

# Exercise Sheet 2: Short Solutions.

## Exercise 1

- a) Denote the exchange rate, given as CHF per EUR, as  $\frac{CHF}{EUR}$ . The implied cross rate between CHF and EUR is then  $\frac{CHF}{EUR} = \frac{CHF}{USD} * \frac{USD}{EUR} = \frac{1}{0.94} * 1.25 \approx 1.33$  CHF per Euro.
- b) In this case the Swiss Franc sells at a "too high price" vis-à-vis the Euro. For instance, currency traders can make an arbitrage profit by selling USD for CHF, then trading the CHF for Euro, and trading the Euro back to USD. In the end, they will have more USD than at the beginning.

Suppose you start with 100'000 USD. The arbitrage strategy would look like this: Trading the 100'000 USD for CHF gives  $\frac{100'000}{0.94} = 106'382$  CHF. Exchanging this for Euros gives  $\frac{106'382}{1.28} = 83'110$  EUR. Exchanging the Euro back to USD gives  $1.25 * 83'110 = 103'887$  USD, yielding an arbitrage profit of  $103'887 - 100'000 = 3887$  USD. (of course the trader could now start again and making an infinitely large profit in the end).

## Exercise 2

In the spot market, the Swiss Franc is selling for 1.064 USD per CHF. In the 6 months forward market the Swiss Franc is selling for 1.067 USD per CHF. Thus it is more expensive to buy Swiss Francs 6 months forward than buying them at the spot market. The Swiss Franc is selling at a forward premium. The opposite is true for the British pound which is selling at a forward discount.

## Exercise 3

- a) The exchange rate at December 19th implied by the futures contracts is  $\frac{125'000}{128'000} = 0.98$  CHF per USD. The currency speculator believes that the Swiss Franc will be worth less at December 19th than implied by the futures contracts. Therefore he will sell futures contracts, i.e. he will commit himself to selling Swiss Francs at a rate of 0.98 CHF per USD at December 19th. If his guess is right he will make

a profit. He can buy Swiss Francs at the spot rate at December 19th (which he believes will be above 0.98 CHF per USD) and then sell the CHF for the higher price specified in the futures contract.

- b) At December 19th, the currency speculator is obliged to sell 125'000 CHF for 128'000 USD. He buys the 125'000 CHF at a rate of 1.05 CHF per USD, which costs him  $\frac{125'000}{1.05} = 119'048$  USD. He then sells the 125'000 CHF for 128'000 USD. His profit for each futures contract traded is  $128'000 - 119'048 = 8952$  USD.

#### Exercise 4

- a) Appreciated
- b) The option allows the company to buy CHF at a price of 1.05 USD per CHF. The company bought the option to insure against an appreciation of the CHF. With the option, they know that they will not have to pay more than  $1'000'000 * 1.05 = 1'050'000$  USD for the watches.
- c) The option will be exercised whenever the exchange rate in 6 months is above 1.05 USD per CHF.
- d) Without the option, the company would have paid  $1'000'000 * 1.07 = 1'070'000$  USD for the watches. With the option they pay only  $1'000'000 * 1.05 = 1'050'000$  USD. So thanks to the option they paid 20'000 USD less than on the spot market. The option cost them 10'000 USD, so we can say that they saved money with the option.

#### Exercise 5

- a) If the line goes up it means that the CHF appreciates vis-à-vis the USD (you need to pay more USD for one Swiss Franc).
- b) The manufacturer knows that he gets 10m CHF at September 1st. However he does not know how much this will be in US Dollars. If the Swiss Franc depreciates unexpectedly against the USD until September 1st, his revenue in USD might be lower than planned. He buys the put option to insure against a depreciation of

the Swiss Franc. The option gives him the right to sell the 10m CHF for USD at a rate of 1.05 USD per CHF. This means that he gets at least  $1.05 \cdot 10'000'000 = 10'500'000$  USD from selling the tractors.

- c) At september 1st the spot exchange rate of the Swiss Franc was below the strike price of the option. The option gave the manufacturer the right to sell the CHF for a higher exchange rate than at the spot market. He therefore exercised the option.
- d) If the manufacturer had sold the 10m CHF at the spot market at September 1st, he would have gotten  $1.0448 \cdot 10'000'000 = 10'448'000$  USD. Thanks to the option he has the right to sell the CHF at a rate of 1.05 USD per CHF and gets 10'500'000 USD. Thus his revenue at September 1st was 52'000 USD higher thanks to the option. The manufacturer paid  $10'000'000 \cdot 0.008 = 80'000$  USD for the option. Therefore, had he known the exchange rate in advance, he would not have bought the option. He would rather have sold the the SFR at the spot market at September 1st.

### Exercise 6

Apparently the Belarussian central bank was conducting a policy of a fixed exchange rate vis-à-vis the US Dollar. This means that the central bank buys or sells Belarussian Rouble on the market to maintain a certain exchange rate. If the central bank lost 60 percent of its foreign currency reserves, this means that it had to buy Belarussian Rouble (and sell foreign currency) to prevent a depreciation of the Belarussian Rouble. We can only speculate why the demand for Belarussian Rouble on the currency market has decreased. It might be because demand for Belarussian products suddenly decreased. The central bank cannot keep the exchange rate of the Belarussian Rouble artificially high forever. At some point, it will not have any foreign currency left to sell. Apparently this is what happened - when the central bank lost too much of its foreign currency reserves, it finally had to let the Belarussian Rouble to depreciate.