CHAPTER 7. ENTERPRISE COST OF CAPITAL

The cost of capital is a concept that is central to valuation, investment (and divestment) decisions, measures of economic profit, and performance appraisal. Perhaps you already understand the cost of capital from other finance courses. As a review, think about someone who makes an investment, hoping to make a profit in the future. Since the future value of the investment is uncertain today, the investor thinks today in terms of an expected rate of return. The investor has a target expected rate of return that is compensation for the risk specific to the investment. That target expected rate of return is sometimes called the required rate of return, or the cost of capital, for the investment. Given the risk taken, the investor makes a good investment if he expects a higher rate of return than the cost of capital.

Financial market investors have required rates of return on their investments in firms' equity. The market's aggregate required rate of return on a company's shares is the company's cost of equity. The overall cost of capital for the company as a whole is similarly the required rate of return the market would have on the whole company, that is, on the company if it were entirely financed by equity. You probably recall the weighted average cost of capital, or WACC, from prior finance courses. The WACC is an estimate of the overall cost of capital for the firm as a whole. In this chapter, we cover a different version of the cost of capital called the enterprise cost of capital, or ECC. A firm's ECC is based on the risk of the firm's business operations, whereas the WACC is based on the risk of the firm as a whole. The firm as a whole encompasses not only the firm's business operations, but also the firm's financial risk management policies. Thus, we'll see that a firm's ECC usually differs from its WACC due to the firm's chosen financial risk management policies. A firm's WACC is often estimated by standard methods, but estimating a firm's ECC requires some additional effort.

In addition to the firm's overall ECC, each division or project of a firm is likely to have its own ECC, based on the specific risk of the division or project. That is, a division's ECC differs from the firm's overall ECC because the risk of the division's business operations is different than the risk of the overall firm's business operations, especially for an overseas division. A division's ECC is even more difficult to estimate than a firm's overall ECC, but we cover some methods to use. We first introduce the global Capital Asset Pricing Model (global CAPM), which we'll often use in the text. The global CAPM is an extension of the traditional CAPM that you may have learned in other courses. The global CAPM is theoretically superior to the traditional CAPM in a world of globally integrated financial markets and internationally diversified investors. Since financial capital now flows fairly freely throughout the developed world's financial markets, and since investors worldwide are finding it increasingly simple and convenient to invest internationally, our emphasis on the global CAPM seems justified. Cost of capital may be viewed from the perspective of different currencies. So you must be careful to specify which currency you are using to express a firm's (or a division's) cost of capital. If your analysis of a Swiss division is in US dollars, you use a cost of capital for the division from the US dollar perspective. If your analysis of the Swiss division is in Swiss francs, you use a cost of capital for the division from the Swiss franc perspective. For example, a firm's cost of equity might be 10% expressed in US dollars and 8% expressed in Swiss francs. The different numbers expressed in different currencies are different ways to express the same COST OF EQUITY. Expressing a firm's cost of equity from different currency perspectives is no different from saying that a firm's equity has only one value, but it is a different number when expressed in different currencies. For example, you can express a firm's equity value either as $100 or Sf 160 assuming a spot FX rate of 1.60 Sf/$. This is the same idea as a firm's cost of equity being 10% in US dollars or 8% in Swiss francs. Here in this chapter, we focus only on cost of capital from the US dollar perspective, even for the overseas divisions of US companies. The next chapter takes a look at cost of capital from the perspective of other currencies.

GLOBAL CAPM

You likely learned about the capital asset pricing model (CAPM) in previous finance courses. The CAPM is a standard model of risk and required return that practitioners have found to be very useful. In a 1995 survey of 27 highly regarded companies, the most common model used in estimating cost of equity was found to be the CAPM. A more comprehensive survey published in 2001 reported that 73.5% of 392 responding chief financial officers of US companies use the CAPM.

