23

Cross-Border Valuation

To value businesses, subsidiaries, or companies in foreign countries, follow the same principles and methods that we presented in Part Two. Fortunately, cross-border valuations have become simpler over the past few years as international accounting differences have rapidly diminished. Most of the world's major economies have now adopted either International Financial Reporting Standards (IFRS) or U.S. Generally Accepted Accounting Principles (GAAP), and these two standards are rapidly converging. Moreover, remember that if you follow the recommendations for rearranging financial statements in Chapter 9, you will obtain identical results regardless of which accounting principles you follow in preparing the financial statements.

Nevertheless, the following issues arise in cross-border valuations and still need special attention:

- Forecasting cash flows, whether in foreign currency (the currency of the foreign entity to be valued) or domestic currency (the home currency of the person performing the valuation)
- Estimating the cost of capital
- Incorporating foreign-currency risk in valuations
- Using translated foreign-currency financial statements

This chapter highlights the steps involved in the special analyses required for each of these issues.

FORECASTING CASH FLOWS

A company or business unit valuation should always result in the same value regardless of the currency or mix of currencies in which cash flows are projected. To achieve this consistent outcome, you should use consistent monetary assumptions and one of the following two methods for forecasting and discounting cash flows denominated in foreign currency:

EXHIBIT 23.1 **Projecting and Discounting Foreign Cash Flows**

		2016	2017	2018	2019	2020	2021
Foreign currency, Swiss francs	**Cash flows**						
	Nominal cash flow	103.0	106.6	110.9	115.4	120.1	124.9
	Real cash flow	102.5	105.6	109.3	113.7	118.3	123.1
	Inflation, %	0.50	1.00	1.50	1.50	1.50	1.50
	Interest rates, %						
	Real interest rate	3.00	3.00	3.00	3.00	3.00	3.00
	Nominal forward interest rate	3.52	4.03	4.55	4.55	4.55	4.55
	Nominal interest yield	3.52	3.77	4.03	4.16	4.24	4.29
Foreign-exchange rates, Swiss francs/€	Spot exchange rate 1.200						
	Forward exchange rate	1.194	1.188	1.177	1.165	1.154	1.137
Domestic currency, €	**Interest rates**, %						
	Nominal interest yield	4.03	4.29	4.71	4.93	5.06	5.23
	Nominal forward interest rate	4.03	4.55	5.58	5.58	5.58	6.09
	Real interest rate	3.00	3.00	3.00	3.00	3.00	3.00
	Inflation, %	1.00	1.50	2.50	2.50	2.50	3.00
	Cash flows						
	Real cash flow	85.4	88.4	92.0	96.7	101.5	106.7
	Nominal cash flow	86.3	89.8	94.3	99.1	104.1	109.9

1. *Spot-rate method:* Project foreign cash flows in the foreign currency, and discount them at the foreign cost of capital. Then convert the present value of the cash flows into domestic currency, using the spot exchange rate.
2. *Forward-rate method:* Project foreign cash flows in the foreign currency, and convert these into the domestic currency using the relevant forward exchange rates. Then discount the converted cash flows at the cost of capital in domestic currency.

Let's use a simple example to illustrate both methods. Assume you want to estimate the value of a Swiss subsidiary for its German parent company as of 2015. Exhibit 23.1 shows the cash flow projections for the subsidiary in the foreign currency (Swiss francs).

The nominal cash flows grow at 3 percent per year in real terms plus inflation, which is projected to increase from 0.5 to 1.5 percent per year until 2021. Note that this inflation projection is consistent with the interest rates shown. For example, in 2017, the forward interest rate equals the real interest rate plus the expected inflation rate for that year:

$$(1 + 3.00\%)(1 + 1.00\%) - 1 = 4.03\%$$

And the two-year interest rate (yield) as of 2015 is the geometric average of the first- and second-year nominal forward interest rates:

$$[(1 + 3.52\%)(1 + 4.03\%)]^{1/2} - 1 = 3.77\%$$

Using the *spot-rate method*, simply project cash flows in Swiss francs (CHF), and discount them at the Swiss risk-free interest rates. (We assume the subsidiary's beta is zero.) The resulting present value is 589.9 Swiss francs. Converting this value at the spot exchange rate of 1.200 Swiss francs per euro results in a discounted-cash-flow (DCF) value of €491.6 million:

		Year					
Spot-rate method		**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Cash flow, CHF, million		103.0	106.6	110.9	115.4	120.1	124.9
Discount factor		0.966	0.929	0.888	0.850	0.813	0.777
Present value of cash flow, CHF, million		99.5	99.0	98.6	98.1	97.6	97.1
DCF value, CHF, million	589.9						
DCF value, € million	**491.6**						

The *forward-rate method* is more complex. The projected cash flows in Swiss francs should be converted to euros on a year-by-year basis using forward rates and then discounted at euro interest rates. For most currencies, however, forward exchange rates are not available beyond 18 months. This means you need to estimate synthetic forward exchange rates using interest rate parity theory.

Following the theory, the forward foreign-exchange rate in year t, X_t, equals the current spot rate, X_0, multiplied by the ratio of nominal interest rates in the two currencies over the forecast interval, t:

$$X_t = X_0 \left(\frac{1 + r^F}{1 + r^D} \right)^t$$

where r^F is the interest rate in foreign currency and r^D is the interest rate in domestic currency.

In Exhibit 23.1, the euro–Swiss franc forward exchange rates are consistent with interest rate parity. For example, as of January 2016, a German company can borrow four-year money in Switzerland at a 4.16 percent nominal interest rate, r^F, while the borrowing rate in euros, r^D, is 4.93 percent for the same period. The spot exchange rate, X_0, is 1.200 Swiss francs per euro. It is possible to use interest rate parity to estimate the three-year forward rate, X_3:

$$X_3 = 1.200 \left(\frac{1 + 4.16\%}{1 + 4.93\%} \right)^4 = 1.165$$

As these calculations show, whether a company borrows in Swiss francs or euros has no impact on value (unless there are any tax implications). If a German company borrows 1,200 Swiss francs today, it has to repay the loan with interest of 4.16 percent a year, totaling 1,412 Swiss francs in 2019. It can convert this total into a €1,212 payment in 2019 at today's four-year forward exchange rate (1,412 ÷ 1.165). Converting the borrowed amount of 1,200 Swiss francs at the current spot rate, the German company has effectively taken up a €1,000 loan, which is to be repaid with 4.93 percent annual interest, the euro interest rate on four-year money, totaling €1,212 in 2019.

