International finance

Finance

EXERCISES 1. Suppose that a treasurer of Apple has an extra cash reserve of USD 100. 000. 000 to invest for six months. The six-month interest rate is 8 % per annum in the U. S. and 7 % per annum in Germany. Currently, the spot exchange rate is USD/EUR = 1. 01 and the sixmonth forward exchange rate is USD/EUR = 0. 99. The treasurer of Apple does not wish to bear any exchange risk. Where should he/she invest to maximize the return? Investing in the US| Amount in USD| US| Amount in USD| | | 100. 000. 000, 00| 1, 0399| 103. 992. 032, 00| | Investing in Germany| Amount in EUR| GER| Amount in EUR| Amount in USD| | 101. 00. 000, 00| 1, 0349| 104. 528. 834, 96| 105. 584. 681, 78| How we computed the results: Investing in the US| Amount in USD| US| Amount in USD| | | 100. 000. 000| = (1, 08)^(1/2)| = E4*D4| | Investing in Germany| Amount in EUR| GER| Amount in EUR| Amount in USD| | = 100. 000. 000*1, 01| = (1, 07)^(1/2)| = E6*D6| = F6*(1/0, 99)| The treasurer of Apple should invest in Germany to maximize Apple’s return. Despite the fact that the interest rate is higher in the USA, the appreciation of the Euro over the Dollar gives the investor a bigger gain when investing in Germany.

To protect himself from the exchange risk, he must make sure that he has signed a contract in which he will exchange his money in Euros back to Dollars by today’s valid forward rate. 2. As of November 1, 1999, the exchange rate between the Brazilian real (BRL) and the USD was USD/BRL = 1. 95. The consensus forecast for the U. S. and Brazil inflation rates for the next one-year period is 2. 6 % and 20 %, respectively. What would you forecast the exchange rate to be around November 1, 2000? In order to compute the exchange rate we will use the formula expressing the “ Relative

Purchasing Power Parity” in mathematical terms: t = e0 1+iht1+ift = 1. 95* 1. 21. 026 = 2, 28 USD/BRL Today (e0)| BR Inflation (ih)| US Inflation (if)| 1, 95| 20%| 2, 60%| USD/BRL Forecast (et)| | | 2, 280701754| | | The expected high inflation in Brazil will cause the BRL to depreciate. Therefore the exchange rate between USD/BRL is going to increase. Our forecast for the exchange rate on November 1st of 2000 is USD/BRL= 2, 28. 3. Santander PP, an international pension fund manager, uses the concepts of purchasing power parity (PPP) and the international fisher effect (IFE) to forecast spot exchange rates.

Santander gathers the financial information as follows: Base price level 100 Current U. S. price level 105 Current South African price level 111 Base rand spot exchange rate 0. 175 USD Current rand spot exchange rate 0. 158 USD Expected annual U. S. inflation 7 % Expected annual South African inflation 5 % Expected U. S. one-year interest rate 10 % Expected South African one-year interest rate 8 % Calculate the following exchange rates: a-? The current ZAR/USD spot rate that would have been forecast by PPP. b- ? Using the IFE, the expected ZAR/USD spot rate one year from now. c-?

Using PPP, the expected ZAR/USD spot rate four years from now. A – Calculating the ZAR/USD spot rate, adjusting it by its inflation by the PPP formula: et = e0 1+iht1+ift | ZAR/USD Today (e0)| US Inflation| SA Inflation| | 0, 158| 7%| 5%| | ZAR/USD Forecast (e1)| | | | 0, 161009524| | | The ZAR/USD spot rate is: 0, 161 ZAR/USD B – Using the IFE, we find the expected ZAR/USD spot rate one year from now. The IFE states that countries with higher inflation rates have higher interest rates and so that the Spot rate

adjust to this interties differentials between the countries. The formula is: ete0= 1+rht1+rft