You should recall that in the traditional CAPM,

asset i's Equilibrium Expected Rate of Return: $k_i = r_f + \beta_i(MRP)$

where, r_f is the risk-free rate of interest,
β_i is the beta of asset i relative to the market portfolio,
MRP is the market risk premium.

The Equilibrium Expected Rate of Return on asset i, (k_i) is not the actual expected asset return, but is the minimum expected rate of return, or required rate of return, that investors must earn to compensate for the asset's beta risk, β_i. You can think of an asset's beta as its sensitivity, or exposure, to unexpected changes in the value of the market portfolio.

Example: if an asset has a beta of 1.20 and the market portfolio's rate of return is 10% higher than expected, then the asset's rate of return will (on average) be 1.20(10%) = 12% higher than expected.

The market risk premium, MRP = $k_M - r_f$, i.e., the required rate of return on the market portfolio minus the risk-free rate.

The MRP is the minimum rate of return over the risk-free rate that investors (in the aggregate) require as compensation for the risk in the most diversified portfolio possible, the market portfolio.

The market risk premium, MRP, depends not only on how much volatility (risk) is in the overall market, but also the average investor's degree of risk aversion. Thus the MRP changes as market volatility changes and as investors' tolerance for risk changes.

Years ago, it was standard to use 7%-8% for the US equity market risk premium. More recently, the US equity market portfolio has become less volatile and investors have become less risk averse, justifying estimates for the US equity market risk premium of 3%-4%.

There is some natural tendency to think in terms of a separate CAPM for each country, e.g. a US CAPM in US dollars based on the US market portfolio, a British CAPM in pounds based on the British market portfolio, and so forth. This tendency is a mistake. As the world's financial markets have integrated, we must interpret the CAPM a global sense and think in terms of a common risk-return trade-off for all assets in the integrated global financial market, regardless of asset nationality or whether we choose to express the trade-off in US dollars, in euros, or in any other currency.

The version of the CAPM we use in this text is called the GLOBAL CAPM.

The required rate of return on asset i in the global CAPM depends on:

1. a beta for the asset, $\beta_{iG}^{\$}$
2. a market risk premium, $GRP^{\$}$
3. a risk-free rate, $r_f^{\$}$

It is the interpretation of the three factors that distinguishes the global CAPM from the traditional CAPM. Asset i's equilibrium expected rate of return in US dollars, $k_i^{\$}$, is given in the global CAPM in equation (7.1):

Asset *i*'s equilibrium expected rate of return (US \$): $k_i^{\$} = r_f^{\$} + \beta_{iG}^{\$}(GRP^{\$})$ (7.1)

$GRP^{\$}$ represents the risk premium on the global market index, or global risk premium

In the global CAPM, we interpret the market portfolio as the global market portfolio: theoretically the portfolio of all risky assets in the integrated financial world.

Even though the global market portfolio includes assets from countries around the world, for purposes of applying equation (7.1) the rate of return is expressed in terms of US dollars. We do not simply combine the rates of return on all risky assets from the view of their local currencies, we must adjust all rates of return to one currency. The global market index should be an unhedged index, meaning that FX changes are part of the returns.

Although the Dow Jones World Index is an unhedged global index reported in US dollars in the Wall Street Journal, many regard the MSCI World Index as the best global market index. (MSCI stands for Morgan Stanley Capital International.) The MSCI World Index is an unhedged index that can be expressed from the point of view of any currency, inclusive of the impact of FX changes on foreign shares. Thirty years ago, we said that investors could not possibly hold the entire market portfolio, or even the S & P 500 stock portfolio. But the creation of index funds in the 1970s changed that. Nowadays, index funds abound.

The beta in the global CAPM is the asset's global beta: $\beta_{iG}^{\$}$ measured in US dollars.

This beta measures the sensitivity of its US dollar returns, adjusted into US dollars if a foreign asset, relative to the US dollar returns of the unhedged global market index.