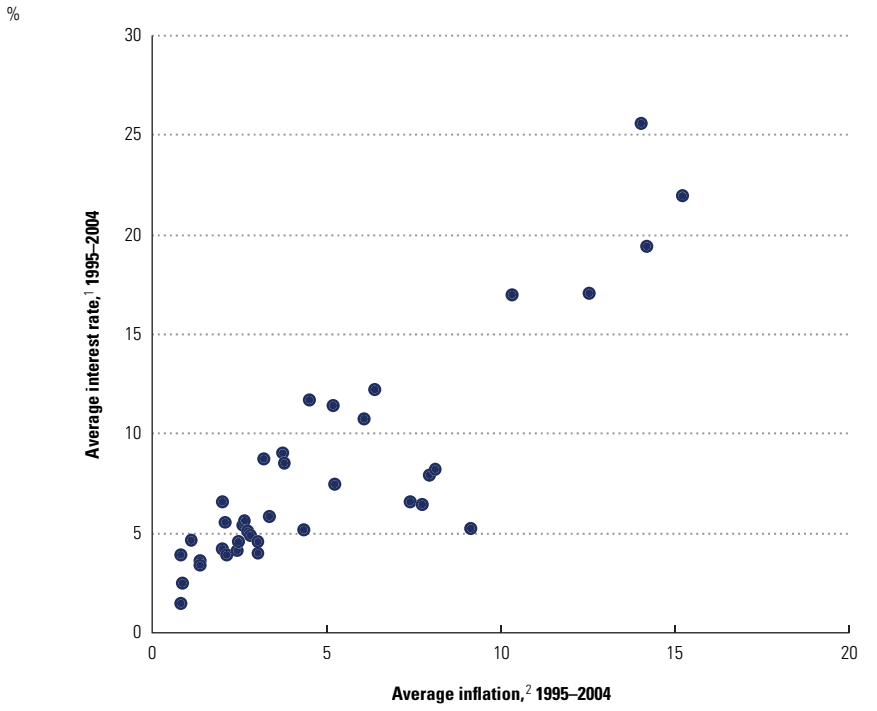
In the forward-rate method, the Swiss-franc cash flow projections are converted to euro cash flows by using the forward exchange rates (see Exhibit 23.1). Using the euro interest rates to discount the converted cash flows, we obtain a present value of €491.6 million, exactly the same value as obtained under the spot-rate method:

		Year					
Forward-rate method		**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Cash flow at forward exchange rate, € million		86.3	89.8	94.3	99.1	104.1	109.9
Discount factor		0.961	0.919	0.871	0.825	0.781	0.737
Present value of cash flow, € million		82.9	82.5	82.1	81.7	81.3	80.9
DCF value, € million	**491.6**						

Following the International Fisher relation,[1] differences in interest rates reflect the ratio of expected inflation rates between two currencies. Exhibit 23.2 plots the relationship between domestic inflation and domestic interest rates for 38 countries from 1995 to 2004. As the empirical results show, inflation differences explain most of the difference in nominal interest rates.

[1]See, for example, R. Brealey, S. Myers, and F. Allen, *Principles of Corporate Finance*, 11th ed. (Burr Ridge, IL: McGraw-Hill/Irwin, 2013), chap. 27.

EXHIBIT 23.2 **Relationship between Inflation and Interest Rates**



[1] Money market rate.
[2] Consumer price inflation.
Note: Sample of 38 countries in North and Latin America, Western and Eastern Europe, and Asia-Pacific.
Source: International Monetary Fund International Financial Statistics.

You could therefore also derive the forward exchange rate in year t, X_t, from the current spot rate, X_0, multiplied by the ratio of the rates of inflation for the two currencies over the forecast interval:

$$X_t = X_0 \left[\frac{\left(1 + i_1^F\right) \times \left(1 + i_2^F\right) \times \ldots \times \left(1 + i_t^F\right)}{\left(1 + i_1^D\right) \times \left(1 + i_2^D\right) \times \ldots \times \left(1 + i_t^D\right)} \right]$$

where i_t^D = inflation rate in year t in domestic currency
i_t^F = inflation rate in year t in foreign currency

For example, in Exhibit 23.1, the three-year forward rate equals:

$$X_3 = 1.200 \left[\frac{(1.005) \times (1.010) \times (1.015)}{(1.010) \times (1.015) \times (1.025)} \right] = 1.177$$

After conversion, the Swiss subsidiary's cash flows in euros differ from the original cash flows in Swiss francs by exactly the difference in inflation rates between the two currencies. Thus, the forward Swiss-franc-to-euro exchange rates are tied not only to the Swiss franc and euro interest rates, but also to the differences in Swiss-franc and euro expected future inflation rates.

When you project and discount cash flows in different currencies, you cannot make independent assumptions for inflation, interest rates, and forward exchange rates across currencies. To ensure that your valuation results do not change with the choice of currency of denomination for a business's cash flows, you need to ensure that your monetary assumptions for all the currencies involved are consistent, as follows:

- Inflation assumptions underlying cash flow projections in a specific currency need to be consistent with inflation assumptions underlying interest rates in that currency.
- Forward exchange rates between two currencies need to be consistent with inflation and interest rate differences between those currencies.
- Cash flow projections should be converted from one currency into another at forward exchange rates.

ESTIMATING THE COST OF CAPITAL

As when you are forecasting cash flows in different currencies, the most important rule when you are estimating costs of capital for cross-border valuations is to have consistent monetary assumptions. The expected inflation that determines the foreign-currency cash flows should equal the expected inflation included in the foreign-currency weighted average cost of capital (WACC) through the risk-free rate. Then estimate the cost of capital, depending on the investor's position.

For investors and companies that face little or no restriction on investing outside their home markets, the cost of capital is best estimated following a global capital asset pricing model (CAPM) that applies equally to foreign and domestic investments. This means that there is a single, real-terms risk-free rate and that the market risk premium and beta should be measured against a global market portfolio and not against a local (foreign or domestic) market portfolio. We recommend this approach because capital markets have become global, in the sense that a considerable share of all equity trades is now international, and global traders, primarily large institutional investors, draw their capital from and invest it all around the world.