ZAR/USD Today (e0)| US int. rate (rh)| SA int. rate (rf)| 0, 158| 10%| 8%| USD/BRL Forecast (et)| | | 0, 160925926| | | The expected ZAR/USD spot rate for one year is: 0. 1609 ZAR/USD C – Now the years to forecast change (t moves from t= 1 to t= 4), we calculate the expected ZAR/USD spot rates for 4 years by PPP's formula et = e0 1+iht1+ift | ZAR/USD Today (e0)| US Inflation| SA Inflation| | 0, 158| 7%| 5%| | ZAR/USD Forecast (e1)| | | | 0, 170386429| | | The expected ZAR/USD spot rate for four years is: 0. 1704 ZAR/USD 4. Due to the integrated nature of their capital markets, investors in both the U.

S. and the U. K. require the same real interest rate, 2. 5 %, on their lending. There is a consensus in capital markets that annual inflation rate is likely to be 3. 5 % in the U. S. and 1. 5 % in the U. K. for the next three years. The spot exchange rate is currently GBP/USD = 1. 50. ?? Compute the nominal interest rate per annum in both the U. S. and the U. K. , assuming that the Fisher effect holds. ?? What is your expected GBP/USD future spot exchange rate in three years from now? ?? Can you infer the GBP/USD forward exchange rate for one year maturity?

A: Assuming Fisher holds, we use its formula to determine the nominal interest rate for both countries: r= a+i | Real int. Rate (a)| Exp. Infl. Rate (i)| Nom. int. Rate (r)| USA| 2, 50%| 3, 50%| 6%| UK| 2, 50%| 1, 50%| 4%| B: In order to compute the GBP/USD future spot exchange rate at t= 3 we are using PPP formula: et= e0 1+iht1+ift GBP/USD Today (e0) | US Int. Rate| UK

Int. Rate| 1, 5| 6%| 4%| GBP/USD Exp. (et)| | | 1, 590428618| | | C: Yes, we can infer the GBP/USD forward exchange rate for one year since in equilibrium returns on currencies will be the same.

Thus, Interest Parity Theory formula says: 1+rh1+rf= f1e0 | GBP/USD Today (e0)| US Int. rate (rh)| UK Int. rate (rf)| | 1, 5| 0, 06| 0, 04| | Forward rate (f1)| | | | 1, 53| | | Substituting the values on the formula we obtain that f1= 1, 53 GBP/USD 5. John Smith is a currency trader with Bank of America. He notices the following quotes (USD/CHF): * Spot exchange rate1. 2051 * Six-month forward exchange rate1. 1922 * Six-month USD interest rate2. 50 % per year * Six-month CHF interest rate2. 00 % per year * Is the interest rate parity (IRP) holding? You may ignore transaction costs. Is there an arbitrage opportunity? If yes, show what steps need to be taken to make arbitrage profit. Assuming that John Smith is authorized to work with USD 1. 000. 000, compute the arbitrage profit in dollars. According to the IRP theory, the forward exchange rate differs from the spot exchange rate in equilibrium by an amount equal to the interest differential between the two countries. Therefore, according to the IRP formula of f1-e0e0 = rh-rf, the forward exchange rate ought to be 1. 8076. As this result differs from the given value of 1. 1922, the IRP does not hold.

Since there is no equilibrium, there is an arbitrage opportunity, as the interest rate differential does not equal the forward premium. So, Arbitrage profit in USD The arbitrage opportunity can take advantage of lending 1M USD in Switzerland and then borrow the same amount in the US. STEP| ACTION| T = 0| T = 1/2| 1| LEND IN SWITZERLAND| -1 M USD| 1. 217. 151 CHF/1, 1922 = 1. 020. 928, 535 USD| | | -1. 205. 100 CHF| 1. 205. 100 CHF +

1. 205. 100 CHF*(0, 02/2) = 1. 217. 151 CHF| 2| BORROW IN THE US| +1 M USD| 1M USD + 1M USD * (0, 025/2) = - 1. 012. 500 USD| 3| FINAL PROFITS| -| 8, 428. 535 USD|