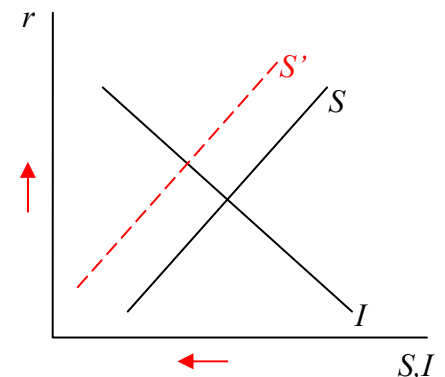


Homework #6 - *Answers*
Uses of Macro Policy
Due April 20

Answer all questions on these sheets, adding extra sheets where necessary.

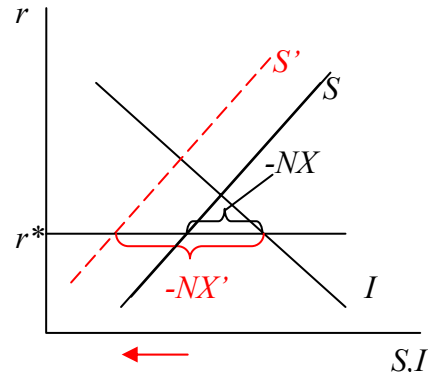
1. Suppose that the government were to increase its purchases of goods and services by some amount, continuing to spend at the new level from now on, and that it finances this increase in spending by borrowing. That is, it keeps taxes and the money supply both unchanged. For each of the following models in the Mankiw text, show (using appropriate diagrams) how this policy change will affect the economy and determine in particular how it will affect the levels of national saving and investment.
 - a. The closed-economy model of savings and investment in Chapter 3. Do this both for the case where savings depends on the interest rate, and where it does not.

*The increase in government purchases reduces government saving, and thus national saving for a given interest rate. If private savings does not depend on the interest rate, that is the end of the story, and the interest rate simply rises to reduce investment by the same amount. If private saving does depend on the interest rate (as is allowed for in Chapter 3 but not later), then the rise in the interest rate increases it, but **national savings still is reduced**, since in equilibrium it must equal the **reduced level of investment, I** .*



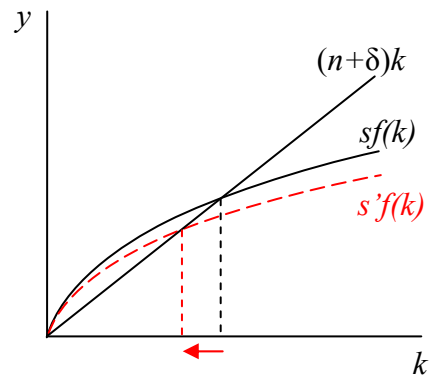
- b. The open-economy model of Chapter 5.

In this model the interest rate is fixed at the level of the interest rate abroad, r^ , so it cannot increase. Instead, the reduced saving by government causes a capital inflow to finance it. In the exchange market, this requires a matching increase in the trade deficit, which is achieved by means of an appreciation of the currency. **Investment is unchanged**, due to the unchanged interest rate, while **national saving is reduced** by the decline in government saving.*



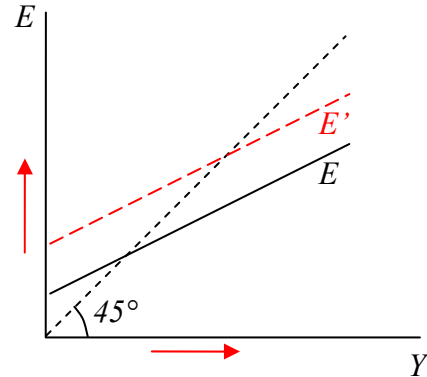
- c. The growth model of Chapter 7 (using what you found for national saving in parts a and b).

In both a and b we found that national saving decreased as a result of the government's increased purchasing. In the growth model, therefore, the country saves a smaller fraction of its income. This means that it also invests less, and therefore that its capital stock fails to keep up with depreciation and its growing labor force, so that its capital stock per person falls over time. This, as shown in the figure, causes the steady-state level of income per capita to fall, and therefore the amounts of savings and investment per capita also to fall even further.



- d. The goods-market equilibrium model (the Keynesian Cross) of Chapter 10 (taking the interest rate and price level both as given).