For investors and companies in markets facing capital controls that prevent them from freely investing abroad, we recommend using a so-called local

CAPM. By definition, they can invest in domestic assets only and should estimate the cost of capital from a domestic perspective, measuring market risk premium and beta versus a (diversified) domestic portfolio. The following sections provide further background for our recommendations and practical guidelines for estimating the cost of capital in foreign currency.

CAPM: Global, International, or Local?

The standard CAPM introduced in Chapter 13 to estimate the cost of capital does not explicitly account for foreign assets, foreign investors, or currencies. The question arises whether such a model can provide the right cost of capital for investments in foreign currencies. If foreign-currency rates are changing, the same investment will generate different returns to investors from different countries. For example, a German government bond denominated in euros generates a risk-free return from the perspective of a German or Dutch investor for whom the euro is also the domestic currency (assuming there is no inflation). But the bond's return is not risk-free for investors in the United States, as the return measured in U.S. dollars will vary with the dollar-to-euro exchange rate. As a general rule, investors from countries with different currencies are likely to disagree about an asset's expected return and risk. In theory, this means that the standard CAPM no longer holds, and a more complex, international CAPM is required. In practice, however, we find that the CAPM-based approach as laid out in Chapter 13 is still valid to estimate the cost of capital for cross-border investments.

Global CAPM The disagreement between investors about the return and risk of international investments disappears if purchasing power parity (PPP) holds across all currencies. In that case, changes in exchange rates perfectly match differences in inflation between currencies:[2]

$$X_t = X_{t-1}\left(\frac{1+i_A}{1+i_B}\right)$$

where X_t = exchange rate of currency B expressed in units of currency A at time t
i_A, i_B = inflation rate for currency A, B

As a result, the expected return and risk in real terms for any asset will be the same for all investors, regardless of their domestic currency. In this

[2]Technically, this is so-called relative purchasing power parity, referring to changes in prices and exchange rates. Absolute purchasing power parity requires that prices be the same across currencies (see, for example, Brealey et al., *Principles of Corporate Finance*, chap. 27).

example, any appreciation of the U.S. dollar relative to the euro would make the nominal bond return for U.S. investors lower. But if PPP holds, the inflation rate in the United States would be lower by exactly the same amount, so the payoff in real terms for U.S. and German investors would be equal. In real terms, there is no currency risk for investors. They will all hold the same global market portfolio of risky assets and face the same real risk-free rate, as if there were only a single currency. The resulting so-called global CAPM is in fact the standard CAPM with a global market portfolio. It expresses the expected real return for an asset j as follows:

$$E(r_j) = r_f + \beta_{j,G}[E(r_G) - r_f]$$

where r_j = return for asset j
r_f = risk-free rate
$\beta_{j,G}$ = beta of asset j versus global market portfolio G
$\beta_{j,A}$, $\beta_{j,B}$ = r_G = return for global market portfolio G

Following the global CAPM, the cost of capital for domestic and foreign assets is determined in exactly the same way. What matters is their beta relative to the global market portfolio and the market risk premium of that same portfolio relative to the risk-free rate.

This also makes intuitive sense. Consider the consumer goods companies Procter & Gamble and Unilever. Both sell their household products around the world and have roughly the same geographic spread. The shares of both are traded in the United States and Europe. The primary difference is that Procter & Gamble is domiciled in the United States, and Unilever is domiciled in the United Kingdom and the Netherlands. With such similar business profiles and investor bases, it would be odd if the two companies had different costs of capital. In general, we find that the domicile of otherwise-comparable companies does not influence their valuation levels. For example, the valuation multiples of U.S. and European pharmaceutical companies are all in a very narrow range around 12 times enterprise value to EBITA, regardless of the company domicile.

Technically, the global CAPM holds only if PPP holds, which is the case—in the long run.[3] Although evidence on PPP has been mixed in the past, more recent academic research finds that on average, deviations from PPP between currencies are reduced to half their value within three to five years. In other words, exchange rates ultimately do adjust for differences in inflation between countries, although not immediately and perfectly.

[3]For an overview, see A. M. Taylor and M. P. Taylor, "The Purchasing Power Parity Debate," *Journal of Economic Perspectives* 18, no. 4 (Fall 2004): 135–158.

For investors and companies able to invest outside their home markets without restrictions, we recommend using the global CAPM to estimate the cost of capital for foreign and domestic investments. Effectively, this means applying the approach described in Chapter 13. Although the alternative, international CAPM (discussed next), may be theoretically superior, it is far more complex and does not lead to materially different results in practice.

International CAPM If PPP does not hold, real returns from foreign assets are no longer free from currency risk, because changes in exchange rates are not offset by differences in inflation. The greater the correlation between the return on a foreign asset and the relevant currency rate, the higher the risk for an investor. Take, for example, a Dutch company whose stock returns, measured in euros, tend to be higher when the euro appreciates against the U.S. dollar and vice versa (for instance, because the company imports components from the United States and sells end products in Europe). The stock's returns will be more risky for an American investor than for a European investor, because the exchange rate tends to amplify the returns when translated into U.S. dollars. The absence of PPP means that disparities between dollar and euro inflation will not offset this difference in returns when measured in real terms.

To hold foreign assets, rational investors will require some compensation in the form of a higher expected return for an asset, depending on its exposure to currency risk. As a result, what matters for an asset's expected return is no longer only the asset's beta versus the global market portfolio (as in case of the global CAPM). The international CAPM captures the additional return requirements by also including asset betas versus currency exchange rates. For example, in a world consisting of three countries, each with its own currency, the international CAPM would define the expected return on asset j in a given home currency as follows:[4]

$$E(r_j) = r_f + \beta_{j,G}[E(r_G) - r_f] + \beta_{j,A}\text{CRP}_A + \beta_{j,B}\text{CRP}_B \tag{23.1}$$

where
r_j = return for asset j
r_f = risk-free rate
$\beta_{j,G}$ = beta of asset j versus global market portfolio G
$\beta_{j,A}$, $\beta_{j,B}$ = beta of asset j versus currency rate X_A, X_B
CRP_A, CRP_B = risk premium for currency A, B

[4]This is a simplified version of the Solnik-Sercu international CAPM; see, for example, P. Sercu, *International Finance* (Princeton, NJ: Princeton University Press, 2009), chap. 19 and S. Armitage, *The Cost of Capital* (Cambridge, UK: Cambridge University Press, 2005), chap. 11.

