new long-run goal, say, 2 percent, in part owing to the persistence built into the inflation process, and in part because the cost in terms of higher unemployment would be unacceptably high. However, over time we would expect to see inflation rates that are more likely to be delivered by a low-inflation central bank than a high-inflation central bank.

The public faces a difficult inference problem when it starts to see lower inflation rates: Are the lower rates mere happenstance or is the Fed now a low-inflation central bank? In applying Bayes's rule, the public in essence takes on board both possibilities. While it is not likely that a high-inflation central bank would generate, say, a 6 percent inflation rate, changes in central bank type are presumably rare events and the public should not place too much weight on such a transformation. Initially, the public places a greater weight on chance, and so the probability that the Fed is now a low-inflation central bank will remain close to zero. Over time, as more low inflation rates are observed, the probability that the public places on the Fed being a low-inflation central bank rises. As this probability rises, it will in fact rise more quickly because the weight on a change in the central bank's type is rising while the weight on chance is falling.

How will inflation expectations evolve over time? To start, the expected inflation rate will be a weighted average of the inflation rate delivered by a high-inflation Fed (around 10 percent) and that delivered by a low-inflation Fed (less than 10 percent), where the weights are given by the probabilities that the public assigns to the Fed's being a high or low-inflation type. As a result, just after the Fed changed its type, inflation expectations would remain around 10 percent since the probability associated with the Fed being a high-inflation type was close to one while the probability that it was a low-inflation type was close to zero. In fact, inflation expectations will remain above actual inflation for some time since it takes time for the public to revise upwards the probability that the Fed has switched types. As the Fed continues to deliver relatively low inflation, the probability assigned to it being a low-inflation type will gradually rise, and so inflation expectations will fall.

As mentioned earlier, this process of gaining credibility—raising the probability that the central bank is a low-inflation type—is costly since the central bank needs to run tight monetary policy in order to lower the inflation rate. If the central bank does not "surprise" the public with lower-than-expected inflation, then the probability assigned to it being a low-inflation central bank will not change, and it does not gain credibility.

Contrast this situation with one in which the type of the central bank could be known by the public. In such a case, credibility would not be an issue, there would be no signal extraction problem, and Bayes's rule would *not* need to be applied. The public could assign a probability of either zero or one to the central bank being a low-inflation type. If the central bank changed from a high-inflation to a low-inflation type, the public would instantaneously change the probability that it assigned to the central bank being a low-inflation type from zero to one. Inflation expectations would drop immediately. The process of gaining credibility would be incredibly short, and the central bank would not need to run tighter-than-expected monetary policy.

■ A Practical Benefit of Credibility

Flash forward to the time just prior to the 2001 recession. Having seen many

years of low inflation, the public assigned a very high probability to the Federal Reserve being a low-inflation type of central bank. This credibility allowed the FOMC to initiate an easier monetary policy in 2001 and maintain a fairly accommodative policy for several years thereafter without a run-up in inflation expectations. At the time, loose monetary policy was entirely consistent with the Federal Reserve still being a low-inflation central bank. Of course, it was possible that the Fed had switched and was again a high-inflation central bank. But now the same mechanism that made it difficult for the Fed to gain credibility in the 1980s implies that it would take time for the Fed to lose its credibility after 2001. Owing to Bayes's rule, the public continued to assign a probability close to one that the Fed was a low-inflation bank, and the Fed maintained its credibility.

Consider what might have happened if the FOMC had had less credibility (if the public had placed a lower probability on the central bank being a low-inflation type). In this case, any rise in inflation that might result from the Fed's loose monetary policy was more likely to be attributed to a switch in the central bank's type. As a consequence, the public would further revise downward the probability that it attached to the Fed being a low-inflation type of central bank—the FOMC would have lost credibility—and inflation expectations would have started to rise.

Evidence regarding inflation expectations suggests that the Federal Reserve has, in fact, maintained its credibility since 2001. Measures of inflation expectations can be obtained directly from surveys and indirectly from inflation-indexed Treasury securities. Although some measures have risen during the past few months, they still appear to be contained in the same range of fluctuation that has prevailed since 2001. A number of analysts have suggested that the flat yield curve is evidence of FOMC credibility: The long end of the yield curve has not risen because inflation expectations have not changed.

■ Summary

Formally modeling credibility hopefully provides some insight into why it takes time for policymakers to lose or gain credibility. When a central bank is trying

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to restore its credibility, the public initially infers that the low inflation is more likely due to chance factors than to a change in the central bank's type, since such changes are rare. It will take months if not years of low inflation for the central bank to regain or to lose its credibility. This *Economic Commentary* provides a coherent account of the disinflation of the 1980s, a time when the Federal Reserve was rebuilding its credibility, and an explanation of why inflation expectations have remained contained after monetary policy became more accommodative in 2001.

■ **Recommended Reading**

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