Practice questions: Set #4

What should you do with this set?

To help students prepare for the exams and group cases, several problem sets with solutions shall be handed out. They shall not be graded: the number of "points" for a question solely indicates the time/difficulty of that question.

Students are strongly encouraged to try hard to solve them and to use office hours to discuss any problems they may have doing so. The best self-test for a student of his or her command of the material before an exam is whether he or she can handle the questions of the relevant practice sets. To reflect this close association between practice sets and exams, the final exam shall include at least a part of a question from the relevant practice sets.

Question 1. (10 points)

a. Suppose that the exchange rates are free to vary (free-float). In each of the following scenarios, how will the dollar's value change relative to that of the foreign currency? Assume that all other factors that may influence the exchange rate are unchanged.

i. What should happen to the spot Yen/dollar FX rate if real interest rates become higher in the US than in Japan. (currently the case)

ii. What should happen to the same exchange rate if U.S. wages rise relative to Japanese wages while the productivity of U.S. workers falls behind that of Japanese workers. (Situation at the end of the Seventies, in particular)

b. Following a coup in December, 2006, a junta that took power in Thailand expressed support for new legislation that would (soon afterward) place restrictions on the ability of foreigners to buy Thai companies and real estate. At the same time, the coup and the proposal caught everybody by surprise. How do you think the $/Baht exchange rate behaved on that day that legislation was proposed? (Hint: remember markets are efficient)

c. Would your answer in b. change if market participants had expected both the coup and a tightening of Thai ownership laws? (Hint: remember markets are efficient)

Question 2. (10 points)

The ¥/$ exchange rate moved from ¥105/1$ in March 1994 to ¥90/1$ in March 1995. During the same period, the U.S. consumer price index (CPI) rose from 130 to 133.6, and the corresponding Japanese index moved from 110 to 110.7. What was the real appreciation of the ¥ during the relevant year (3-94 to 3-95)? Explain, intuitively and formally.
Question 3. (10 points)
In 1988, the U.S. prime rate - the rate banks charge on their loans to their best customers - stood at 9.5%. Japan’s prime rate, meanwhile, was around 3.5%. Pointing to this discrepancy, a number of politicians and journalists argued at the time that the cost of capital had to come down in the U.S.A. for American corporations to be competitive with Japanese companies. Comment briefly.

(Hint: What additional information do you need to assess this claim properly? Why might interest rates be higher in the U.S.A. than in Japan?)

Question 4. (10 points)
Suppose the 3-month interest rate in Switzerland is currently about 3.5% and inflation is about 3%. Meanwhile, the equivalent interest rate in England is about 6.5% (all rates are annualized).

a. What should be the annualized 3-month forward discount or premium at which the Swiss franc should sell against the pound? Explain.

b. Suppose that the expected inflation rate in Denmark is 3% (in reality, it is about 1.8%). What is your estimate of the forward discount or premium at which the DKr should be selling against the Swiss Franc? What assumptions did you use to answer the question? Explain briefly.
Practice set #4: solutions

Question 1. (10 points)

a. Suppose that the exchange rates are free to vary (free-float). In each of the following scenarios, how will the dollar's value change relative to that of the foreign currency? Assume that all other factors that may influence the exchange rate are unchanged.

i. What should happen to the spot Yen/dollar FX rate if real interest rates become higher in the US than in Japan. (currently the case)

Answer

Investors will want to invest in the U.S. rather than in Japan in order to capture the higher U.S. real interest rates. This pushes the yen price of the dollar up (you need more ¥ to buy 1 $).

ii. What should happen to the same exchange rate if U.S. wages rise relative to Japanese wages while the productivity of U.S. workers falls behind that of Japanese workers (this was the situation at the end of the Seventies, in particular).

Answer

If U.S. workers are paid more for less, relative to their Japanese counterparts, then prices in the U.S. will increase relative to those in Japan, i.e., inflation in the U.S. will increase relative to that in Japan. As a result, the dollar will depreciate against the yen.