In equation (7.1), $GRP^{\$}$ represents the risk premium on the global market index, or global risk premium, in US dollars: the equilibrium required rate of return on the overall unhedged global market portfolio in US dollars minus the US dollar risk-free rate. Different sources recommend different estimates for $GRP^{\$}$. Based on recent estimates for the US equity market premium of 3% to 4%, and since the global beta of the US equity market index has on average been about 1 in recent years, we will consistently use 4% for $GRP^{\$}$ in all our examples.

The Global Risk Premium reflects two factors:

1. the level of volatility risk in the global financial market; and
2. how the risk is priced in global markets, based on the degree to which global investors are averse to risk.

Thus, while 4% seems like a reasonable estimate for $GRP^{\$}$ in the current environment, the best estimate in the future may change with market conditions.

The risk-free rate used in equation (7.1) is for an asset that is risk-free in US dollars. It is not some kind of world average of risk-free rates in various currencies. The term risk-free rate used here is assumed to mean the nominal interest rate on an asset that has no credit risk.

There has been much debate over whether US firms should use a short-term Treasury bill rate or a long-term Treasury bond rate as the risk-free rate in the CAPM. Indeed, surveys find companies are split on the issue. The best approach may be to view the proper risk-free rate as dependent on the horizon of the application.

For COST OF EQUITY ESTIMATION, the horizon is long-term. So a long-term Treasury bond yield is often used in equation (7.1) for the risk-free rate. A slight adjustment is covered in the asterisked section later in the chapter.

Example: assume the US dollar risk-free rate is 6%. With a global risk premium of 4% and the estimate of IBM's global equity beta in US dollars of 1.03, the estimated US dollar cost of equity for IBM is:

$k_S^{\$} = 0.06 + 1.03(0.04) = 0.101$, or 10.1%.

(In this text, the subscript notation for equity is S, for stock.)

There are more complex theoretical versions of international asset pricing models than the global CAPM in equation (7.1). Some of the versions contain extra factors for FX risk. In practice, the marginal benefits of using a more complex model may not justify the additional complexity.

The simple global CAPM in equation (7.1) should be sufficient for many purposes as a model of risk and return in integrated markets.

General Electric's estimated global equity beta (in US dollars) is 0.69. Assume the US dollar risk-free rate is 6% and the global risk premium in US dollars is 4%. What would be the estimated cost of equity in US dollars for GE with the global CAPM?

Answer: GE's estimated global equity beta is 0.69. The global CAPM implies that GE's ESTIMATED COST OF EQUITY in US dollars is:

$$K_S^{\$} = r_f^{\$} + \beta_G^{\$} \times GRP = 0.06 + 0.69\left(0.04\right) = 0.088,\ or\ 8.8\%$$

Figure 7.1 shows the global CAPM in US dollars graphically. You can think of the line as representing the expected rate of return in US dollars that would be required on any asset, regardless of country, as compensation for the asset's systematic risk relative to the global market index in US dollars. The line shows the relationship between risk and expected return in US dollars, in equilibrium, i.e., for assets that are correctly priced in US dollars in the global financial market. The slope of the line is the global risk premium.

