Appendix to Chapter 13

Central Bank Credibility and Consistency

(Non-Math-Intensive Version)

Central banks around the world jealously guard their credibility as inflation-fighters, and seek as hard as they can to acquire a reputation for consistency in following low-inflation policies. The principal reasons that they do this are twofold:

- First, they fear the consequences should workers, managers, and financiers conclude that the central bank will not follow low-inflation policies—and should expected inflation in the economy rise.
- Second, they fear that their credibility and reputation for consistency is very fragile—for there are always very strong pressures on central banks to abandon low-inflation policies.

To see where these reasons come from, let's build an analytical model of the pressures on the central bank, and the consequences of its decisions.

Central Bank Objectives and the Phillips Curve

Begin by formalizing the idea that the central bank dislikes inflation and dislikes unemployment. Assume that the central bank tries to

make a *social welfare function* as large as possible. For analytical convenience, assume that the social welfare function is:

$$SWF = -u - 25 \times \pi^2$$

Social welfare—in the central bank's conception, at least—is equal to minus the rate of unemployment u (for higher unemployment is a bad thing, and lowers social welfare) minus 25 times the square of the rate of inflation (minus because higher inflation is a bad thing, squared because the economic harm done by inflation increases more than proportionately with increases in the inflation rate).

Let us also ruthlessly simplify the whole process by which macroeconomic policy is made and aggregate demand is determined, and simply assume that the central bank gets to choose what the rate of inflation π will be. But the central bank's choice of a monetary policy that generates its particular chosen value of the inflation rate has consequences, for inflation and unemployment are linked by the Phillips Curve:

$$\pi = \pi^e - 0.5 \times (u - 0.12)$$

where 0.12—12%—is u*, the economy's natural rate of unemployment, and π^e is the expected rate of inflation in the economy. The 0.5 tells us that over the course of a year 0.5 percentage points of extra inflation will be generated by a one percentage point reduction in unemployment.

Notice that at the time the central bank makes its decisions—actually chooses the policies that will produce its target rate of inflation (and

the associated rate of unemployment), the determinants of the position of the Phillips Curve are fixed. The economy's workers, managers, and financiers have already formed their expectations of what inflation will be. The institutional and other factors that determine the natural rate of unemployment have already had their effects. So the current position of the Phillips Curve gives the central bank its menu of attainable combinations of unemployment and inflation.

What Will the Central Bank Do?

From this menu of choices offered by the current position of the Phillips Curve, the central bank will try to pick that combination of inflation and unemployment that maximizes the economy's welfare. What point on the Phillips Curve maximizes social welfare? The most straightforward way to answer this question is to flip the Phillips Curve equation around:

$$u = 0.12 + 2 \times \left(\pi^{e} - \pi\right)$$

And then to substitute this flipped-around Phillips Curve in for unemployment in the social welfare function:

$$SWF = -0.12 - 2 \times \pi^{e} + 2 \times \pi - 25 \times \pi^{2}$$

Social welfare thus depends on the parameters of the model, on one factor that central bank's decisions do not control and cannot affect—the expected inflation rate π^{e}—and on the actual inflation rate π. To find out what choice of inflation maximizes social welfare—is best for society—let's calculate what the social welfare function is for a number of different values of inflation:

Table 1: Social Welfare as a Function of Inflation

If Inflation Is…	Social Welfare Is…
0%	$-0.12 - 2 \times \pi^e$
2%	$-0.09 - 2 \times \pi^e$
4%	$-0.08 - 2 \times \pi^e$
6%	$-0.09 - 2 \times \pi^e$
8%	$-0.12 - 2 \times \pi^e$

No matter what the level of expected inflation π^e, the highest level of social welfare is attained for a level of inflation π of 4% per year. Call this inflation rate π_{max}, for it is the value of inflation that maximizes social welfare. A central bank seeking to maximize the welfare of society as a whole should choose policies that lead to an inflation rate equal to π_{max}.

What the unemployment rate is that corresponds to this inflation rate depends on what the level of expected inflation is. Substituting in the value of 4% per year for inflation that it is best for the central bank to choose into our Phillips Curve:

$$u = 0.12 + 2 \times \left(\pi^e - \pi\right)$$

produces an equation for the unemployment rate:

$$u = 0.04 + 2.5 \times \pi^e$$

The higher the level of expected inflation, the higher will be the unemployment rate. So what will the level of expected inflation be?

Expected Inflation

Workers, managers, and financiers understand the existence of the Phillips Curve. They understand the central bank's objectives. They understand the structure of the economy. And they understand the chain of reasoning that will lead a benevolent, social welfare-maximizing central bank to choose inflation equal to:

$$\pi_{max} = 4\%$$

So it seems plausible that their expectations of inflation will be:

$$\pi^{e} = 4\%$$

If these are inflation expectations, then the Phillips Curve and the social welfare function tells us that the unemployment rate, the inflation rate, and the level of social welfare will be:

$$u = 0.12 = 12\%$$
$$\pi = 0.04 = 4\%$$
$$SWF = -0.12 - 25 \times (0.04)^{2} = -0.16$$

Unemployment will be equal to its natural rate—6%—the inflation rate will be positive—4% per year—and the social welfare function will have the relatively low value of –0.16.

The Value of Central Bank Credibility

But there is a way to attain a higher level of social welfare. Suppose that the central bank has "credibility": suppose that the central bank announced that it was going to pick policies that would produce an inflation rate of zero; suppose that because workers, managers, and

investors found it credible that it was believed; and suppose that the central bank was consistent and followed through on its commitment to a zero-inflation policy. Then the Phillips Curve and the social welfare function tell us that the economy's equilibrium will be:

$u = 0.12 = 12\%$
$\pi = 0\%$
$SWF = -0.12$

This is a clear improvement over what takes place if the central bank sets inflation at π_{max}=4% per year, and if workers, managers, and financiers anticipate that the central bank will set inflation at π_{max}=4% per year.

So why can't any central bank attain this better equilibrium result? Why is "credibility" required? Because from the central bank's perspective there is an even better option than announcing a zero-inflation policy and following through on it. Remember, *whatever* the level of inflation expectations, the central bank obtains the highest level of social welfare by choosing policies that produce inflation equal to π_{max}=4% per year. So if the central bank announces a zero-inflation policy, is believed so that π^{e}=0, and then does *not* follow through but instead sets inflation at π_{max}=4% per year, then:

$u = 0.04 = 4\%$
$\pi = 0.04 = 4\%$
$SWF = -0.08$

This value of the social welfare function—0.065—is best of all. It is better than if the government chooses policies that lead to an inflation rate of 4% and inflation expectations are 4%. It is better than if the

government chooses policies that lead to an inflation rate of zero and inflation expectations are zero.

The obvious implication is clear. Unless circumstances are in some way very special, any claims by the central bank that it will follow a zero-inflation policy will simply not be believed. One expectations are set, it is to the advantage of the central bank—it is to the benefit of the economy as a whole—it is beneficial for social welfare—for the central bank to break its commitment to zero inflation. So the economy is likely to settle at the worst of the three possible equilibria, with inflation expectations π^e=4% per year.

How do you make circumstances special? If the central bank acquires a reputation for living up to its commitments no matter what, then it may be able to get workers, managers, and financiers to believe its claims that it will follow a low-inflation policy. Thus central banks carefully guard their reputations for credibility and consistency. It is to everyone's benefit that expectations of inflation be low. But inflation expectations can be low only if the central bank has a strong reputation as an organization whose policies are consistent, and whose claims and announcements are credible—can be trusted.