

Homework Assignment #2

This assignment is due on Thursday, October 28 at the beginning of class (or sooner) .

1. *You have acquired an option to buy Swiss francs at a strike price of \$.70 per franc. The maturity of the option is 90 days, and the spot price of the franc when you bought the option was \$.50.*

- (a) *If the spot price of the franc appreciates to \$.60 will you exercise the option?*

brief answer No. Since the spot price is below the strike price you cannot exercise the option. Even if you could, you would not since you would lose ten cents on each unit.

- (b) *If the spot price of the franc appreciates to \$.85 will you exercise the option? Does your answer depend on whether this is day 50 or day 90? Explain.*

brief answer Yes. You can purchase at 70 cents and sell at 85 cents, earning a profit on each franc purchased. It does not depend on the maturity. The option is in the money.

- (c) *How does the price you are willing to pay for this option change if the maturity was 180 days? Explain.*

brief answer If the option has a longer maturity you would pay more for it. Greater maturity increases the likelihood that the spot price will exceed the strike price during the life of the option. It provides more insurance.

- (d) *Suppose you think that the market is over-estimating future volatility of the franc. How can you sell volatility to profit from this?*

brief answer If the market is over-estimating the future volatility of the franc you can profit by selling it. This is called a short straddle. You sell a call and a put option. If the currency is not volatile neither option is exercised and you get the revenue. If you thought volatility was cheap you would do the opposite.

2. *Under the classical gold standard capital mobility was very high. What were the critical features of the gold standard that made this possible?*

brief answer The most critical feature was the restoration rule, which meant that if convertibility was temporarily suspended, it would be restored at the old parity. This reduced (eliminated) exchange rate risk. Another important feature was that central banks "played by the rules of the game." This meant that they encouraged capital flows that eliminate the need for gold flows. The simplest way to think of this is as anti-sterilization. Rather than offset the outflows of gold that would arise if the country's price level was too high. They accelerated the contractionary effects. They sacrificed internal balance for external balance. This gave the system credibility.

- (a) *If countries played by the rules of classical gold standard what would we expect to observe with regard to the interest differential across these countries? Explain.*

brief answer If countries play by the rules of the game then exchange rates will not fluctuate beyond the bounds created by the cost of shipping gold (gold points). Moreover, if countries play by the rules of the game capital will be mobile. So interest differentials will be arbitrated away. Putting these two ideas together, we see that interest differentials cannot get very large. The reason is the absence of exchange rate risk if the gold standard is credible. Interest differentials under the gold standard should thus be very small. Alternatively, we could say that the low interest differentials indicate that investors believed that the gold standard was credible. We can show this more formally. Let \bar{S} be the maximum value of the exchange rate between dollars and sterling so that it is not profitable to ship gold to Britain, and let \underline{S} be the minimum rate so that it is not profitable to ship gold from Britain to the US, and let S_t be the current exchange rate. Then if agents *believe* that the rule of the game will be played then $\frac{\bar{S}}{S_t}$ is the maximum appreciation of sterling over the period of the investment. So the domestic interest rate could never exceed \bar{R}_t , where this is defined by:

$$\bar{R}_t = (1 + R_t^*) \frac{\bar{S}}{S_t} - 1. \quad (1)$$

We can similarly calculate the lowest value that the domestic interest rate could take (\underline{R}_t) consistent with the lower bound of the gold points:

$$\underline{R}_t = (1 + R_t^*) \frac{\underline{S}}{S_t} - 1 \quad (2)$$

Using the expressions (1) and (2) we have bounds for the domestic rate. That is, if the gold standard is credible we would expect to observe interest rates staying within these bounds: $\underline{R}_t \leq R_t \leq \bar{R}_t$. Interestingly, this is exactly what economists have found to be the case.

- (b) *After WW1 attempts to put the gold standard back in place failed. What changed to make it so difficult? Why was it so much harder to play by the "rules of the game" after WW1?*

brief answer The biggest problem was that countries no longer were willing to sacrifice internal balance for external balance. Partly due to increase in democracy. Also, prices were much less flexible downward than prior to WW1. Hence, the restoration rule was no longer feasible. This meant that people did not believe that par values would, or could, be maintained.