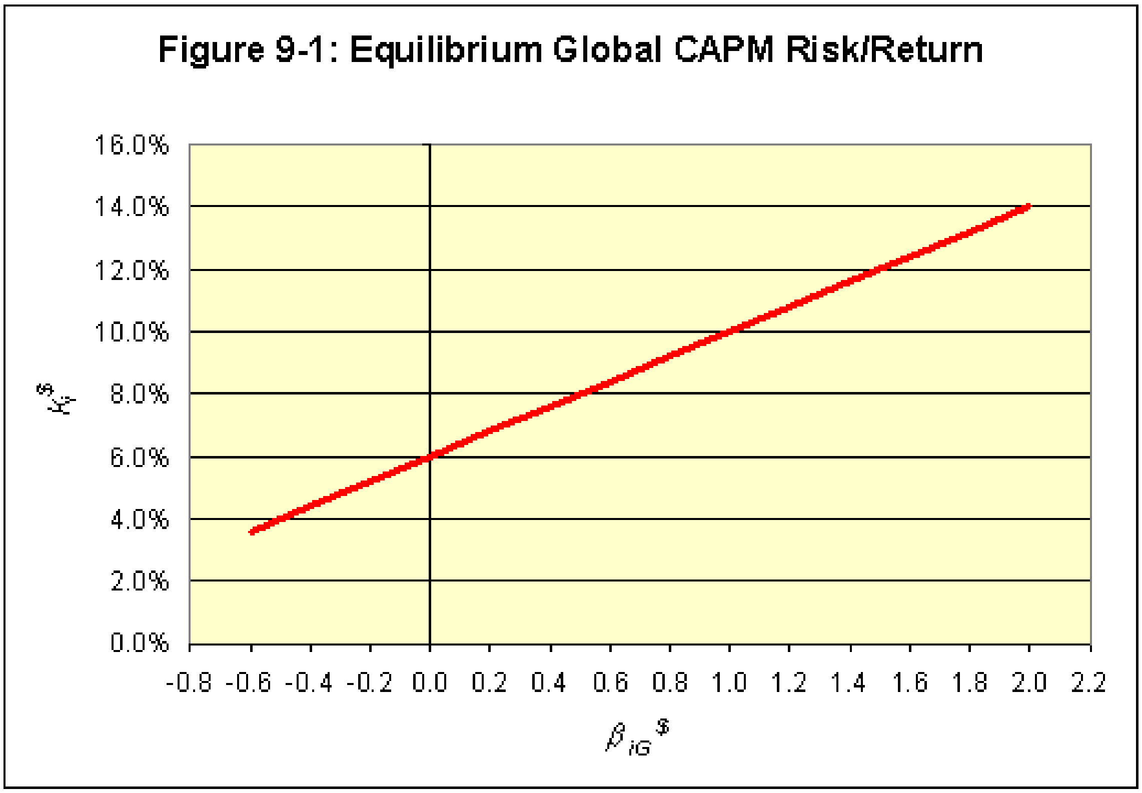

Figure 7.1 shows the equilibrium risk/return relationship of the global CAPM in US dollars. The assets are from all countries in the integrated global financial world, but the returns are in US dollars. The risk/return trade-off line intercepts the Y-axis at the US dollar risk-free rate, assumed in this graph to be 6%. The slope of the line is the global risk premium, i.e., the risk premium in US dollars required on the global market portfolio, assumed in this graph to be 4%.

Whichever currency we express the risk-return trade-off, the notion of using one trade-off for all assets in the world, including foreign assets, requires a conceptual leap because we have traditionally taken a risk-return relationship in US dollars to apply to US assets; or a risk-return relationship in British pounds to apply to UK assets, and so on. In fact, the tradition comes from viewing national financial markets as segmented from each other. Today, in a global financial market, we must abandon this traditional notion of country-specific CAPMs. We are in a new world where the most logical risk-return model is the global CAPM applied to all assets in the integrated financial markets.

AMERICAN DEPOSITARY RECEIPTS (ADRs)

American Depositary Receipts (ADRs) help us see this point about asset pricing in globally integrated markets. ADRs are foreign shares directly traded in the United States in US dollars. A depositary, like Bank of New York, will hold the actual foreign shares in that foreign country, while the US office issues US dollar-denominated receipts that are more easily traded in US markets. Stocks traded on both their home and foreign exchanges are said to be cross-listed stocks.

In 1990, there were only 352 non-US stocks traded on the New York Stock Exchange (NYSE) and NASDAQ, but, by the end of 2002, the number was more than 850. If one includes over-the-counter and private placement issues, there are now more than 2300 foreign companies with shares traded in the United States. This situation reflects the US investors' need for international diversification and the desire of foreign companies to access global capital, broaden their shareholder base, and enhance company visibility.

The price of an ADR must obey the "international law of one price", or there will be a relatively easy arbitrage between the ADR shares and the actual underlying shares, called the ordinary shares.

