

4.5: Applying the Rate of Return Formulas

Learning Objectives

1. Learn how to apply numerical values for exchange rates and interest rates to the rate of return formulas to determine the best international investment.

Use the data in the tables below to calculate in which country it would have been best to purchase a one-year interest-bearing asset. These numbers were taken from the *Economist*, Weekly Indicators, December 17, 2005, p. 90, <http://www.economist.com>.

Example 1

Consider the following data for interest rates and exchange rates in the United States and Britain:

	2.37% per year
	4.83% per year
	1.96 \$/£
	1.75 \$/£

We imagine that the decision is to be made in 2004, looking forward into 2005. However, we calculate this in hindsight after we know what the 2005 exchange rate is. Thus we plug in the 2005 rate for the expected exchange rate and use the 2004 rate as the current spot rate. Thus the ex-post (i.e., after the fact) rate of return on British deposits is given by

which simplifies to

$$R_0 R_{\text{£}} = 0.0483 + (1 + 0.0483)(-0.1071) = 0.064 \text{ or } -6.4\%$$

A negative rate of return means that the investor would have lost money (in dollar terms) by purchasing the British asset.

Since $R_0 R_{\$} = 2.37 > R_0 R_{\text{£}} = -6.4\%$, the investor seeking the highest rate of return should have deposited her money in the U.S. account.

Example 2

Consider the following data for interest rates and exchange rates in the United States and Japan.

	2.37% per year
	0.02% per year
	104 ¥/\$
	120 ¥/\$

Again, imagine that the decision is to be made in 2004, looking forward into 2005. However, we calculate this in hindsight after we know what the 2005 exchange is. Thus we plug in the 2005 rate for the expected exchange rate and use the 2004 rate as the current spot rate. Note also that the interest rate in Japan *really* was 0.02 percent. It was virtually zero.

Before calculating the rate of return, it is necessary to convert the exchange rate to the yen equivalent rather than the dollar equivalent. Thus

Now, the ex-post (i.e., after the fact) rate of return on Japanese deposits is given by

which simplifies to

$$R_0 R_{\text{¥}} = 0.0002 + (1 + 0.0002)(-0.1354) = -0.1352 \text{ or } -13.52\%.$$

A negative rate of return means that the investor would have lost money (in dollar terms) by purchasing the Japanese asset.

Since $R_0 R_{\$} = 2.37 > R_0 R_{¥} = -13.52\%$, the investor seeking the highest rate of return should have deposited his money in the U.S. account.

Example 3

Consider the following data for interest rates and exchange rates in the United States and South Korea. Note that South Korean currency is in won (W).

	2.37% per year
	4.04% per year
	1,059 W/\$
	1,026 W/\$

As in the preceding examples, the decision is to be made in 2004, looking forward to 2005. However, since the previous year interest rate is not listed, we use the current short-term interest rate. Before calculating the rate of return, it is necessary to convert the exchange rate to the won equivalent rather than the dollar equivalent. Thus

Now, the ex-post (i.e., after the fact) rate of return on Italian deposits is given by

which simplifies to

$$R_0 R_W = 0.0404 + (1 + 0.0404)(0.0328) = 0.0746 \text{ or } +7.46\%.$$

In this case, the positive rate of return means an investor would have made money (in dollar terms) by purchasing the South Korean asset.

Also, since $R_0 R_{\$} = 2.37 > R_0 R_W = 7.46\%$, the investor seeking the highest rate of return should have deposited his money in the South Korean account.

key takeaway

- An investor should choose the deposit or asset that promises the highest expected rate of return assuming equivalent risk and liquidity characteristics.

? Exercises

1. Consider the following data collected on February 9, 2004. The interest rate given is for a one-year money market deposit. The spot exchange rate is the rate for February 9. The expected exchange rate is the one-year forward rate. Express each answer as a percentage.

	2.5%
	0.7541 US\$/C\$
	0[0].7468 US\$/C\$

- Use both RoR formulas (one from Chapter 4, [Section 4.3](#), the other from Chapter 4, [Section 4.4](#), Step 5) to calculate the expected rate of return on the Canadian money market deposit and show that both formulas generate the same answer.
 - What part of the rate of return arises only due to the interest earned on the deposit?
 - What part of the rate of return arises from the percentage change in the value of the principal due to the change in the exchange rate?
 - What component of the rate of return arises from the percentage change in the value of the interest payments due to the change in the exchange rate?
2. Consider the following data collected on February 9, 2004. The interest rate given is for a one-year money market deposit. The spot exchange rate is the rate for February 9. The expected exchange rate is the one-year forward rate. Express each answer as a percentage.

	4.5%
	1.8574 \$/£
	1.7956 \$/£

- Use both RoR formulas (one from Chapter 4, [Section 4.3](#), the other from Chapter 4, [Section 4.4](#), Step 5) to calculate the expected rate of return on the British money market deposit and show that both formulas generate the same answer.
- What part of the rate of return arises only due to the interest earned on the deposit?
- What part of the rate of return arises from the percentage change in the value of the principal due to the change in the exchange rate?
- What component of the rate of return arises from the percentage change in the value of the interest payments due to the change in the exchange rate?

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