

Econ 375  
 Problem Set 3 Key

1. This one is straight out of the book.

2. Anticipated vs Unanticipated AD shock.

a)  $Y = 3000$ ; yes, it is a long run equilibrium since  $Y = Y_n = 3000$  and  $P = EP$

b)  $Y = 3333$ ;  $P = 166.7$

c)  $P = 200$ ;  $Y = 3000$

3. The economy has the Phillips curve:  $\pi = \pi_{-1} - 0.5(u-0.06)$ .

a) The natural rate of unemployment is the rate at which the inflation rate does not deviate from the expected inflation rate. Here, the expected inflation rate is just last period's actual inflation rate. Setting the inflation rate equal to last period's rate, that is,  $\pi = \pi_{-1}$ , we find that  $u = 0.06$ . Thus the natural rate of unemployment is 6 percent.

b) With inflation on the vertical axis and unemployment on the horizontal axis, the short run PC is negatively sloped. The long run PC is vertical at the natural rate of unemployment.

c) To reduce inflation, the Phillips Curve (PC) tells us that unemployment must be above its natural rate of 6 percent for some period of time. We can write the PC in the form:  $\pi - \pi_{-1} = 0.5(u-0.06)$ . Since we want inflation to fall by 5 percentage points, we want  $\pi - \pi_{-1} = -0.05$ . Plugging this into the above equation gives us  $u = 0.16$ . Hence, we need 10 percentage point-years of cyclical unemployment above the natural rate of 6 percent. According to Okun's law, a 1% increase in unemployment requires a 2% drop in GDP. Thus, a 10 percentage point increase in unemployment requires a 20 percentage point drop in GDP. This makes the sacrifice ratio =  $20/5 = 4$ .

d) Once scenario is to have very high unemployment for a short period of time. For example, we could have 16 percent unemployment for a single year. Alternatively, we could have a small amount of cyclical unemployment spread out over a long period of time. For example, we could have 8 percent unemployment for 5 years. Both would bring the inflation rate down from 10 percent to 5 percent, although at different speeds.

4. Another PC question. Parts (a) and (b) are shown in the table below.

Period	$\pi$	$E\pi$
0	.03	.03
1	.04	.03
2	.05	.04
3	.06	.05
4	.07	.06
5	.08	.07
6	.08	.08
7	.08	.08
8	.08	.08
9	.08	.08
10	.08	.08

c) In part (a) the government was trying to keep the unemployment artificially below its natural rate. Such a policy will always cause the inflation rate to accelerate (as you can see in periods 1 - 5). In part (b), the government simply held the economy at the natural rate, which does not put any further pressure on inflation to rise (or fall for that matter).

5. Check out the text's discussion of hysteresis.

6. Rational expectations.

a) Short run:  $P$  rises,  $Y$  rises

Long run:  $P$  rises further,  $Y$  returns to  $Y_n$

b) Short run: see below, there is no distinction between SR and LR

Long run:  $P$  rises,  $Y$  remains at  $Y_n$

c) Short run: P falls, Y rises

Long run: P returns to initial level, Y returns to  $Y_n$

d) Short run P rises, Y falls (assuming Fed actually does cut  $M^s$ )

Long run: P rises further, Y returns to  $Y_n$

or

Short run: P remains constant, Y remains constant (assuming the Fed does not actually change the  $M^s$ )

Long run: same as above

7. Demand-pull inflation is due to increases in the AD curve. Cost-push inflation is due to decreases in the AS curve. The additional macro data required to explain the cause of the inflation would be real GDP. If real GDP fell while inflation rose, then it must be due to cost-push inflation. If real GDP rose while inflation rose, then it must be due to demand-pull inflation.

8. Supply-side economics?

a) A tax cut would increase the natural rate of output since normal labor supply would increase.

b) The tax cut would shift each of the three curves to the right. The result would be higher output, but an indeterminate effect on price.

c) The traditional view suggests that a tax cut would stimulate AD only, thereby raising Y and P.

9. More accurate forecasting would reduce the policy lags associated with diagnosing the economic climate and formulating countercyclical policies. One way economists try to forecast developments in the economy is with the index of leading indicators (a package of 10 data series that often fluctuate in advance of the general economy). A second way forecasters look ahead is with statistical (econometric) models of the economy.

10. This is in your text.

11. This is in your text.

12. Given that the economy has the following Phillips curve:  $u = u_n - a(\pi - E\pi)$ , it implies that if inflation is lower than expected, then unemployment rises above the natural rate, and there is a recession. Similarly, if inflation is higher than expected, then unemployment falls below its natural rate, and there is a boom. Also suppose that the Dems always follow a policy of high money growth and high inflation (call it  $\pi_D$ ), while the Repubs always follows a policy of low money growth and low inflation (call it  $\pi_R$ ).

a) The pattern of the political business cycle we observe depends on the inflation rate people expect at the beginning of each term. If expectations are perfectly rational and contracts can be adjusted immediately when a new party comes into power, then there will be no political business cycle pattern to unemployment. For example, if the Dems win the coin flip, people immediately expect high inflation. Because  $\pi = \pi_D = E\pi$ , the Dems' monetary policy will have no effect on the real economy. We do observe a political business cycle pattern to inflation, in which Dems have high inflation and Repubs have low inflation.