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3. Consider the graphical model of the gold standard. Analyze graphically (be sure to distinguish impact effects from long-run effects. Assume the economy started in full equilibrium) what happens to the price level and the stock of gold if:

(a) there is a rise in foreign income.

brief answer A rise in foreign income increases exports so the flow supply of gold will increase. This causes the stock of gold to rise. Given the demand for gold the relative price of gold must fall. Under the gold standard this requires the price level to rise. Once the price level rises sufficiently the flow supply of gold is once again equal to the flow demand and the stock of gold stops changing. The gold stock is now higher than before and the relative price of gold is lower.

(b) credit cards reduce the need for money in making transactions

brief answer This reduces the monetary demand for gold. The same level of transactions can be made with the same level of gold. With the demand for gold decreased the relative price of gold must fall. At the lower relative price, the flow supply of gold is below demand. The gold stock decreases, and this raises the relative price of gold until we reach equilibrium. Notice that the new equilibrium price level is the same as before as long as the flow supply and demand curves do not shift. What happens is that the gold stock is lower than in the initial equilibrium.

(c) gold discoveries occur in some faraway land .

brief answer The answer is similar to part (a). The increased gold production will lead to more purchases of domestic goods. At unchanged relative prices, goods in the domestic country are cheaper for those who discovered the gold. So more gold will flow in, and then the argument is the same as in (a).

4. Suppose that the price level in the home country is given by $P = P_n^\alpha P_t^{1-\alpha}$, where P_t is the price of traded goods, and α is the share of non-traded goods in the domestic price index, and similarly $P^* = P_n^{\alpha} P_t^{*1-\alpha}$ for the foreign country. Suppose that tradables have a common price of 1 in both countries. Show how the ratio of home to foreign prices depends on the relative price of non-traded goods (e.g., derive a simple expression for this).

brief answer This part is trivial and is only to set up the rest. $P = (1)^{1-\alpha} P_n^\alpha = P_n^\alpha$ and likewise $P^* = (P_n^*)^\alpha$ for the foreign country. Hence

$$\frac{P}{P^*} = \frac{P_n^\alpha}{P_n^{*\alpha}} \tag{3}$$

Thus in this model the real exchange rate depends only on the internal relative price of non-traded goods.

(a) Let \dot{P} be the growth rate of the price level and let \dot{P}^* be the growth rate of the foreign price level. If α is constant, when will $\dot{P} > \dot{P}^*$?

brief answer Looking at (3) we can see that the only way the left-hand side can get bigger, given $\alpha > 0$ and constant, is if the price of non-traded goods rises faster at home than abroad; i.e., if $\dot{P}_n > \dot{P}_n^*$.

- (b) Let \dot{A}_T be productivity growth in tradable goods in the home country and let \dot{A}_N be productivity growth in the non-traded goods sector (and \dot{A}_T^* , \dot{A}_N^* for the foreign country). Suppose that $\dot{A}_T - \dot{A}_T^* > \dot{A}_N - \dot{A}_N^*$. What would you expect to happen to $\mathbf{P} - \mathbf{P}^*$? Why?

brief answer It should rise. If this condition holds, it follows that $\dot{A}_T - \dot{A}_N > \dot{A}_T^* - \dot{A}_N^*$.

So we should expect wages to be rising faster domestically than in the foreign country.

Higher productivity growth in traded goods raises wages in the entire economy.

- (c) Is the condition $\dot{A}_T - \dot{A}_T^* > \dot{A}_N - \dot{A}_N^*$ more likely to hold in richer countries or poorer countries? What then would you expect to happen to a country's real exchange rate as it gets richer?

brief answer More likely in poorer countries that are developing. Catchup is when productivity growth in traded goods will be highest. Rich countries can only grow at the rate of technological progress, but poorer countries catch up by accumulating capital, etc. Just as Japan after WW2. In these cases their real exchange rate depreciates (for them recall that the rich country is the foreign country).