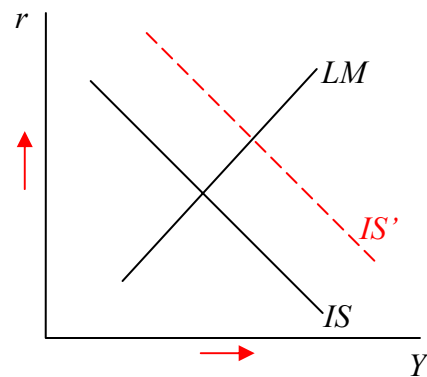
The increase in government purchases shifts the expenditure curve up, as shown. The new equilibrium is found at its intersection with the 45° line, indicating that income Y rises by more than the government purchases.



*Since we have not changed the interest rate here, **investment is unchanged**, and therefore **national savings must also be unchanged**. That is possible, even though government saving is reduced, because the rise in income has induced an increase in private saving.*

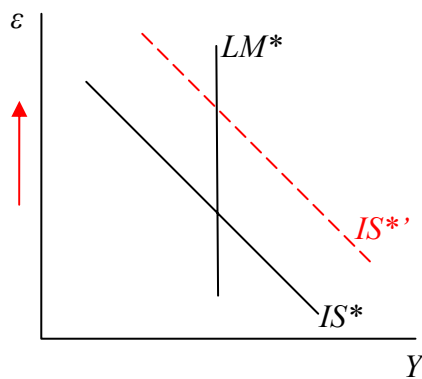
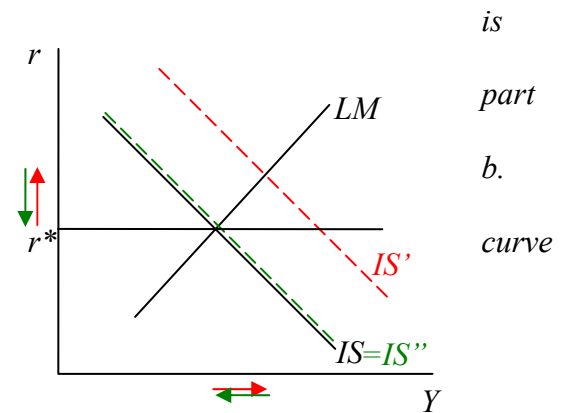
- e. The IS-LM model (with constant price level) of Chapters 10-11.

*The increase in government purchases shifts the IS curve to the right, by the amount of the increase in Y found in part d. Interacting with the money market along the unchanged LM curve, a new equilibrium involves both a higher interest rate and a higher income (though not as high as if the interest rate had not gone up). The higher interest rate assures that **investment falls**, and therefore that **national saving also falls**. Even though the rise in income raises private saving, it evidently does not rise as much as government saving falls.*



- f. The Mundell-Fleming model with a floating exchange rate (and with a constant price level) of Chapter 12.

Now the interest rate cannot rise, because it is fixed at the world rate, r^* . Instead, the upward pressure on the interest rate found in *c* pulls in capital from abroad causing the country's currency to appreciate, as in part *c*. This appreciation reduces net exports, reversing the increase in demand until the IS is pushed back to its initial position.

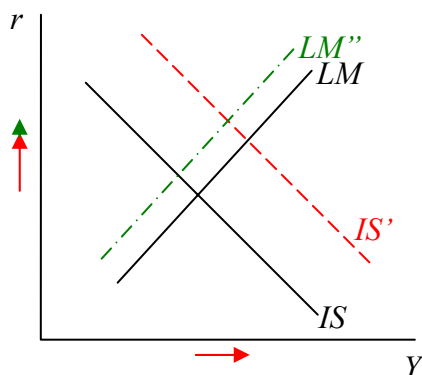


Alternatively, using a diagram with Y and ϵ on the axes, the LM^* curve is vertical and the rightward shift of IS^* merely moves the equilibrium to a higher ϵ but the same Y . As in part *b*, while **investment remains unchanged** due to the unchanged r , government saving is reduced, private savings is unchanged (since Y is unchanged) and therefore **national savings is reduced**.

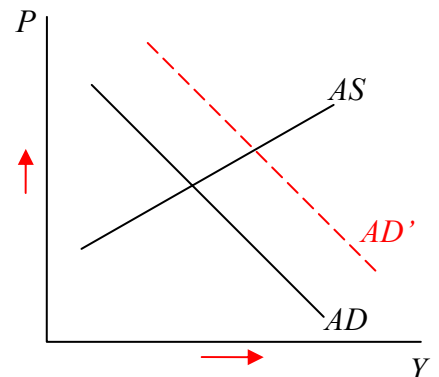
- g. The AD-AS model of Chapter 13 in the short run. Consider both the case of a small open economy with a floating exchange rate, and a closed economy.