Now suppose that contracts are long enough that nominal wages and prices cannot be adjusted immediately. Before the result of the coin flip is known, there is a 50 percent chance that inflation will be high, and a 50 percent chance that it will be low. Thus, at the beginning of each term, if people's expectations are rational, they expect an inflation rate of  $E\pi = 0.5\pi_D + 0.5\pi_R$ . If Dems win the coin toss, then  $\pi > E\pi$  initially, and unemployment falls below its natural rate. Hence, there is a boom at the beginning of Democratic terms. Over time, inflation rises to  $\pi_D$ , and unemployment returns to its natural rate.

If Repubs win, then inflation is lower than expected, and unemployment rises above its natural rate. Hence, there is a recession at the beginning of Republican terms. Over time, inflation falls to  $\pi_R$ , and unemployment returns to its natural rate.

b) If the two parties take turns, then there will be no political business cycle to unemployment, since everyone knows which party will be in office, so everyone knows whether inflation will be high or low. Even long-lasting contracts will take the actual inflation rate into account, since all future inflation rates are known with certainty. Inflation will alternate between a high level and a low level, depending on which party is in power.

13. When shocks to the economy are primarily due to shifts in the IS curve (random shocks to exogenous spending), a constant money rule will lead to less fluctuation in GDP than a policy that seeks to maintain fixed interest rates.

14. There is a time-inconsistency problem with an announcement that new building will be exempt from rent-control laws. Before new housing is built, a city has an incentive to promise this exemption: landlords then expect to receive high rents from

the new housing they provide. Once the new housing has been built, however, a city has an incentive to renege on its promise not to extend rent control. That way, many tenants gain while a few landlords lose. The problem is that builders might expect the city to renege on its promise; as a result, they may not build new buildings.

15. The Lucas critique argues that economic policy based on econometric forecasting models is likely to be erroneous since the key parameter values (such as the MPC) can not be expected to remain constant in the face of expected changes in the policy variables (such as money supply or tax rates).

16. According to the Phillips curve, in the long run the economy will be at its natural rate regardless of the rate of inflation. Therefore, while more independent central banks may choose lower inflation rates, they will have no effect on the long run level of unemployment.

17. Inside lag is the time it takes to design and implement a policy change. The outside lag is the time it takes a policy to have an impact after it is implemented. Fiscal policy generally has a longer inside lag compared to monetary policy. Monetary policy generally has a longer outside lag though.

18. Look in the text.

19. Traditional view: public saving decreases, private savings decreases, national savings decreases; Ricardian: public savings decreases, private savings increases, national savings constant.

20. a) If you assume that people want to keep consumption as smooth as possible over their lifetimes, then a temporary change in income will be spread out over a person's entire remaining life. Consider the following example: Let  $T$  be the amount of the one-time, temporary tax levied on the young, and let  $B$  be the amount of the one-time benefit paid to the old, where  $B = T$ . If a typical old fart has 10 years left to live, then the temporary benefit increases the present consumption of the elderly by  $B/10$  (that is, the benefit is spread out evenly over the remaining 10 years). If a typical young slacker has 30 years left to live, then the increase in taxes decreases their present consumption by  $T/30$  (that is, the total tax bill reduces consumption by an even amount over the next 30 years). Aggregate consumption changes by an amount:  $\text{Change in } C = B/10 - T/30 = B/15$ . The transfer of wealth to the elderly causes a net increase in consumption, and therefore a decrease in saving. This happens because the elderly increase consumption by more than the workers decrease it, because the elderly have fewer years left to live and thus have a higher marginal propensity to consume.

b) The answer to part (a) does depend on whether generations are altruistically linked. If generations are altruistically linked, then the old farts may not feel any better off because of the Social Security benefit, since the tax and benefit increase has no effect on a typical family's permanent income; it simply transfers resources from one generation of the family to another. If the old farts do not want to take advantage of this opportunity to consume at their children's expense, they may try to offset the effect of the tax increase on the young by giving them a gift or leaving them a bequest. To the extent that this takes place, it mitigates the impact of the tax change on consumption and saving.

21. We did this in class.

22. Broadband is arguably an example of government investment. Such investment can be expected to increase productivity and stimulate future economic growth. Assuming tax rates are constant, an expanding economy will bring in more tax revenues and reduce the government debt.

23. If people believe higher inflation is coming, the SRAS curve would shift to the left.

24. Most likely the internet has improved the information flow between job searchers and potential employers, thereby leading to quicker matches and a reduced natural unemployment rate. This can be shown as a rightward shift in the LRAS.