ECON 329
Spring 2009

Answers to Homework 3

First, a few overall comments about this problem, the next exam, and the monetary approach:

At this point, you have now used this complex framework (the combined asset & monetary approach) a few times. First, we used it in class a few weeks ago to analyze the effects of a one-time permanent increase in the money supply. Second, you worked through this HW on your own to analyze the effects of a permanent decrease in real GDP. And third, we went over this HW in class on 3/30. We will review it a bit more before our next exam, which will very likely contain a problem that uses it.

Problems like these are complex in the literal sense, as this analysis ties together many things we've learned this semester (PPP, uncovered interest parity, and the Quantity Theory of Money, to name a few). Each of these things is, in itself, a theory or model, as well as a building block or part of the larger framework used to solve problems such as this HW assignment. To solve such complex problems, you must first know how each of the parts works as its own theory/model (we covered this over the first half of the semester), and second how the various parts fit together. If you have trouble using the larger framework, a good place to start is to review and master each of the building blocks by itself and make sure you know how it works.

A separate issue some of you have mentioned to me involves some confusion about questions like "what happens on 3/9/09" in the monetary (long-run) approach, which omits any transitional dynamics. Example: In the monetary (long-run) approach, a fall in Y on 3/9/09 causes P to rise on 3/9/09. Yet, in the asset (short-run) approach, if Y falls on 3/9/09, P does not change on 3/9/09, because prices are sticky in the short run. The behavior of P is inconsistent in the two approaches. Moreover, it generally seems confusing to talk about what happens on a specific date in the monetary approach.

It may help to think about these issues in the following way: The monetary approach only tells us the long-run effects of a shock (such as a fall in Y) or policy change (such as an increase in M). Thus, we should interpret a change that occurs on the date of the shock (such as an increase in P on 3/9/09) as the change between the initial equilibrium and the new long-run equilibrium. For example, when we say "in the monetary approach, P rises on 3/9/09", we do not mean literally that prices rise on the exact same day that income falls; we merely mean that the price level is higher in the post-3/9/09 long-run equilibrium than it was in the pre-3/9/09 long-run equilibrium. The change that occurs on 3/9/09 in the monetary approach is simply the change from the initial equilibrium and the new long-run equilibrium.

So, the monetary approach gives us no information about the actual behavior of variables in the short run or in the transition from SR to LR. Yet, the monetary approach remains important. It gives us good answers about where the economy will end up in the long run, which we need to know for two reasons: first, to figure out what happens in the short run, we need to know whether and how people's expectations/forecasts about the future will change, because expectations potentially have huge effects on people's behavior. (What would you do if you had money and suddenly got credible information that Microsoft stock would double next week?) Second, knowing where we end up in the long run makes it easy to figure out the transitional dynamics: if you know the short run value of E and the long run value of E, the transition is merely the path from the short-run value to the long-run value.

1. Determine long-run effects using the monetary approach. For each, briefly explain your answer.

a. What (if anything) happens to the nominal interest rate on 3/9/09?

The nominal interest rate equals the real interest rate plus the inflation rate, so to find out what happens to the nominal interest rate, we have to figure out what happens to the real interest rate and inflation rate.

In the long run, real interest parity insures that the country's real interest rate will equal the exogenous world interest rate r^*, which does not change on 3/9/09 and is the same before and after 3/9/09.

In the long run, the Quantity Theory of Money tells us the inflation rate will equal the difference between the growth rate of the money supply and the growth rate of real GDP. Both of these growth rates equal zero before and after 3/9/09, so the inflation rate is zero before and after 3/9/09. It does not change on 3/9/09.

Since neither r^* nor the inflation rate change on 3/9/09, the nominal interest rate also does not change on 3/9/09. It has the same value before 3/9/09 and in the new long-run equilibrium after 3/9/09.

b. What (if anything) happens to real money demand on 3/9/09?

Real money demand = $L(i)Y$ depends on the nominal interest rate and real income. 1a established that the nominal interest rate does not change, but real income decreases, so money demand will decrease: since people have less income, they won't spend as much, and therefore won't need as much money. Needing less money, they'd rather keep more of their wealth in the form of bonds (or other income-generating assets) because money pays no interest, it is useful only for its liquidity and people don't need as much liquidity if they won't be spending as much.

c. What (if anything) happens to the price level P on 3/9/09?

