14.02 Principles of Macroeconomics
Problem Set 3
Spring 2003

Distributed Wednesday, March 19
Due Wednesday, April 2 in class

**PLEASE FILL IN THE BLANKS BELOW AND ATTACH THIS COVER
SHEET TO THE FRONT OF YOUR COMPLETED PROBLEM SET.**

NAME: _____

MIT ID NUMBER: _____

TA: _____

CLASS TIME: _____

Part 1. True or False Questions

a) One of the reasons why the original Phillips curve vanished is that the U.S. was hit twice in the 70s by a large increase in oil prices.

b) One of the reasons why the original Phillips curve vanished in the U.S. is that the wage setters changed the way they form their expectations.

c) The natural rate of unemployment is also called NAIRU because it is the rate of unemployment required to keep output constant.

d) The modified Phillips curve captures well the aggregate supply relation in the U.S. today

e) The modified Phillips curve captures well the aggregate demand relation in the U.S. today

f) If expected inflation is well approximated by last year's inflation then unemployment is above its natural rate leads to an increase in inflation.

g) Changes in the rate of growth of money have no effect on output or unemployment in the medium run, but are reflected one for one in changes in the rate of inflation.

h) Disinflations typically lead to higher unemployment for some time.

i) Faster disinflations are associated with smaller sacrifice ratios.

Part 2. Macronesia After the War

1) The wage setting equation is: $W=P^e(1 - 0.5\ u)$

The Price setting equation is: $P=2\ P^e(1 - 0.5\ u)$

Solving for the AS curve, deviding by P_{t-1}, and taking logs:

$Log\ (P_t/P_{t-1}) = log\ 2 + log\ P_t^e\ /P_{t-1} + log(1-0.5u_t)$

Replacing for inflation, assuming that $\pi_t^e=0$ gives the Phillips curve:

$\pi_t = log\ 2 - 0.5\ u_t$

2) No, inflation expectations won't be zero anymore.

3) $Log\ (P_t/P_{t-1}) = log\ 2 + log\ P_t^e\ /P_{t-1} + log(1-0.5u_t)$

   $\pi_t - \pi_{t-1} = log\ 2 - 0.5\ u_t$

4) *The NAIRU is given by* $0 = log\ 2 - 0.5\ u_n => u_n = 2\ log\ 2$

It's called NAIRU because it is the unemployment rate at which inflation does not changes.

B. Inflation and Money Growth

1) *Medium run unemployment is u_n*

2) *Desired path of inflation*

Year	0	1	2	3	4	5	6	7	8	9	10	11	12
Π path	50	45	40	35	30	25	20	15	10	5	0	0	0
U path	u_n	u_n+10	u_n+10	u_n+10	u_n+10	u_n+10	u_n+10	u_n+10	u_n+10	u_n+10	u_n+10	u_n	u_n

To compute the unemployment path we have that

$$\pi_t - \pi_{t-1} = \log 2 - 0.5\, u_t$$

$$\pi_t - \pi_{t-1} = -0.5\,(u_t - u_n)$$

$$u_t = u_n + 2\,(\pi_{t-1} - \pi_t)$$

3) *Point-years of excess = Sum over all years of $(u_t - u_n) = 100$.*

Sacrifice ratio = point-years of excess / total change in inflation = 100/50 = 2

4) *No, they will all add up to the same point-years of excess unemployment.*

5) *The new Phillips curve is*

$$\pi_t = [.10\,\pi_t + .9\,\pi_{t-1}] - 0.5\,(u_t - u_n)$$

$$\pi_t - \pi_{t-1} = -0.5/.9\,(u_t - u_n)$$

$$\pi_t - \pi_{t-1} = -0.555\,(u_t - u_n)$$

Sacrifice ratio = 1/0.555 = 1.8

*point-years of excess = Sacrifice ratio * total change in inflation = 90*