The answer here depends on whether the economy is small and open, as in part *f*. In part *f*, since Y does not increase, there is no shift of the AD curve and nothing else happens.

If on the other hand the economy is closed, as in part *e*, then the increase in Y found in the IS-LM model indicates a higher Y for a given P , and therefore a rightward shift in the AD curve. Equilibrium moves to higher Y and higher P also. In part *e* we found that investment and national saving falls,

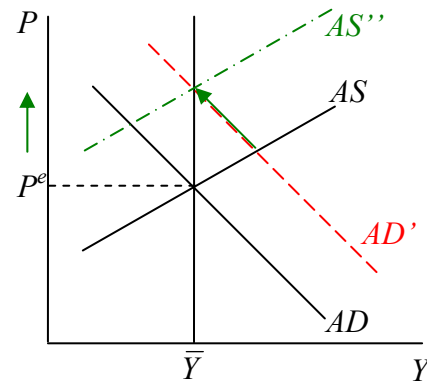


when the price level did not rise. Here the rise in P causes a leftward shift of LM, moving to a still higher interest rate and **even lower rates of investment and national saving**.



- h. The AD-AS model of Chapter 13 in the long run.

*Now the fact that price has risen above its expected level causes expected price subsequently to rise, pushing up AS until it intersects AD' at the natural rate of output, \bar{Y} . In the new equilibrium private saving has returned to its initial level (since Y is unchanged), and therefore **national saving has fallen** by the full amount of the increase in G . A further rise in the interest rate has pushed **investment even further down** to this level.*



- i. The model of Ricardian Equivalence of Chapter 15.

*In the model of Ricardian Equivalence, changes in the government budget are expected to require changes in taxes in the future. Therefore, even though in this example the government did not finance its increased purchases with a tax increase today, consumers expect that taxes will be increased at some time in the future to pay back the increased borrowing. Therefore they reduce their consumption today by the same amount that they would have if taxes had been increased today by ΔG . That is, they reduce consumption by $(1-MPC)\Delta G$. This does not totally eliminate the expansionary effect of the government purchases, but it does eliminate their multiplier effect. The effect is the same as that of the balanced-budget change in spending that we studied in an earlier homework assignment. That means that, in the short-run, closed-economy cases above, there is still some increase in Y and therefore some increase in private saving, but the results that **investment and national saving fall** continue to hold.*

2. Discuss the pros and cons of

- a. Central bank independence. That is, should or should not the central bank be answerable to the elected government of the country?

Points to include:

Con:

- *All policy should be subject to democratic control, including monetary policy.*
- *Central bankers are likely to act primarily in the interest of their constituents, the commercial banks, and at the expense of the public.*

Pro:

- *Elected officials will always choose the short-run gains from monetary expansion over the long-run benefits of price stability, and will therefore cause excessive inflation.*
- *Governments are tempted to use printing money as a means of financing deficits.*
- *Empirical studies indicate that central bank independence tends to produce lower inflation, without any offsetting adverse effects.*

- b. Central bank secrecy. That is, should or should not the central bank make public its uses of tools of monetary management?

Points to include:

Con:

- *The public has a right to know what the central bank is doing, especially if it is independent.*
- *The best that monetary policy can achieve is stable income and low inflation at the natural rate of unemployment. Rational expectations will help to achieve that target most effectively if monetary policies are made public.*

Pro:

- *Monetary policy can succeed in temporarily raising income above the natural rate only if it surprises decision makers. Secrecy is necessary to accomplish that.*
- *If the central bank is pegging the exchange rate, too much public information may lead to destabilizing speculation against the currency.*

3. (Adapted from Mankiw, p. 401) Suppose that the tradeoff between unemployment and inflation is determined by the Phillips curve:

$$u = u^n - \alpha(\pi - \pi^e)$$

where u denotes the unemployment rate, u^n the natural rate of unemployment, π the rate of inflation, and π^e the expected rate of inflation. In addition, suppose that the Democratic party always follows a policy of high monetary growth and the Republican party always follows a policy of low monetary growth.

