

4.3: Calculating Rate of Returns on International Investments

Learning Objective

1. Learn how to calculate the rate of return (RoR) for a domestic deposit and a foreign deposit.

Suppose that an investor holding U.S. dollars must decide between two investments of equal risk and liquidity. Suppose one potential investment is a one-year **certificate of deposit (CD)** issued by a U.S. bank while a second potential investment is a one-year CD issued by a British bank. For simplicity we'll assume that interest is calculated on both CDs using a simple interest rather than with a compounding formula. A CD is a type of deposit that provides a higher rate of interest to the depositor in return for a promise to keep the money deposited for a fixed amount of time. The time period could be six months, one year, two years, or any other period decided by the bank. If the depositor wants to withdraw the money earlier, she must pay a penalty.

Since we imagine that an investor wants to obtain the highest rate of return (RoR) possible, given acceptable risk and liquidity characteristics, that investor will choose the investment with the highest rate of return. If the investor acted naively, she might simply compare interest rates between the two investments and choose the one that is higher. However, this would not necessarily be the best choice. To see why, we need to walk through the calculation of rates of return on these two investments.

First, we need to collect some data, which we will do in general terms rather than use specific values. Examples with actual values are presented in a later section.

Let $E_{\$/\pounds}$ = the spot ER.

$E_{\$/\pounds}^e$ = the expected ER one year from now.

$i_{\$}$ = the one-year interest rate on a CD in the United States (in decimal form).

i_{\pounds} = the one-year interest rate on a CD in Britain (in decimal form).

U.S. Rate of Return

The rate of return on the U.S. CD is simply the interest rate on that deposit. More formally,

$$R_0 R_{\$} = i_{\$}.$$

This is because the interest rate describes the percentage increase in the value of the deposit over the course of the year. It is also simple because there is no need to convert currencies.

British Rate of Return

The rate of return on the British CD is more difficult to determine. If a U.S. investor, with dollars, wants to invest in the British CD, she must first exchange dollars for pounds on the spot market and then use the British pound (£) to purchase the British CD. After one year, she must convert pounds back to dollars at the exchange rate that prevails then. The rate of return on that investment is the percentage change in dollar value during the year. To calculate this we can follow the procedure below.

Suppose the investor has P dollars to invest (P for principal).

Step 1: Convert the dollars to pounds.

1 is the number of pounds the investor will have at the beginning of the year.

Step 2: Purchase the British CD and earn interest in pounds during the year.

2 is the number of pounds the investor will have at the end of the year. The first term in parentheses returns the principal. The second term is the interest payment.

Step 3: Convert the principal plus interest back into dollars in one year.

3 is the number of dollars the investor can expect to have at the end of the year.

The rate of return in dollar terms from this British investment can be found by calculating the expected percentage change in the value of the investor's dollar assets over the year, as shown below:

After factoring out the P , this reduces to

Thus the rate of return on the foreign investment is more complicated because the set of transactions is more complicated. For the U.S. investment, the depositor simply deposits the dollars and earns dollar interest at the rate given by the interest rate. However, for the foreign deposit, the investor must first convert currency, then deposit the money abroad earning interest in foreign currency units, and finally reconvert the currency back to dollars. The rate of return depends not only on the foreign interest rate but also on the spot exchange rate and the expected exchange rate one year in the future.

Note that according to the formula, the rate of return on the foreign deposit is positively related to changes in the foreign interest rate and the expected foreign currency value and negatively related to the spot foreign currency value.

Key Takeaways

- For a dollar investor, the rate of return on a U.S. deposit is equal to the interest rate: $R_0 R_\$ = i_\$$.
- For a dollar investor, the rate of return on a foreign deposit depends on the foreign interest rate, the spot exchange rate, and the exchange rate expected to prevail at the time the deposit is redeemed: In particular, .

Exercise

1. **Jeopardy Questions.** As in the popular television game show, you are given an answer to a question and you must respond with the question. For example, if the answer is “a tax on imports,” then the correct question is “What is a tariff?”
 - These three variables influence the rate of return on a foreign deposit.
 - For a U.S. dollar investor, this is the rate of return on a U.S. dollar deposit yielding 3 percent per year.
 - The term used to describe the exchange rate predicted to prevail at some point in the future.
 - The term for the type of bank deposit that offers a higher yield on a deposit that is maintained for a predetermined period of time.

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