The currency risk premiums are defined as follows:

$$\text{CRP}_n = \frac{E(X_{n1}) - F_{n1}}{X_{n0}} \tag{23.2}$$

where X_{nt} = exchange rate of home currency expressed in units of currency n at time t where $n = A,B$
F_{nt} = forward rate for time t of home currency expressed in units of currency n

Although theoretically correct, the international CAPM is probably too cumbersome for practical use. For example, it is not clear how many of the world's currencies to include in estimating the cost of capital. Even taking only a handful of leading global currencies would mean that you must estimate as many currency risk premiums. And in addition to an asset's market beta, you would need to estimate its beta versus each of these currencies.

Another reason not to use the international CAPM is that empirical research has shown that the currency risk premiums are typically too small to matter when estimating a cost of capital.[5] Recent research has shown that differences are probably less than half a percentage point when comparing cost of capital estimates from a global and an international CAPM for large U.S. companies.[6] As we can see from equations 23.1 and 23.2, the international CAPM simplifies to the global CAPM when currency risk premiums are negligible, reinforcing our recommendation to use the global CAPM.[7]

Local CAPM Some practitioners and academic researchers propose estimating the cost of capital for an investment opportunity in a particular country by using a local CAPM. The investment's beta is then estimated versus the market portfolio of the country, and the market risk premium follows from the excess return of that same market portfolio over the local risk-free rate. The approach is theoretically correct if stocks are correlated to the global market portfolio only through the local market:[8]

$$\beta_{j,G} = \beta_{j,L} \times \beta_{L,G} \tag{23.3}$$

[5]Sercu, *International Finance*, chap. 19.
[6]See W. Dolde, C. Giaccotto, D. Mishra, and T. O'Brien, "Should Managers Estimate Cost of Equity Using a Two-Factor International CAPM?" *Managerial Finance* 38, no. 8 (2012): 708–728; and D. Mishra and T. O'Brien, "A Comparison of Cost of Equity Estimates of Local and Global CAPMs," *Financial Review* 36, no. 4 (2001): 27–48.
[7]In other words, PPP apparently holds sufficiently well for the global CAPM to lead to the same cost of capital as the international CAPM.
[8]See R. Stulz, "The Cost of Capital in Internationally Integrated Markets: The Case of Nestlé," *European Financial Management* 1, no. 1 (1995): 11–22.

where $\beta_{j,G}$ = beta of asset j versus global market portfolio G
$\beta_{j,L}$ = beta of asset j versus local market portfolio L
$\beta_{L,G}$ = beta of local market portfolio L versus global market portfolio G

This implies that any international risk factors influencing the returns of companies in a given country are fully captured by the local market portfolio of that country. You can then indirectly estimate any asset's global beta by multiplying its local beta with the global beta of the local market. If the local stock market is fully integrated and correctly priced in the global market, its expected return is:

$$E(r_L) = r_f + \beta_{L,G}[E(r_G) - r_f] \tag{23.4}$$

where r_L = expected return for local market portfolio L
r_f = risk-free rate
r_G = return for global market portfolio G

Combining equations 23.3 and 23.4 shows that the expected return for a stock j estimated via the local and global CAPM should be equal as well. Following the global CAPM, this return is given by:

$$E(r_j) = r_f + \beta_{j,G}[E(r_G) - r_f]$$

Substituting the asset's global beta by the indirect beta defined previously in equation 23.3 leads to:

$$E(r_j) = r_f + \beta_{j,L} \times \beta_{L,G}[E(r_G) - r_f]$$

This can be rearranged to show equivalence with the local CAPM as:

$$E(r_j) = r_f + \beta_{j,L}[E(r_L) - r_f]$$

Although the assumptions may not seem very realistic at face value, there is evidence that the local and global CAPM generate similar results. Empirical research finds that the cost of capital estimated for U.S. companies with a local CAPM is very close to the estimate based on a global CAPM.[9] For U.S. stocks, this may not be surprising, as the U.S. market portfolio is well diversified and highly correlated with the global market portfolio. But supporting evidence also comes from nine developed economies, including not only the United States but also the United Kingdom, Germany, France, and smaller economies such as the Netherlands and Switzerland. An analysis of beta estimates for

[9] R. Harris, F. Marston, D. Mishra, and T. O'Brien, "Ex-Ante Cost of Equity Estimates of S&P 500 Firms: The Choice between Domestic and Global CAPM," *Financial Management* 32, no. 3 (2003): 51–66.

companies versus a local and global market portfolio has shown that for these countries the betas are typically related, as indicated by equation 23.3.[10]

However, the local CAPM approach has some practical drawbacks when compared with the global CAPM. When applying the local CAPM for investments in different countries, you should estimate the local market risk premium and beta for each of these countries instead of only the global market risk premium when applying the global CAPM. Using a local CAPM also means you cannot make a straightforward estimate of a company's beta based on the average of the estimated betas for a sample of industry peers. Estimating an industry-average beta is recommended in Chapter 13 to reduce its standard error, but if the peers are in different countries, their local betas are not directly comparable.

Last, but not least, local risk premiums are typically less stable over time than their aggregate, the global risk premium. For example, Exhibit 23.3 compares the realized premiums on local stock market indexes with government bond returns for several countries and the world, from Dimson, Marsh, and Staunton's analysis of long-term average returns on equities, corporate bonds, and short-term government bonds.[11] The individual countries' risk premiums vary considerably, depending on the time period over which they are measured, while the global premium remains almost unchanged.

Note that the risk premium differences shown in Exhibit 23.3 do not mean that the price for risk varies across these countries. These differences are driven by several factors. First, levels of economic development and, therefore, profit growth have varied over the past century among the countries. Second, capital markets were less integrated in the past, so prices across countries may not have been equalized. The main reason, though, is that many of the stock market indexes used had different levels of diversification and beta. Therefore, their performance was skewed by different industry concentrations. In most European countries the key stock market indexes, which account for the majority of their stock markets' total capitalization, typically include only 25 to 40 companies, often from a limited range of industries. Indeed, research has shown that a large fraction of the variation in returns on European market indexes could be explained by their industry composition (see Exhibit 23.4).[12]

