

Macroeconomics and Global Economics

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Dinsinflation, Credibility and Cold Turkey v. Gradualism

Suppose that the Phillips curve is given by

$$\pi_t = \pi_t^e - (u_t - u_n)$$

where $u_n = 5\%$.

1. Assume that expectations are myopic (i.e. fully backward): $\pi_t^e = \pi_{t-1}$. What is the sacrifice ratio in this economy?
2. Suppose that at time $t = 0$ unemployment is initially equal to the natural rate (i.e. $u_0 = 5\%$) and $\pi_0 = 12\%$. The central bank decides that 12% inflation is too high and that starting in year 1 it will decrease inflation to 2%. Which are the implications of this "Cold Turkey" disinflationary policy for unemployment?
3. Suppose that at time $t = 0$ unemployment is initially equal to the natural rate (i.e. $u_0 = 5\%$) and $\pi_0 = 12\%$. The central bank decides that 12% inflation is too high and that, starting in year 1, it will maintain the unemployment rate 1 percentage point above the natural rate of unemployment until the inflation rate has decreased to 2%. In other words, now the central bank opts for "gradualism". Compute the rate of inflation for years 1, 2, 3, 4, and so on. For how many years must the central bank keep the unemployment rate above the natural rate of unemployment? Discuss your results.
4. Suppose that at time $t = 0$ unemployment is initially equal to the natural rate (i.e. $u_0 = 5\%$) and $\pi_0 = 12\%$. The central bank decides that 12% inflation is too high and that starting in year 1 it will decrease inflation to 2% (back to a Cold Turkey approach!). Now assume that people know that the central bank wants to lower inflation to 2%, but they are not sure about the central bank's willingness to accept an unemployment rate above the natural rate of unemployment. As a result, their expectation of inflation is a weighted average of the target of 2% and last year's inflation - i.e. $\pi_t^e = \lambda 2\% + (1 - \lambda)\pi_{t-1}$, where λ is the weight they put on the central bank's target of 2%. Assume that $\lambda = 0.5$. Which are the implications of this "Cold Turkey" disinflationary policy for unemployment? What is now the sacrifice ratio?

5. Suppose that at time $t = 0$ unemployment is initially equal to the natural rate (i.e. $u_0 = 5\%$) and $\pi_0 = 12\%$. The central bank decides that 12% inflation is too high and that starting in year 1 it will decrease inflation to 2% (again with this Cold Turkey approach!). Now suppose that people believe that the central bank is indeed committed to reducing inflation to 2%. As a result, they now set their expectations according to $\pi_t^e = 2\%$. Which are now the implications of this disinflationary policy for unemployment? What is now the sacrifice ratio?
6. Suppose that at time $t = 0$ unemployment is initially equal to the natural rate (i.e. $u_0 = 5\%$) and $\pi_0 = 12\%$. The central bank decides that 12% inflation is too high and that starting in year 1 it will decrease inflation to 2% (again and again with this Cold Turkey approach!). Now suppose that wages are fully indexed to current inflation.... Which are now the implications of this disinflationary policy for unemployment? What is now the sacrifice ratio?

Solution

1. Given the Phillips curve $\pi_t = \pi_t^e - (u_t - u_n)$, assuming $\pi_t^e = \pi_{t-1}$ the sacrifice ratio is 1, that is the number of percentage point of excess of unemployment needed to achieve a decrease of inflation of 1%.
2. Under myopic expectations the Phillips curve is $\pi_t = \pi_{t-1} - (u_t - u_n)$, where $u_n = 5\%$. At time $t=1$, the law of motion of inflation is simply $\pi_1 = \pi_0 - (u_1 - 5\%)$ with $\pi_0 = 12\%$. If at time $t=1$ the central bank sets inflation to 2%, the Phillips curve gives the implied value for the unemployment rate of this "Cold Turkey" disinflationary policy, that is $2\% = 12\% - (u_1 - 5\%) \rightarrow u_1 = 15\%$. Therefore in this economy decreasing inflation by 10 percentage points in one period creates an excess of unemployment equal to 10 percentage points (i.e. the sacrifice ratio is in fact equal to 1).
3. Now the central bank is wiser and opts for a gradual disinflationary policy. In particular, the central bank starting in year 1, will reduce inflation by maintaining the unemployment rate 1 percentage point above the natural rate of unemployment until the inflation rate has decreased to 2%. We have then the following disinflationary plan:

in $t=1$

$$\pi_1 = \pi_0 - (u_1 - 5\%)$$

using the fact that $\pi_0 = 12\%$ and recalling that the central bank maintains the unemployment rate 1 percentage point above the natural rate of unemployment during the disinflationary process, we have

$$\pi_1 = 12\% - (6\% - 5\%) = 11\% \text{ (this is the rate of inflation in } t=1, \text{ that is the first year of the disinflationary process)}$$

in $t=2$

$$\pi_2 = \pi_1 - (u_2 - 5\%)$$

using the fact that $\pi_1 = 11\%$ and recalling that the central bank maintains the unemployment rate 1 percentage point above the natural rate of unemployment during the disinflationary process, we have

$$\pi_2 = 11\% - (6\% - 5\%) = 10\% \text{ (this is the rate of inflation in } t=2, \text{ that is the second year of the disinflationary process)}$$

in $t=3$

$$\pi_3 = \pi_2 - (u_3 - 5\%)$$

using the fact that $\pi_2 = 10\%$ and recalling that the central bank maintains the unemployment rate 1 percentage point above the natural rate of unemployment during the disinflationary process, we have