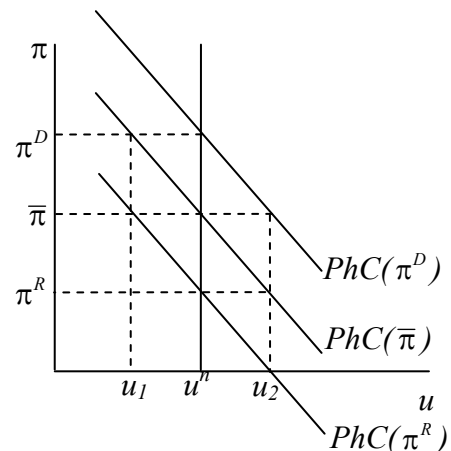
Assume for simplicity that the party in power is able each period to move the economy's unemployment rate to that which will bring about the desired rate of inflation. (A more plausible alternative might be to have it set the rate of monetary expansion that will achieve the desired inflation in the long run, and then let the economy respond to that over time. That would be easier for it to do, but harder for us to analyze.) Assume also that expectations are formed (and labor contracts written, for example) just before the start of a year, at the beginning of which, if it is an election year, a party is chosen and then runs the economy for the rest of the year. When expectations are formed, assume that they are formed rationally, taking all available information into account. But then assume that, once these expectations are formed, they do not change until just before the start of the next year.

What "political business cycle" pattern of inflation and unemployment would you predict under the conditions below? Use the Phillips curve diagram to explain.

- a. Every four years, one of the parties takes control based on a random flip of a coin (or a hanging chad). (Hint: What will expected inflation be prior to the election?)

Let $\pi^D > \pi^R$ be the rates of inflation that will result under the two parties' policies if they are pursued in the long run (equal to their respective rates of monetary expansion minus the long-term rate of growth of real income), and let

$\bar{\pi} = (\pi^D + \pi^R) / 2$ be the average of those two rates and thus the true expected long-term rate of inflation when the parties are chosen with equal probabilities. Just before the start of an election year, people expect a rate of inflation of $\bar{\pi}$, since they don't know which party will win. Thus the short-run Phillips Curve for the first year is the one shown here as $PhC(\bar{\pi})$, crossing the vertical line at u^n at $\bar{\pi}$, halfway between π^D and π^R .



Now one of the parties is chosen by a coin toss. If it is the Republican party, it will use its policies to move the economy to u_2 , where the rate of inflation is π^R . If it is the

Democratic party, it will use its policies to move the economy to u_1 , where the rate of inflation is π^D . Just prior to the second year the public forms new expectations (and writes new contracts based on them), now knowing which party is in power. Thus the short-run Phillips curve moves to either $PhC(\pi^R)$ or $PhC(\pi^D)$, depending the party. In either case, the party will then have to move the unemployment rate back to u^n in order for the rate of inflation to achieve its target.

Thus, the result is that the economy experiences a recession in the first year of any Republican administration and a boom in the first year of any Democratic administration, with unemployment at its natural rate in years two through four of both.

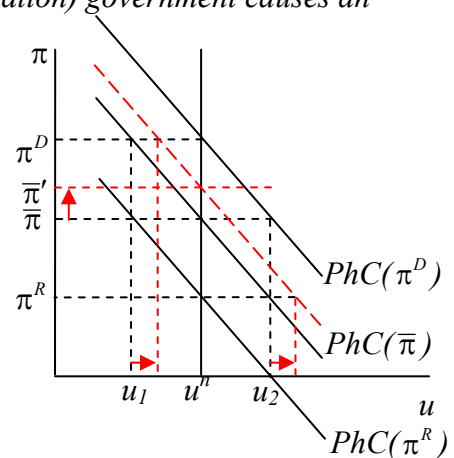
- b. The two parties take turns.

Now there is never any uncertainty as to which party will be in power. As a result, each party will face a Phillips curve that corresponds to its target rate of inflation in every year of its administration, including the first. As a result, unemployment will stay at its natural rate in every year.

- c. Returning to the random selection of part a, suppose now that the probability of the Democratic party taking power is p , $0 < p < 1$, while that of the Republican party is $(1-p)$. What, then, will an increase in p do to the unemployment rates in different years? And what will it do to the average unemployment rate over time?

Now the expected rate of inflation in the first year after an election is $\bar{\pi} = p\pi^D + (1-p)\pi^R$, which is closer to π^D , and thus higher, the higher is p . Thus a rise in p shifts $PhC(\bar{\pi})$ up, also increasing both u_1 and u_2 as shown. That is, a rise in the probability of a Democratic (high-inflation) government causes an increase in the rate of unemployment that will be observed in the first year of either type of administration. It has, of course, no affect on unemployment in years two through four.

Interestingly, however, the rise in p does not necessarily increase the average unemployment rate over time, since it also causes the high-inflation, low-unemployment Democrats to be elected more often. In fact, if the Phillips curve is a straight line, then it looks like the average rate of unemployment is unchanged at u^n .



- d. How would your answers be altered, do you think, if expectations were formed adaptively? [This one is optional, and I do not promise to give you answers.]