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Econ 182

Suggested Solutions to Problem Set I

1. This question involves considering how increasing debt burdens may affect the economy. Conceptually, increasing present stocks of debt means that one is committing portions of one's future income streams to debt servicing, i.e., making payments on interest and eventually on principal. So assuming the stock of the net debt of the US economy is 25% of GNP, then an interest rate of 5% implies that every year the economy must devote (.05)(.25)*GNP = .0125*GNP = 1.25% of US GNP to making interest payments, until maturity. If the stock is 100% of GNP, then (.05)(1)GNP = 5% of US GNP.

The best way to address whether this is burdensome is to examine growth rates. In other words, if GNP is growing at a healthy rate, the fraction devoted to debt service falls. If the growth rate is g, the net stock of debt d (in percentage of GNP), and the interest rate is r, then you can characterize next year's debt burden as $[rd*\text{GNP}]/[(1+g)*\text{GNP}] = rd/(1+g)$, which is the fraction of next year's income going to interest payments. This tells us that as long as the growth rate can hold down this expression, the debt burden can be manageable. If growth is low, then debt servicing will consume a larger share of the national income.

2. If the debt assumed by the United States from the rest of the world is greater than the debt assumed by the rest of the world from the US, but the payments to foreigners by the US are less than payments by foreigners to the US, this suggests that interest rates faced by the US must be less than those faced by foreigners. This is likely the case because of the special role that the US dollar plays in the world economy. If the dollar is perceived by global financial markets as a safer asset, due to vehicle-currency status or otherwise, it will be cheaper to borrow in dollars than it will be to borrow in other currencies. If foreigners are borrowing from the US in their own currencies, then increased riskiness can drive up interest rates and, hence, account for the positive differential of $291.3 billion – $252.6 billion = $38.7 billion in favor of the United States.

A second way to interpret the question is that if the term "net debtor" is taken is to mean "net debtor" over a single year, then this is equivalent to saying the economy is running a deficit in the current account. If net factor income is positive and the balance on the current account is negative, it must be because of the net financing needs of a large trade deficit.

3. This question just calls for applying the uncovered interest parity condition.

a. Using the particular numbers given, the US interest rate = Swiss rate + expected rate of depreciation of the dollar against the Swiss franc => .08 = .05 + (E^e – .60)/.60 => E^e = .618.

b. Now we're given that $E^e = .63$. So if the interest parity condition is to hold, what must the rate of return on dollars be? → US interest rate = .05 + (.63-.60)/.60 = .05 + .05 = .10 = 10%.

4. It needs to be made clear before answering this question what assumptions we make about the patterns and behavior of the expected exchange rate. There are many to be made (adaptive expectations, rational expectations, etc.). But for the purposes of this class, to keep things relatively simple and manageable, we'll make the assumption that the expected exchange rate is constant and only changes in response to permanent events, not temporary ones. It'll be important in the coming weeks to spell out exactly what assumptions about expected inflation, expected interest rates, etc. we'll be using, so ALWAYS BE MINDFUL of actually what we assume regarding other economic variables.