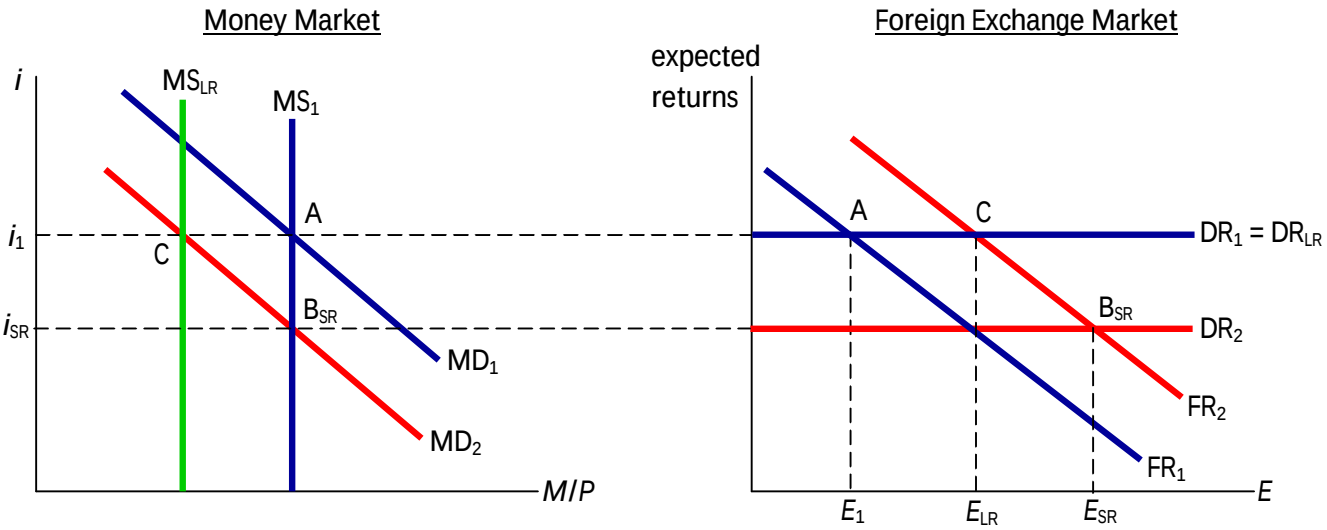
In the long run, P is endogenous and adjusts to keep the real money supply, M/P, equal to real money demand. Since real money demand has fallen, the real money supply must fall to maintain equilibrium in the money market. But the instructions to this problem tell us that the nominal money supply, M, does not change on 3/9/09. Therefore, the only way the real money supply can decrease on 3/9/09 is if P rises.

d. What (if anything) happens to the nominal exchange rate E on 3/9/09?

In the long run, PPP dictates that $E = P/P_f$, where P is the U.S. price level and P_f is the foreign price level. On 3/9/09, P increases, so E must also increase. This result should be intuitive: the increase in P means that the U.S. currency has less purchasing power than before (in terms of U.S. goods and services), so it depreciates in value relative to the foreign currency.

2. Determine short-run effects using the asset approach.

a. On the graphs below, draw the initial (pre-shock) equilibrium in the money and FX markets. Label the initial equilibrium point A in both graphs. As always, label all curves and axes correctly. On the appropriate axes, label the initial values of i and E as i_1 and E_1.



b. On March 9, Y falls. In the money market diagram, which curve shifts? Explain. What (if anything) happens to i? Illustrate on your money market diagram. Label the new equilibrium "B_{SR}," and if the new short-run equilibrium value of i is different than before, label it i_{SR} on the vertical axis.

The money demand curve shifts to the left: at each interest rate, people in the U.S. demand less money than before, because the fall in their incomes reduces their desire to spend. (Well, maybe I should say reduces their *ability* to spend. Even when my income falls, I always have the *desire* to spend.)