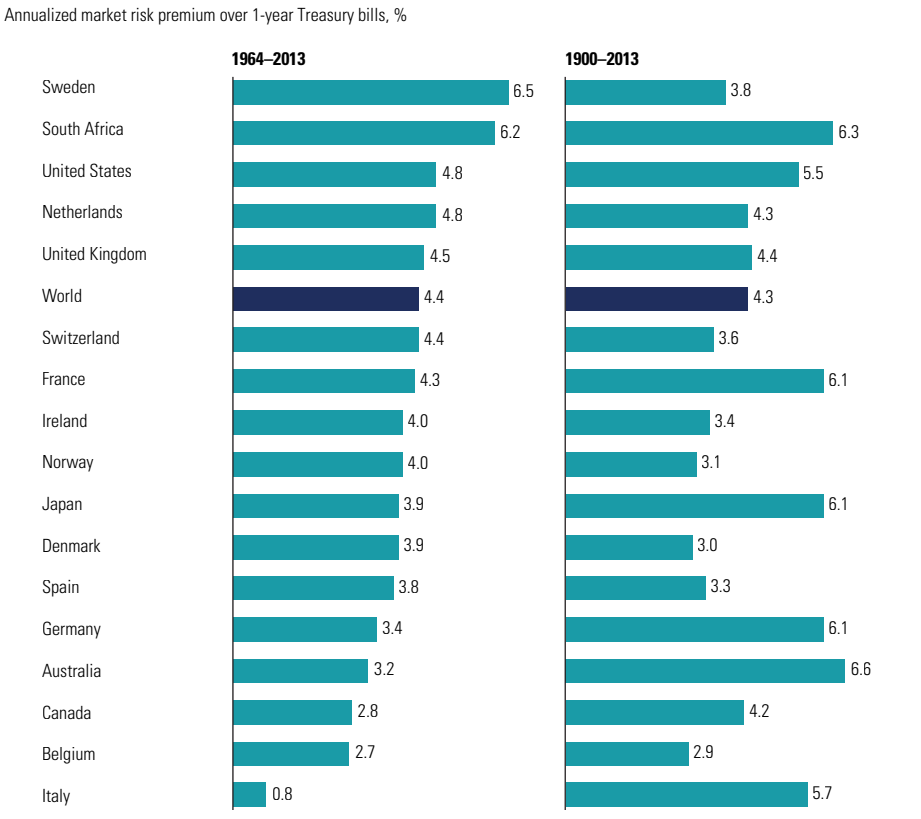
We recommend a local CAPM only for investors and companies facing restrictions to invest abroad. In that case, the local market portfolio is the right

[10]See C. Koedijk, C. Kool, P. Schotman, and M. van Dijk, "The Cost of Capital in International Financial Markets: Local or Global?" *Journal of International Money and Finance* 21, no. 6 (2002): 905–929.

[11]E. Dimson, P. Marsh, and M. Staunton, *Triumph of the Optimists: 101 Years of Global Investment Returns* (Princeton, NJ: Princeton University Press, 2002); and E. Dimson, P. Marsh, M. Staunton, and M. Mauboussin, *Credit Suisse Global Investment Returns Yearbook 2014* (London: Credit Suisse Research Institute, 2014).

[12]R. Roll, "Industrial Structure and the Comparative Behavior of International Stock Market Indexes," *Journal of Finance* 47, no. 1 (1992): 3–42.

EXHIBIT 23.3 **Comparing Risk Premiums across Countries and over Time**

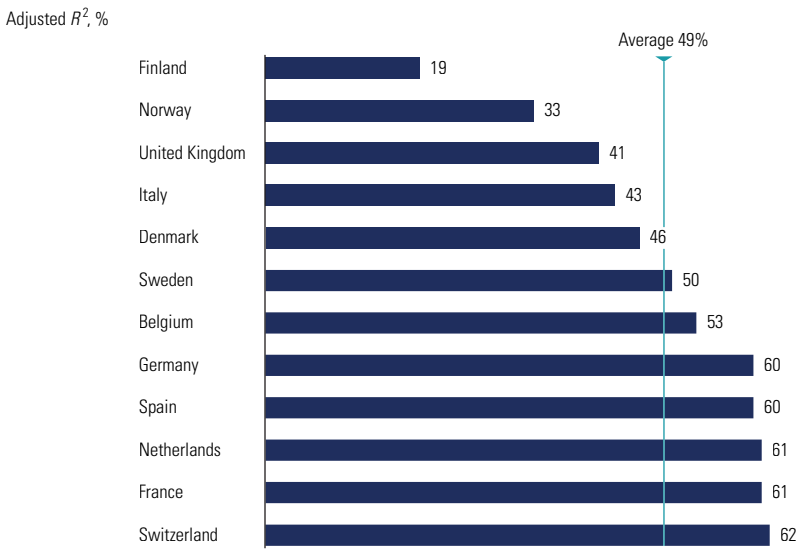


Source: E. Dimson, P. Marsh, M. Staunton, and M. J. Mauboussin, *Credit Suisse Global Investment Returns Yearbook 2014* (London: Credit Suisse Research Institute, 2014).

reference to estimate the cost of capital. As a result, valuations in such restricted markets can be out of line with those in global markets—which is what we have encountered in the past for valuations in, for example, the Indian and mainland Chinese stock markets.

Estimating Market Risk Premium in Global CAPM In the absence of capital controls for investors, the global market risk premium should be based on a global index that includes most of the world's investment assets. As explained in Chapter 13, the market risk premium for an index can be estimated from its historical returns, from current financial ratios, or from forward-looking models, which, by and large, lead to similar results. Global indexes rarely go far back in time, so long-term estimates of historical market risk premiums are

EXHIBIT 23.4 **Share of Equity Returns Explained by Industry Composition of Index**



Source: R. Roll, "Industrial Structure and the Comparative Behaviour of International Stock Market Indexes," *Journal of Finance* 47, no. 1 (1992): 3–42.

not readily available. Therefore, we generally resort to specially compiled estimates for the global market or the well-diversified U.S. market as a basis for a global market risk premium. Correlation between the S&P 500 and global market indexes (such as the MSCI World Index) has, so far, been very high, making the S&P 500 a good proxy. Estimates from both sources are typically not far apart, falling in the range of 4.5 to 5.5 percent (also see Chapter 13).

Estimating Beta across Currencies in Global CAPM Since we are using a global market risk premium, a global beta should also be used. As just noted, the local market indexes of many countries are biased toward certain companies or industries. Therefore, a beta derived from a local market index does not necessarily represent the risk contribution of that stock to a diversified, global portfolio.