Example: if the ordinary shares of Siemens are priced in Germany at €100 per share at time 0, when the spot FX rate is 1.25 $/€, then the ADRs should be priced at $125 in the United States.

If the ordinary Siemens shares are priced in Germany at €120 per share at time 1, when the spot FX rate is 1.45 $/€, the ADRs should be priced in the United States at €100*1.25 $/€=$174.

Given no-arbitrage pricing of Siemens ADRs and the ordinaires, an investor in Siemens ADRs would earn the same RATE OF RETURN in US dollars of $174/$125 – 1 = 0.392, or 39.2%.

Otherwise, there would be an easy arbitrage opportunity for traders who have access to both markets.

Ignoring transaction costs, there is really no difference whether a US investor holds actual Siemens shares or the ADRs. Either way, the rate of return in US dollars is the same, as the ADR returns will reflect both returns on an ordinary share and changes in the spot FX rate.

ADRs often trade in a share ratio different than one-for-one. For example, one ADR for Telefonos de Mexico represents 20 underlying Mexican shares, while one ADR for Diageo (a British company that resulted from the merger of Guinness and Grand Metropolitan in 1997) represents four ordinary UK shares.

The ordinary shares for Diageo are denominated in British pounds and traded on the London

Stock Exchange (LSE). There is one ADR share for every four ordinary shares. At time 0, the price of an ordinary share is £10 in London and the spot FX rate is 2 $/£. At time-1, the ordinary shares are priced at £12 and the spot FX rate is 1.60 $/£.

A) What is the no-arbitrage price of a Diageo ADR share in US dollars at time 0?
B) What is the time-1 no-arbitrage price of an ADR share?
C) What will be the rate of return to a US investor who buys the Diageo ordinary shares at time 0 and holds until time 1?

Answers:

A) An ordinary share is worth £10(2 $/£) = $20 at time 0.

4 Ordinary shares underlie 1 ADR share, an ADR share should be priced at $20x4 = $80 at time 0.

B) An ordinary share is worth £12(1.60 $/£) = $19.20 at time 0.

4 ordinary shares underlie 1 ADR share, an ADR share should be priced at $19.20x4=$76.80 at time 0.

C) Thus the rate of return in US dollars is $76.80/80 – 1 = –0.04, or –4%.

It is difficult to gauge the amount of arbitrage that occurs between ADRs and underlying ordinaries. However, there are a number of vehicles to facilitate the process, including the Bank of New York's DR Converter, which is a proprietary cost analysis model for ADRs versus home-market ordinaries with web-based access for global investors. Citibank's ADR division has initiated a system to reduce the settlement delays and risks for its customers in ADR issuances and cancellations. The ADR Cross-Book Maximizer of J. P. Morgan's ADR division is the market's first on-line automated marketplace for ADR traders and brokers to execute ADR-ordinary share exchange transactions.

The amount of US trading in foreign company ADRs varies. For some stocks, trading in the United States represents less than 5 percent of global trading, while for others the US trading is over 90 percent. Tomkins, a UK engineering company has very low trading in the United States, but GlaxoSmithKline, a UK pharmaceutical company experiences US trading of about 30%. The larger the percentage of trading in the United States, the more the price is determined in the US market instead of the home market, i.e., the more the "tail wags the dog." But the no-arbitrage relationship should hold regardless of which market price determination takes place.
We cannot estimate required rate of return on the equity of Sony in yen using Sony's equity beta against Japanese market index (in yen) and Sony's required rate of return on equity in US dollars using Sony's ADR beta against the US market index. There is nothing in that approach that links the ordinary Sony shares to the Sony ADRs. Sony's ordinary shares are the same as the ADRs except for the currency denomination; this fact implies that the required rate of return from different currency perspectives must be based on the systematic risk relative to the same market index, but from the different currency perspectives. It would be better to use a world index for both estimations: use the world

index from the yen point of view in estimating the required rate of return on Sony's equity in yen, and use the world index from the US dollar point of view in estimating the required rate of return on Sony's equity (ADRs) in US dollars.