Another way to look at it is the following. As pay rises though productivity lags, U.S. products are becoming less competitive. Currency depreciation is the market's way to restore the balance, but it has a cost to the United States: the USA keeps selling its products by accepting a lower real price for them. In other words, currency depreciation is the market's way to cut wages.

b. Following a coup in December, 2006, the junta that took power in Thailand expressed support for new legislation that would soon place restrictions on the ability of foreigners to buy Thai companies and real estate. Suppose that both the coup and, later, the proposal caught everybody by surprise. How do you think the $/Baht exchange rate behaved on the day that legislation was proposed?

Answer

As the information catches the markets off guard, foreign capital will suddenly rush out of Thailand, driving the foreign-currency (e.g., dollar) price of the baht sharply down. The reasons for the exodus are tied to the anticipated fall in the demand for the baht that ownership-restrictions should induce.

(Note: consistent with this intuition, the baht indeed lost a double-digit percentage of its value against the US dollar upon news of the proposal)
c. Would your answer in b. change if market participants had expected both the coup and a tightening of Thai ownership laws? (Hint: remember markets are efficient).

**Answer**

If markets are efficient, those expectations would already have been incorporated into the world price of the baht. As a result, not much would have happened on the day the legislation was proposed: the damage (see b.) would already have been done.

**Question 2.**

The ¥/$ exchange rate moved from ¥105/1$ in March 1994 to ¥90/1$ in March 1995. During the same period, the U.S. consumer price index (CPI) rose from 130 to 133.6, and the corresponding Japanese index moved from 110 to 110.7. What was the real appreciation of the ¥ during the relevant year (3-94 to 3-95)? Explain, intuitively and formally.

**Answer**

Intuitively, notice that 1$ buys in 3-95 about 14.3% (15/105) fewer ¥ than it did 1 year earlier, yet the inflation differential between the US and Japan was only 2.2% (133.6/130 - 110.7/110). Hence, the real depreciation of the $ must have been about 12% (14.3%-2.2%).

We can look at the same situation from the alternative point of view of the real appreciation of the Japanese ¥. In nominal terms, the ¥ appreciated against the $ by 16.7% (from 0.009524$/1¥ to 0.011111$/1¥), yet the inflation differential was only 2.2%. Hence, the real appreciation of the ¥ must have been about 14.5% (16.7%-2.2%).

Formally, first recall that the real exchange rate at the period of reference t, $t'$ (here, t is March 1994) is equal to the nominal exchange rate at that time, $t$. Next, recall from class that, $t+T$, the real exchange rate T days later (i.e., in March 1995) is defined as the nominal exchange rate $t+T$ adjusted for inflation:

$$s_{t+T} = s_{t+T} \left(\frac{1+\mu^*}{1+\mu}\right)$$

where, $\mu$ and $\mu^*$ are the annualized inflation rates from t to $t+T$ in the US and in Japan, respectively. Plugging the numbers in, we have:

$$1+\mu = \frac{133.6}{130} = 1.028 ; 1+\mu^* = \frac{110.7}{110} = 1.006 ; s_{t+T} = 0.011111 \text{$/1¥}$

$$s'(beginning of this year) = s'_{t+T} = s_{t+T} \left(\frac{1+\mu^*}{1+\mu}\right) = (0.011111 \text{$/1¥}) \left(\frac{1.006}{1.028}\right) = .010873 \text{$/¥}$

Hence, the real appreciation of the ¥ is:

$$\frac{s'(beginning of this year)}{s'(beginning of last year)} - 1 = \frac{s'_{t+T}}{s_t} - 1 = \frac{0.010873}{0.009524} - 1 = 14.17\%$$
Question 3.

In 1988, the U.S. prime rate - the rate banks charge on their loans to their best customers - stood at 9.5%. Japan’s prime rate, meanwhile, was around 3.5%. Pointing to this discrepancy, a number of politicians and journalists argued at the time that the cost of capital had to come down in the U.S.A. for American corporations to be competitive with Japanese companies. Comment briefly.