Follow the guidelines from Chapter 13 on how to estimate beta. There is one special issue to consider when estimating betas for stocks in international markets: the currency in which returns are measured. For example, should a Swiss investor estimate the beta of IBM based on returns in U.S. dollars or Swiss francs? If you use total returns to estimate beta, the results will be different when returns are expressed in U.S. dollars or Swiss francs, because the dollar-to-franc exchange rate fluctuates over time. But a stock's beta should be the same in all currencies, as any difference would imply differences in the real-terms cost of capital across currencies. The solution is to use excess returns

over the risk-free rate, rather than total returns.[13] Beta estimates are consistent across currencies when the stock's excess returns are regressed against the excess return of a global market portfolio, as follows for any period ending at time t:

$$\left(r^A_{j,t} - r^A_{f,t}\right) = \beta_j \left(r^A_{M,t} - r^A_{f,t}\right)$$

where $r^A_{j,t}$ = realized return for stock j in currency A
$r^A_{f,t}$ = risk-free rate in currency A
$r^A_{M,t}$ = realized return for global market portfolio in currency A

If the international Fisher relation and purchasing power parity would hold, differences in international interest rates would reflect differences in inflation across countries; and differences in inflation across countries would also be reflected in changes in exchange rates. In that case, the risk-free rate for each currency should equal the U.S. dollar risk-free return and the change in the exchange rate:

$$\left(1 + r^A_{f,t}\right) = \left(1 + r^{\$}_{f,t}\right) \frac{X_{t-1}}{X_t} \tag{23.5}$$

where $r^{\$}_{f,t}$ = risk-free rate in U.S. dollars
X_t = exchange rate at time t of currency A expressed in U.S. dollars

If risk-free rates across currencies are tied to changes in exchange rates in this way, beta estimates based on excess returns will be the same whether we use U.S. dollars or Swiss francs (or any other currency, for that matter). In practice, the relations will not hold perfectly. To avoid any differences in beta estimates, we recommend using a synthetic risk-free rate for each currency when calculating a stock's excess returns, based on the U.S. risk-free rate and the U.S. dollar exchange rate as defined in equation 23.5.

Although many practitioners make ad hoc adjustments to the discount rate to reflect political risk, foreign-investment risk, or foreign-currency risk, we do not recommend this. As the discussion of emerging markets in Chapter 31 explains, political or country risk is best handled by adjusting expected cash flows and weighting them by the probability of various scenarios.

Finally, keep in mind that estimating a cost of capital is not a mechanical exercise with a precise outcome. The approach outlined in this chapter should

[13]Most practitioners use the so-called market model, estimating beta from absolute returns instead of excess returns. This is an approximation that produces good results if the risk-free rate is relatively stable. When translating returns from another currency, the approximation no longer holds, as the nominal risk-free rate will fluctuate with exchange rate.

be paired with sound judgment on long-term trends in interest rates and market risk premiums (see Chapter 13) to obtain a cost of capital estimate that is sufficiently robust for financial decision making.

INCORPORATING FOREIGN-CURRENCY RISK IN THE VALUATION

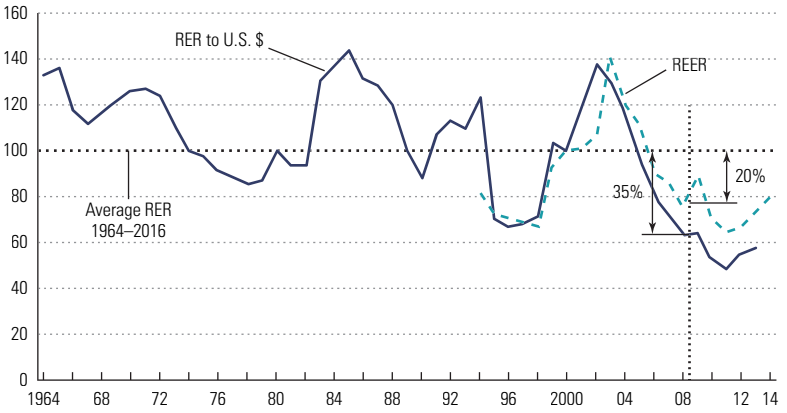
Many executives are concerned about currency fluctuations from foreign investments and their impact on value creation in company results. The analyst community and investors may be wary of the resulting earnings volatility (even though that does not matter for value creation). As a result, many companies still add a premium for currency risk to the cost of capital for foreign investments. There is no need for such a premium. As discussed in the previous section, currency risk premiums in the cost of capital—if any—are likely to be small. There should be no difference between the cost of capital for investments in foreign currency and otherwise identical investments in domestic currency. First of all, price fluctuations tend to mitigate currency fluctuations because of purchasing power parity. Second, currency risk is largely diversifiable for companies and shareholders. Any remaining risk from currency rate changes is best reflected in the cash flow projections for the investment.

Keep in mind that nominal currency risk is irrelevant if exchange rates immediately adjust to differences in inflation rates. The only relevant currency risk is therefore real currency risk as measured by changes in relative purchasing power. For example, if you held $100 million of Brazilian currency in 1974, by 2014 it would have been practically worthless in U.S. dollars. Yet if you adjust for purchasing power, the value of the currency has fluctuated around the $100 million mark during the 40-year period. Exhibit 23.5 shows the estimated real (inflation-adjusted) exchange rate for the Brazilian currency, which explains this effect.

To illustrate, suppose that instead of holding $100 million of Brazilian currency, you held $100 million of Brazil-based assets whose value increased with inflation since 1974. In most of those years, the value of those assets would have been within 20 percent of the original investment measured in U.S. dollars, as purchasing power parity kept the currency rate in line with inflation differences over the long term. Nevertheless, there would be significant deviations in other years. For example, at the end of 2013, the Brazilian assets would have been worth approximately $175 million. To some extent, such deviations may be specific to the exchange rate with the U.S. dollar—which itself could be undervalued in terms of PPP with other currencies. For a more balanced view, the so-called real effective exchange rate (REER) reflects the purchasing power of the Brazilian currency versus an index of foreign currencies with more dampened deviations from PPP, at least for the past 20 years (see Exhibit 23.5). Analysis of purchasing power parity indicates that in general, currencies

EXHIBIT 23.5 **Brazilian Inflation-Adjusted Exchange Rates**

Real exchange rate (RER) index and real effective exchange rate (REER) index, 2000 = 100



Source: World Bank, MGM Consultants, Bank for International Settlements.