What about the cost of equity for Sony in Japanese yen or cost of equity for a US firm in another currency? It is indeed possible to "rotate" the global CAPM in equation (7.1) into a global risk-return trade-off that applies to all assets from the perspective of Japanese yen or any other currency.

If the currency is Japanese yen, the global market portfolio and betas would be viewed from the yen perspective, and the risk-free rate is the yen risk-free rate.

However for technical reasons, the risk-return trade-off has a bit more complicated formula than in equation (7.1) for any currency other than the US dollar (next chapter).

In a perfect market, all assets' expected rates of return would plot exactly on the equilibrium line in Figure 7.1. In reality, if an asset is undervalued (overvalued), its actual expected return will plot above (below) what the line says the expected return would be if the asset were correctly valued.

In US dollars, a foreign asset can be misvalued for either of two reasons:

1. the asset is misvalued in its own currency; or
2. the spot FX rate is misvalued.

To see this point, think about an ADR whose expected rate of return in US dollars depends on its expected rate of return in its own currency and an the expected rate of spot FX change.

GLOBAL vs LOCAL EQUITY BETAS (US DOLLARS)

One worry that some researchers have about the global CAPM is that investors have tended to invest more in assets of their own country than would be advisable given the benefits of international diversification. This tendency is called home bias. Researchers are exploring why home bias occurs, and debating whether it means that local country-specific CAPMs still have some relevance. Despite the home bias, the extent of investors' international diversification and financial markets' integration suggests that the global CAPM is a more appropriate model of risk and return in integrated financial markets than the traditional local CAPM.

For the United States, there is an argument that so many US companies are globally diversified that the US equity market index should behave like a global market index. Indeed the correlation has been about 0.90. And, a study of the differences in the cost of equity estimates for almost 3000 US companies reports that the average difference in the cost of equity estimates between the global CAPM and local US CAPM is about 50 basis points, which many analysts may view 50 basis points as insignificant.

These points may explain why many US companies are currently continuing to use the traditional (local US) CAPM in cost of equity estimation. For assets from other countries, however, there is likely to be a larger difference between the results of using the global CAPM and the local CAPM.

Right now, there are no published estimates of firms' global equity betas. The only way to obtain a global beta estimate is to use regression analysis, as described in Interactive Exercise 2.1. Estimated global equity betas against the MSCI World Index, in US dollars, for selected firms are shown in Exhibit 7.2, along with the estimated traditional local US equity betas for comparison. The estimates were made using monthly rates of return and the method of Interactive Exercise 7.1. Two estimation periods are shown: December 1997 through November 2002, and December 2002 through November 2007.

Example: with monthly returns from November 2002 through November 2007, IBM's estimated global equity beta in US dollars is 1.03. This estimate represents the systematic risk of the firm's equity as viewed by a US dollar holder of an unhedged globally diversified equity portfolio. IBM's estimated local equity beta relative to the US equity market index for the same period is 1.19. This would be IBM equity's systematic risk in a diversified portfolio of US stocks only.

Example: Let us assume the US dollar risk-free rate is 6%. With a global risk premium of 4% and the estimate of IBM's global equity beta in US dollars of 1.03, we found earlier that the estimated US dollar cost of equity for IBM is 10.1%. Using 4% also for the local US market risk premium, IBM's ESTIMATED COST OF EQUITY with the traditional local CAPM would be:

$k_S^{\$} = 0.06 + 1.19(0.04) = 0.108$, or 10.8%.

Use General Electric's estimated global equity beta (in US dollars) and local US equity beta from Exhibit 7.2 for the December 2002 through November 2007 period. What would be the estimated cost of equity in US dollars for GE with the global CAPM? Compare this estimate with the one with the local US CAPM. Assume the US dollar risk-free rate is 6%, the global risk premium in US dollars is 4%, and the US market risk premium is 4%.