In the short run, the leftward shift in money demand results in a lower equilibrium value of i. Intuition: with less income, people will spend less, so they have less need for the liquidity services provided by money. They would like to hold more of their wealth in the form of bonds and less in the form of money. So, they attempt to exchange money for bonds. This drives up the price of bonds and thus reduces the interest rate on bonds.

c. What happens to the expected future exchange rate on March 9? Explain. Show the effects of this and of the fall in Y in your FX market diagram above. Explain any curve shifts. What (if anything) happens to E? Illustrate on your FX market diagram. Label the new equilibrium "B_{SR}," and if the new short-run equilibrium value of E is different than before, label it E_{SR} on the horizontal axis.

The expected future exchange rate, E^e, rises on March 9. When income falls, people know that E will rise in the long run (because everybody in the economy has taken ECON 329 and knows that the monetary approach dictates a higher long-run exchange rate). So they raise their forecast of the future exchange rate.

When we first learned about the downward-sloping FR curve, we learned that an increase in E^e would cause it to shift upward: The foreign return is the expected return on the following three-step operation: (1) converting dollars to foreign currency now, (2) depositing the foreign currency in a foreign bank for a year, then (3) converting the foreign currency (plus any accrued interest) back into dollars. If E^e is higher, then people expect they will get more dollars in step (3) of this process, which increases the expected return on foreign deposits. The increase in the expected foreign return means that the FR curve shifts up.

Also, the DR curve shifts down: the domestic return is simply the U.S. nominal interest rate, which has fallen due to the leftward shift of the money demand curve.

As a result of the downward shift in DR and upward shift in FR, the foreign exchange market has a new short-run equilibrium at point B_{SR}, and the new equilibrium spot exchange rate is higher than at point A.

3. Transition from SR to LR equilibrium.
Hint: to determine the transition dynamics, compare the new SR equilibrium from 2 to the new LR equilibrium from 1 and deduce what must change to move the economy from the SR to the LR.

a. In the money market, what happens to *P* in the transition from the SR to the LR? Why?

We know from the monetary approach that, in the long run, the new price level will be higher than the initial price level. We also know that P will not change immediately, due to short-run price stickiness. Thus, we can infer that, during the transition, *P* will begin to rise over time as the various prices in the economy gradually become "unstuck." *P* will continue rising until it reaches its new long-run equilibrium value.

b. In the money market, what happens to *M*/*P* in the transition from the SR to the LR? Why?

The instructions for this problem tell us that *M* never changes – it remains constant before, on, and after 3/9/09. So, any movement in *M*/*P* will be driven by movement in *P*, which we now know:

Since *P* doesn't change on 3/9/09, *M*/*P* also won't change on 3/9/09. After 3/9/09, as we transition from the short run to the eventual new long-run equilibrium, *P* is rising, and therefore *M*/*P* is falling: gradually rising prices during the transition cause a gradual reduction in the purchasing power of the money supply.

c. In the money market diagram above, show the eventual long-run equilibrium as point C.

As *M*/*P* falls over time, the MS curve will gradually move toward the left, causing the nominal interest rate *i* to gradually rise.

To determine the location of point "C," we need to know how far the MS curve will move to the left. In fact, we can say that the MS curve moves just enough, and the real money supply falls just enough, to bring us back to our initial interest rate: We know from 1a that, in the long run, the nominal interest rate is unchanged from its initial value, so in our money market diagram, the long-run equilibrium interest rate at point C must be the same as the initial equilibrium interest rate at point A.

d. In the FX market, explain any changes that occur. Illustrate them on the diagram above, and label the long-run equilibrium point C. Label the long-run exchange rate E_{LR} on the horizontal axis.

The FR curve does not shift further, it remains at FR_2. However, as the nominal interest rate rises in the money market diagram, the DR curve will move upward in the foreign exchange market diagram. This process continues until the nominal interest rate is back at its initial value, and the DR curve is back in its initial position.

e. On the axes provided, draw time-series diagrams showing the behavior of *P* and *E*, including the transitional dynamics. Does the exchange rate overshoot its eventual long-run value (yes or no)?

In 3b, we determined the behavior of *P*, which we can show in the time-series diagram below-left. We can see the behavior of E in the FX market diagram above. Before 3/9/09, *E* is constant at its initial value E_1. On 3/9/09, *E* jumps way up to E_{SR}. In the transition, *E* gradually comes back down part of the way until settling at its new long-run equilibrium value E_{LR}. Yes, in the short run, *E* overshoots its eventual long-run value.