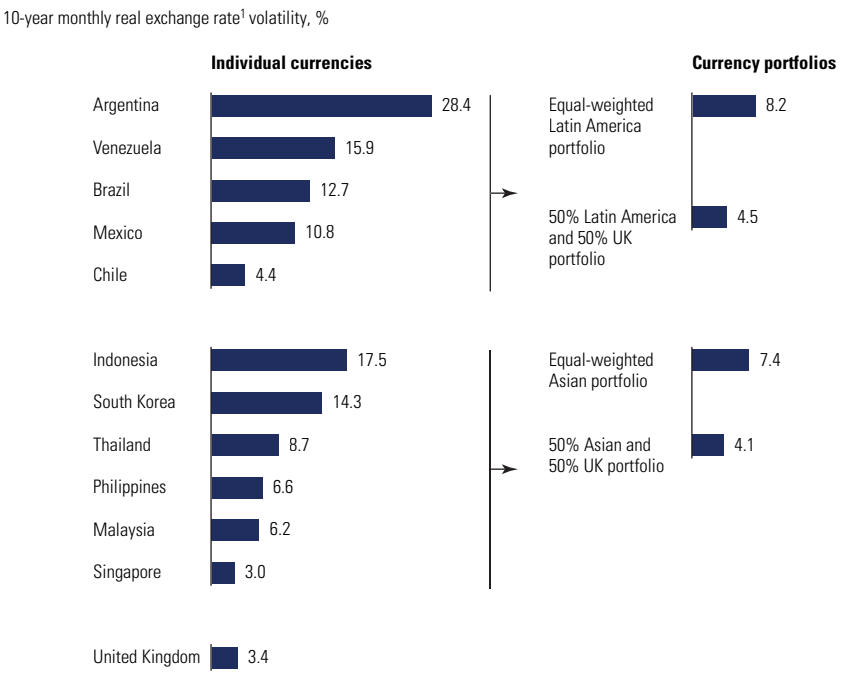
indeed revert to parity levels following changes in relative rates of inflation, but not immediately.[14]

Short-term deviations from exchange rates that give purchasing power parity potentially leave corporations exposed to real-terms currency risk. However, shareholders are typically able to diversify this risk. To see how, consider Exhibit 23.6, which shows the monthly volatility of real exchange rates for a selection of Latin American and Asian currencies, as well as the British pound, and compares them with four currency portfolios. Although some of the currencies are highly volatile, holding a regional portfolio already eliminates a lot of the resulting real currency risk, as shown by the lower volatility of the regional portfolios. Combining a developing-markets portfolio with a British-pounds portfolio diversifies the real risk even further. If shareholders can disperse most real currency risk by diversifying, there is no need for a currency risk premium of any significance in the company's cost of capital.

Sometimes currency exchange rates move fast and far from PPP. As Exhibit 23.5 showed, during a period of just two weeks in 1999, Brazil's currency weakened by more than 50 percent relative to the U.S. dollar. When conducting a valuation in a currency that shows large deviations from PPP, you should account for the risk of a few weeks or even several years passing before the currency moves back toward PPP. Do not adjust the cost of capital, but instead prepare cash flow projections for one or more currency scenarios as follows.

[14]See Taylor and Taylor, "The Purchasing Power Parity Debate."

EXHIBIT 23.6 **Diversification of Real Currency Risk**



[1] Exchange rates to U.S. dollar.

Source: International Monetary Fund.

If the foreign business being valued has limited international purchases and sales, its cash flows are largely determined by its local currency. The impact of any exchange rate convergence toward PPP is likely to be limited as well. In this case, value the business's forecast cash flows using either the spot-rate or forward-rate approach to obtain a valuation in your domestic currency. Apply two different currency scenarios: one using spot and forward rates based on the actual exchange rate, and one based on a deemed convergence of the exchange rate toward PPP. The valuation results in the local currency of the foreign business will be identical for both scenarios, but not so for the result in your domestic currency, highlighting the exposure to a potential exchange-rate change.

If the business has significant cash flows in international currencies, such as an exporting oil company, estimate the impact of an exchange-rate adjustment toward PPP on its cash flows in local currency. Prepare the local cash flow forecasts for the business based on two scenarios: one with convergence of the exchange rate toward PPP, and one without. Then value the cash flows for both currency scenarios using the spot-rate or forward-rate approach as outlined in the previous paragraph. Ensure that the spot and forward rates correctly reflect your assumptions on the convergence of the exchange rate. The result is again

a valuation range in domestic currency, indicating the potential impact of an exchange-rate convergence to PPP.

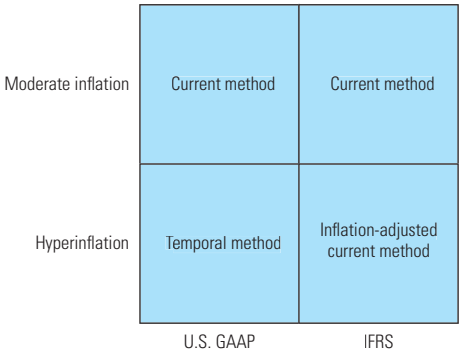
USING TRANSLATED FOREIGN-CURRENCY FINANCIAL STATEMENTS

Analysis of the historical performance of foreign businesses is best conducted in the foreign currency. But sometimes this is not possible—for example, when the business's statements have been translated into its parent company's currency and included (or consolidated) in the parent's accounts. A British subsidiary of a European corporate group will always prepare financial statements in British pounds, and when the European parent company prepares its financial statements, it will translate the British pounds in the statements of the British subsidiary at the current euro–pound exchange rate.

However, if the exchange rate fluctuates from year to year, the European parent company will report the same asset at a different euro amount each year, even if the asset's value in British pounds has not changed. This change in the value of the British asset in the parent's reporting currency would suggest a cash expenditure. But no cash has been spent, because the change is solely due to a change in the exchange rate. Therefore, following the guidelines from Chapter 9, it's necessary to make a correction to the cash flow estimated from the financial statements that is equal to the gains or losses from the currency translation.

Between them, U.S. GAAP and IFRS sanction three approaches to translating the financial statements of foreign subsidiaries into the parent company's currency: the current method, the temporal method, and the inflation-adjusted current method. The correct approach to use depends on which standard you follow and the inflation rate in the country in question. Exhibit 23.7 shows the

EXHIBIT 23.7 **Currency Translation Approaches**



approach recommended by each standard for countries with moderate inflation and for those with hyperinflation.