$\pi_3 = 10\% - (6\% - 5\%) = 9\%$ (this is the rate of inflation in $t=3$, that is the third year of the disinflationary process)

in $t=4$

$$\pi_4 = \pi_3 - (u_4 - 5\%)$$

using the fact that $\pi_3 = 9\%$ and recalling that the central bank maintains the unemployment rate 1 percentage point above the natural rate of unemployment during the disinflationary process, we have

$\pi_4 = 9\% - (6\% - 5\%) = 8\%$ (this is the rate of inflation in $t=4$, that is the fourth year of the disinflationary process)

in $t=5$

$$\pi_5 = \pi_4 - (u_5 - 5\%)$$

using the fact that $\pi_4 = 8\%$ and recalling that the central bank maintains the unemployment rate 1 percentage point above the natural rate of unemployment during the disinflationary process, we have

$\pi_5 = 8\% - (6\% - 5\%) = 7\%$ (this is the rate of inflation in $t=4$, that is the fourth year of the disinflationary process)

and so on..... up you reach an inflation rate equal to 2%, that is at time $t=10$.

Basically, the central bank will have to reduce the inflation rate by 1 percentage point a year for 10 years.

The central bank is able to reduce the inflation rate from 12% to 2% in 10 years, by suffering an excess of unemployment equal to 1 percentage point all along the disinflationary process.

4. Now we assume that **people know that the central bank wants to lower inflation to 2%, but they are not sure about the central bank's willingness to accept an unemployment rate above the natural rate of unemployment (that is, they do not fully trust the central bank)**. As a result, their expectation of inflation is a weighted average of the target of 2% and last year's inflation - i.e. $\pi_t^e = \lambda 2 + (1 - \lambda)\pi_{t-1}$, where λ is the weight they put on the central bank's target of 2%. Assume that $\lambda = 0.5$. Under this new assumption the Phillips curve becomes: $\pi_t = \underbrace{\lambda 2\% + (1 - \lambda)\pi_{t-1}}_{\pi_t^e} - (u_t - 5\%)$. At time $t=1$,

the law of motion of inflation is simply $\pi_1 = \lambda 2\% + (1 - \lambda)\pi_0 - (u_1 - 5\%)$ with $\pi_0 = 12\%$ and $\lambda = 0.5$. If at time $t=1$ the central bank respects the announcement and sets inflation to 2%, the Phillips curve gives the implied value for the unemployment rate of this "Cold Turkey" disinflationary policy, that is $2\% = 0.5 \times 2\% + (1 - 0.5) \times 12\% - (u_1 - 5\%) \rightarrow u_1 = 10\%$. Therefore in this economy decreasing inflation by 10 percentage points in one period creates an excess of unemployment equal to 5 percentage points. Thanks to the fact that now the disinflationary policy is announced in advance and to the fact the central bank announcement

is partially credible, the sacrifice ratio is now halved (i.e. the sacrifice ratio is in fact equal to 0.5).

5. Now we assume that **people fully believe that the central bank is indeed committed to reducing inflation to 2%**. As a result, they now set their expectations according to $\pi_t^e = 2\%$. If at time $t=1$ the central bank respects the announcement and sets inflation to 2%, the Phillips curve gives the implied value for the unemployment rate of this "Cold Turkey" disinflationary policy, that is $2\% = 2\% - (u_1 - 5\%) \rightarrow u_1 = 5\%$. Therefore in this economy decreasing inflation by 10 percentage points in one period does not create any excess of unemployment!!!! In this case the sacrifice ratio is zero.
6. The case of full indexation is isomorphic to the previous case. The generic Phillips curve under indexation is $\pi_t = \lambda\pi_t + (1 - \lambda)\pi_{t-1} - (u_t - u_n)$, where λ measures the degree of indexation. Under full indexation $\lambda = 1$, therefore the Phillips curve boils down to $\pi_t = \pi_t - (u_t - u_n)$. As a result, if at time $t=1$ the central bank sets inflation to 2%, the Phillips curve gives the implied value for the unemployment rate of this "Cold Turkey" disinflationary policy, that is $2\% = 2\% - (u_1 - 5\%) \rightarrow u_1 = 5\%$. Therefore in this economy decreasing inflation by 10 percentage points in one period does not create any excess of unemployment!!!! Also in this case the sacrifice ratio is zero.