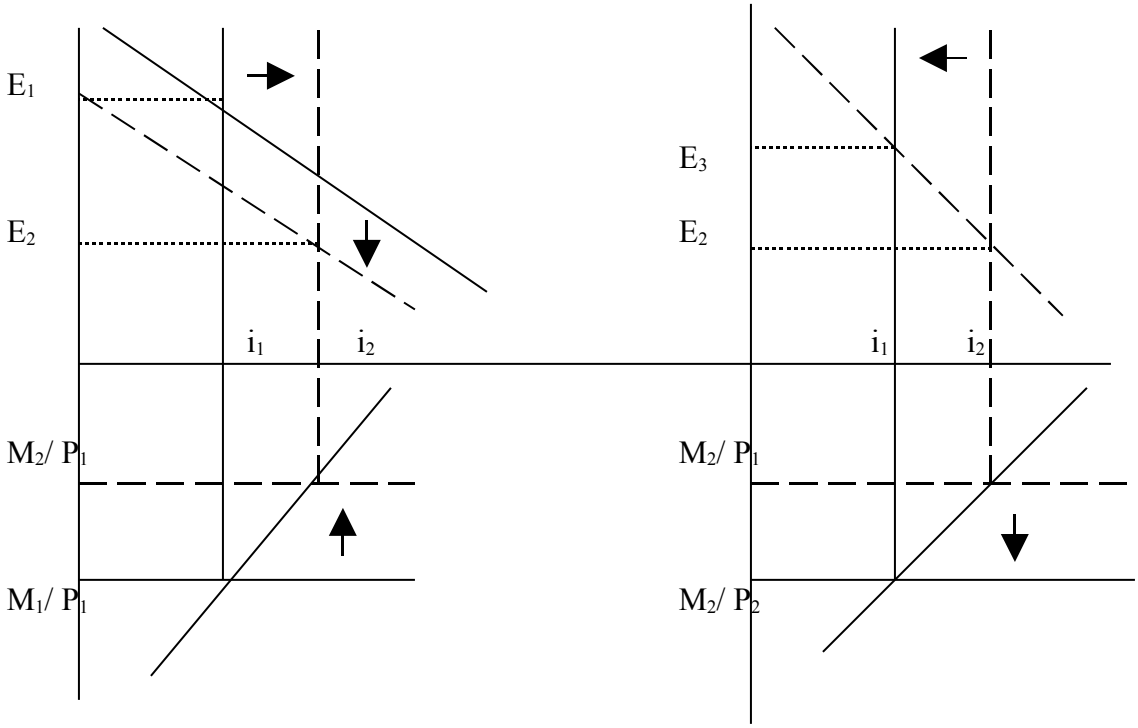
With that in mind, since for this question the decrease in the money supply is permanent, E^e has to fall because now, people expect prices (including the exchange rate) to fall in the long run proportionally to the decrease in money supply.

In the short run, the real supply falls from M_1/P_1 to M_2/P_1, as the diagram shows (see below). P_1 is fixed because prices are sticky in the short run. The fall in the real money supply leads to an increase in the interest rate from i_1 to i_2. Obviously, the currency has to appreciate because of the increased attractiveness of US assets, but this is doubly reinforced by the fall in E^e. This shifts down the curve depicting the expected return on euro deposits. Consequently, the exchange rate decreases from E_1 to E_2.

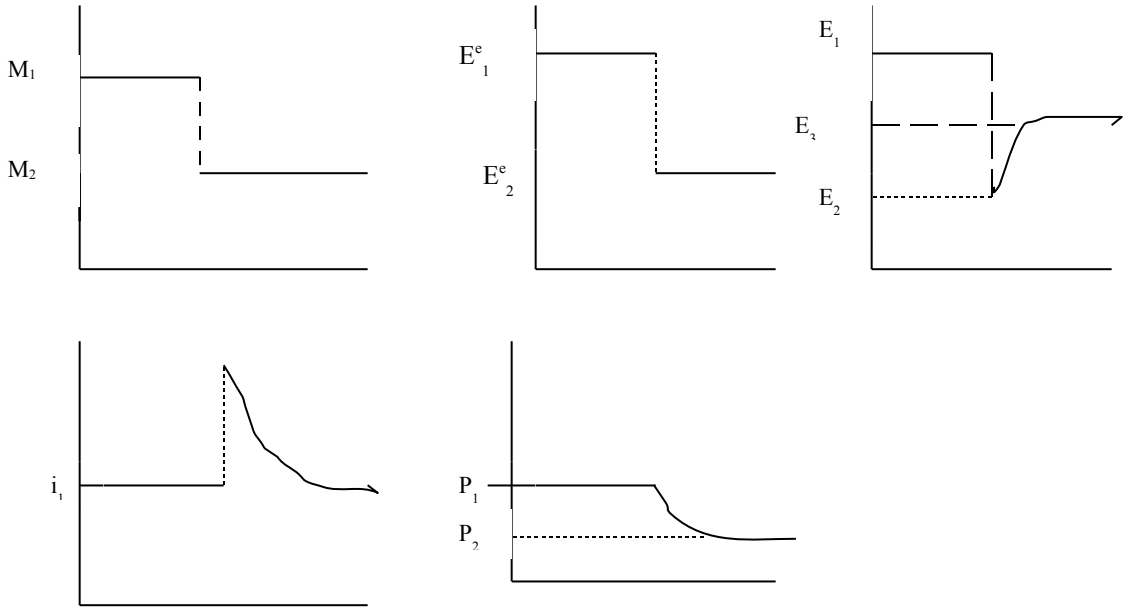
In the long run, P_1 begins to fall toward its long-run level P_2. Making the assumption that $M_1/P_1 = M_2/P_2$, the real money supply starts to rise back up to its original level because of the increasing price level. This means the interest rate, i, is falling down from i_2 to its original level i_1. The exchange rate begins to depreciate to where i_1 = expected return on euro deposits, or at $E = E_3$.