For subsidiaries in moderate-inflation countries, translating the financial statements into the currency of the parent company is fairly straightforward. Both U.S. GAAP and IFRS apply the current method, which requires translating all balance sheet items except equity at the year-end exchange rate. Translation gains and losses on the balance sheet are recognized in the equity account, so they do not affect net income. The average exchange rate for the period is used to translate the income statement.

For subsidiaries where inflation rates are higher, IFRS and U.S. GAAP differ in what they define as hyperinflation, whether to adjust statements for inflation, and what approach to use for translating the financial statements. U.S. GAAP defines hyperinflation as cumulative inflation over three years of approximately 100 percent or more. IFRS states that this is one indicator of hyperinflation but suggests considering other factors as well, such as the degree to which local investors prefer to keep wealth in nonmonetary assets or stable foreign currencies.

U.S. GAAP requires companies to use the temporal method for translating financial statements of subsidiaries in hyperinflation countries into the parent's currency. To use this method, you must translate all items in the financial statements at the exchange rate prevailing at the relevant transaction date. This means using historical exchange rates for items carried at historical cost, current exchange rates for monetary items, and year-average or other appropriate exchange rates for other balance sheet items and the income statement. Any resulting currency gains or losses are reported on the income statement of the parent.

The IFRS approach to currency translation for subsidiaries in hyperinflation countries is similar to that for moderate-inflation countries. The key difference is that IFRS requires the hyperinflation country statements to be restated in current (foreign) currency units based on a general price index before they are translated into the parent company's currency. All except some monetary items need to be restated to account for the estimated impact of very high inflation on values over time. This generally requires some judgment on the part of the translator and will also depend on the details of specific agreements and contracts; for example, any debt-financing agreements may or may not already be linked to an index. This restatement will result in a gain or loss on the subsidiary's income statement. Because the full statements are restated in current (year-end) foreign-currency units, the year-end exchange rate should be used to translate both the balance sheet and the income statement into the parent company's currency. Any translation gains or losses will be included in the equity account of the parent.

Exhibit 23.8 shows an example for a U.S. parent company using all three approaches to currency translation. In this example, the exchange rate has changed from 0.95 at the beginning of the year to 0.85 at the end of the year,

EXHIBIT 23.8 **Currency Translation**

		Current method		Temporal method		Inflation-adjusted current method		
	Local currency	Foreign-exchange rate	U.S. $	Foreign-exchange rate	U.S. $	Adjusted	Foreign-exchange rate	U.S. $
Balance sheet								
Cash and receivables	100	0.85	85	0.85	85	100	0.85	85
Inventory	300	0.85	255	0.90	270	321	0.85	273
Net fixed assets	600	0.85	510	0.95	570	684	0.85	581
	1,000	–	850	–	925	1,105	–	939
Current liabilities	265	0.85	225	0.85	225	265	0.85	225
Long-term debt	600	0.85	510	0.85	510	684	0.85	581
Equity								
Common stock	100	0.95	95	0.95	95	100	0.95	95
Retained earnings	35	–	32	–	95	56	–	48
Foreign-currency adjustment	–	–	(12)	–	–	–	–	(10)
	1,000	–	850	–	925	1,105	–	939
Income statement								
Revenue	150	0.90	135	0.90	135	161	0.85	137
Cost of goods sold	(70)	0.90	(63)	0.93	(65)	(75)	0.85	(64)
Depreciation	(20)	0.90	(18)	0.95	(19)	(23)	0.85	(20)
Other expenses, net	(10)	0.90	(9)	0.90	(9)	(11)	0.85	(9)
Foreign-exchange gain (loss)	–	–	–	–	66	20[1]	0.85	17
Income before taxes	50	–	45	–	108	72	–	61
Income taxes	(15)	0.90	(13)	0.90	(13)	(16)	0.85	(13)
Net income	35	–	32	–	95	56	–	48

[1] Gain from restatement.

consistent with 14 percent inflation in the foreign country during the year and U.S. inflation of 2 percent. The average exchange rate for the year is 0.90. As the exhibit illustrates, the three approaches can result in significantly different amounts for net income and equity in the parent company's currency. Of course, these differences should not affect your estimate of free cash flow for the subsidiary.

SUMMARY

You should apply the DCF valuation approach to foreign companies in just the same way you apply it to domestic companies. Nevertheless, some difficult issues can arise in valuing foreign companies or domestic companies with foreign operations. You need to understand and reflect local accounting in your analysis, but the adjustments are typically straightforward, following the general guidelines from Chapter 9. Because IFRS and U.S. GAAP are now the

dominant accounting standards, however, any difficulties arising from international accounting differences have been greatly reduced.

Cash flows for foreign businesses can be projected in foreign or domestic currency as long as you apply your chosen method of currency translation—spot rate or forward rate—consistently. The approach for estimating the cost of capital should be the same for any company anywhere in the world. With the global integration of capital markets in mind, we recommend using a single real-terms, risk-free rate and market risk premium for companies around the world. Currency risks do not require separate premiums to be added to the cost of capital, as empirical research has shown that even though these are valid in theory, they have proven negligible in practice.

REVIEW QUESTIONS

1. Is the cost of risk-free financing the same or different in different countries?
2. Many companies use economists' forecasts of foreign-exchange rates to translate cash flow projections denominated in foreign currency. What are the possible drawbacks of using such forecasts?
3. Why do local market risk premiums differ across national stock markets? Do the differences mean that some markets are more attractive to invest in than others?
4. Are there conditions under which you should consider using a local market risk premium and a local beta estimate for a valuation, rather than a global risk premium and beta? Explain.
5. What impact does the globalization of capital markets have on a manager's judgment of the appropriate cost of capital to employ when estimating the value of a subsidiary headquartered in a foreign country?
6. U.S. Generally Accepted Accounting Principles (GAAP) and International Financial Reporting Standards (IFRS) are converging. Since this is the case, why would a manager need to understand the historical differences between these standards?
7. Discuss the differences between the current, temporal, and inflation-adjusted current methods for translating the financial statements of acquisitions or divisions located in moderately inflationary and hyperinflationary economic environments.
8. The forward-rate and spot-rate methods for discounting foreign-currency cash flows are equivalent if interest rate parity holds. Assume that interest rate parity does not hold for a specific currency because it is pegged to the dollar at a fixed exchange rate and capital flows are controlled by the monetary authorities in the country in question. Which method would apply in that case and why?