(Hint: What additional information do you need to assess this claim properly? Why might interest rates be higher in the U.S.A. than in Japan?)

Answer

To begin with, 3.5% in ¥ is not the same as 9.5% in $. Absent government controls or subsidized financing, the expected cost of the two loans should be about the same when measured in the same currency (I have just restated uncovered interest rates parity). In other words, changes in currency values should essentially offset the nominal interest rates differential.

Where do those changes in currency values come from? Inflation. Put differently, the interest rates referred to in the question are nominal, not real. Absent government constraints on capital flows, the reason nominal interest rates differ is that lenders expect different rates of inflation measured in the two currencies. Thus, to properly assess the claim made in the question, you need to subtract off expected inflation from the nominal interest rates and compare the real interest rates. Let's check with data. Inflation turned out to be about 5% in the US in 1988 and minus 1% in Japan (deflation), so that the real interest rate was about 4.5% in both countries.

The bottom line is that those nominal interest rates differences did not place U.S. companies at a disadvantage -- if they had, arbitrage would have been available.

Note: in 2005-2007, Hungarian companies engaging in similar practices, borrowing cheaply in Swiss Francs and betting that the exchange rate will not “turn against them.” As the 1997-1998 Asian crisis suggests, this hope was ill placed...

Question 4.

Suppose that the 1-year interest rate in Switzerland is currently about 3.5% and inflation is about 3%. Meanwhile, assume that the equivalent interest rate in England is about 6.5%. (all rates are annualized).

a. What should be the 1-year forward discount or premium at which the Swiss franc should sell against the pound sterling?
Answer

From covered interest rate parity, we know that the pound should sell at a discount against the Swiss franc, i.e., the pound should trade at a forward discount in order to offset the higher interest rate in England. More precisely, let $s$ and $f$ denote the spot and 1-year forward rates ($\$SF/\$£$), respectively. Then the forward discount is equal to:

\[
(f-s)/s = (\text{interest rate in Switzerland} - \text{interest rate in England}) / (1+\text{interest rate in England})
\]

\[= (0.035-0.065)/(1.065)\]

\[= -0.028\]

That is, the £ should trade at a 2.8% forward discount against the Swiss franc (you need fewer Swiss francs to buy a £ 1-year forward than you need to buy it spot).

b. Suppose that the expected annual inflation rate in Denmark is 3% (currently, it is about 1.8%). What is your estimate of the 1-year forward discount or premium at which the DKr should be selling against the Swiss Franc? What assumptions did you use to answer the question? Explain briefly.

Answer

If PPP holds, countries with the same inflation rate should have stable exchange rates over time. Here, the inflation rate expected both in Denmark and in Switzerland is 3%, so the DKr should be selling at the same Swiss franc price in both the spot and the forward markets.

There is an other way to look at the same situation. According to the Fisher effect, the real rate of interest in Switzerland is (3.5-3)%=0.5%. If real interest rates are equal across countries, then the real rate in Denmark should be 0.5% too. To "guesstimate" the nominal rate in Denmark, just add your estimate of the real interest rate (0.5%) to the expected inflation rate (3%). You get a nominal rate of interest of 3.5%, which is just equal to that in Switzerland. As a result, according to covered IRP, the DKr should be selling at the same Swiss franc price in both the spot and the forward markets since nominal interest rates are the same in Denmark and Switzerland.

A good question to ask at this point is whether there is a connection between those two approaches to answering the question. The answer is a resounding "yes": the above two paragraphs describe two ways to say the same thing. Put differently, exchange rate changes will be determined by PPP (§1) if current account considerations are the only determinant of the exchange rate; but this will be true only if capital account considerations are not important, i.e., if no "distortions" are introduced by differences in the real interest rates offered by Denmark and Switzerland (§2).