So observe that the exchange rate initially undershoots, down to E_2. But because of falling interest rates, to maintain the interest parity condition, and hence, foreign-exchange equilibrium, E_2 must depreciate to E_3. All of this occurs because prices are rigid in the short run and flexible in the long run. If prices were perfectly flexible to begin with, then in the event of a permanent fall in M, P_1 would jump instantaneously downward to P_2, E falls instantaneously downward to E_3, while interest rates remain fixed.

The time paths of M, E, E^e, i, and P are on the following page.


E1
E2
i1
i2
M2/ P1
M1/ P1
E3
E2
i1
i2
M2/ P1
M2/ P2

Time Paths:


M1
M2
E^e 1
E^e 2
E1
E2
i1
P1
P2

5. (*thought question*)

a. The key here is to realize that the Fed has the ability and desire to see the exchange rate lowered from 1/120 $/Y to 1/150 $/Y. So it wants the dollar to appreciate. But if you want the value of something to increase, you'd want others to start buying a lot of it. So if the Fed wants the dollar's value to rise, it's going to end up purchasing dollars for yen in the foreign exchange markets. So the Fed's actions cause the dollar's value to rise and the yen's value to fall (by selling yen for dollars). If the Fed is purchasing dollars, that means money is going out of circulation and into its vault. So the foreign-exchange intervention causes the US money supply to fall. Some of you in your answers wrote that the Fed raises interest rates to increase demand for the dollar. This is basically the same thing- the Fed's purchase of dollars for yen effectively causes the US interest rate to go up. We'll see how this happens in chapter 17.

b. The theory of exchange rate overshooting helps us to reconcile volatile currency movements with rational behavior of foreign-exchange markets. Because of price rigidities, exchange rates have to move around a lot in order to maintain equilibrium in the foreign-exchange market. So conditional on expectations of events and policy moves, wild exchange-rate swings are by themselves not compelling evidence of irrational markets.

6. Since Nippon's production of goods employs petroleum and this is priced in US dollars, a rise in the yen price of the dollar - that is, an exchange rate depreciation - would raise Nippon's costs of production. To describe what happens to profits, we also need to know what happens to revenues as the currency depreciates. Assuming that Nippon's production is priced in yens, an exchange rate depreciation would not affect revenue. Hence, in this case, profits would fall (revenue stays the same, costs rise). In the case where Nippon's production is priced in dollars, profit would not be affected (revenues and costs rise proportionately).

7. When a domestic-based firm moves part of its production abroad, the foreign production costs will increase when the dollar depreciates. As the foreign production becomes relatively more expensive, firms whose costs were marginally smaller abroad will shift their production back to the US.

An example of outsourcing is Mexico's *maquiladoras*, which are factories near the US border that assemble parts of products produced in the US. A depreciation of the exchange rate would increase the wage of Mexican workers when measured in dollars, leading firms whose assembly costs were marginally smaller in Mexico to shift their assembly lines back to the US.

8. It is not a coincidence that the yen interest rate in Japan has never dropped below zero. The reason why nominal interest rates in general can never go below zero is that, if this were to happen, lenders would have a dominant investment alternative: keep their money in their pockets. With negative nominal interest rates, money not only provides the advantage of higher liquidity but it also yields higher nominal rates of return (zero) when compared to deposits.