Answers: GE's estimated global equity beta is 0.69. The global CAPM implies that GE's estimated cost of equity in US dollars is 0.06 + 0.69(0.04) = 0.088, or 8.8%. GE's estimated local US equity beta is 0.81. The local US CAPM would imply that GE's estimated cost of equity in US dollars is 0.06 + 0.81(0.04) = 0.092, or 9.2%.

The examples for IBM and GE show that the global CAPM and the local CAPM do not give the same cost of equity estimates. Given our assumption that the risk premium of the US equity market should is the same as the global risk premium, the error one would make in using the local US CAPM when the global CAPM is the correct theory will be mainly driven by the difference between a stock's global beta and local beta.

A firm's global beta may be higher or lower than its traditional local beta. In our examples for IBM and GE, the estimated local US equity beta is higher than the estimated global equity beta. For Exxon, on the other hand, Exhibit 7.2 shows for the December 2002 through November 2007 period an estimated global equity beta of 0.85, higher than the estimated local US equity beta, 0.73.

Exhibit 7.2 also shows some estimated betas for a few selected ADRs. Sony's ADR returns in US dollars had a global beta estimate of 0.44 for the 2002-2007 period. That Sony is headquartered in Japan has no bearing on the fact that a US investor holding a globally diversified portfolio views the risk of holding Sony's ADRs as the beta in US dollars relative to the global market index In US dollars. For comparison, the estimated beta of Sony's ADR returns with the US equity market is also shown, and is 0.24 for the 2002-2007 period.

So the estimated global beta in US dollars for Sony ADRS is higher than the beta estimated relative to the US equity index. This holds for both estimation periods. The same can be said for BHP Billiton, and Diageo. The estimated global beta in US dollars for GlaxoSmithkline ADRS is higher than the beta estimated relative to the US equity index for the latter estimation period but not for the earlier one. So it is difficult to generalize, because we know that FX trends impact ADR returns and global market index returns, in US dollars.

Of course, the choice of time span affects any estimated equity beta. A firm's equity beta is likely to change if the firm changes its operating or financial structure, or even if the composition of the market portfolio changes while the firm stays the same.

ENTERPRISE VALUE and ENTERPRISE COST of CAPITAL

Enterprise Value is meant to measure what a firm's business operations are worth. Firms have different debt ratios and different cash strategies. Enterprise value strips those choices out and states a presumed market value for a firm's operations if the firm had no debt and no cash holdings.

Practitioners compute a firm's enterprise value as the firm's equity market cap plus the firm's debt minus the firm's "cash":

ENTERPRISE VALUE = Equity Market Cap + Debt - Cash

Equity market cap refers to the market capitalization value of the firm's outstanding equity: market price per share times the number of shares outstanding:

Equity Market Cap = Market Price/Share x Number Shares Outstanding

The term CASH refers to "cash plus liquid marketable securities".

Sometimes, debt minus cash is called net debt. So enterprise value may also be computed as the market cap of the firm's equity plus net debt.

NET DEBT = DEBT - CASH

Example: assume a GCH Company has 10 million shares outstanding. The share price is $40. The firm's Equity Market Cap = $40 x 10 Million = $400 million.
The company has:
Cash = $100 million
Debt = $250 million.
Net Debt = $250 mil - $100 mil = $150 million.
Enterprise Value = $400 million + $150 million = $550 million.
The difference between the firm's enterprise value and its total value is shown in the value balance sheet below.

As we said, we'll use the term enterprise cost of capital and the abbreviation ECC to refer to the cost of capital for the firm's enterprise, that is, the firm's business operations. Finance theory tells that present value of the firm's future expected operating cash flows, using the ECC as the discount rate, is the firm's intrinsic enterprise value.

ABC Company has 20 million shares outstanding. The share price is \$30. The company has \$100 million in cash and \$200 million in debt. Find ABC's enterprise value.

Answer: The firm's equity market cap is \$600 million. The net debt is \$100 million. The enterprise value is \$600 million + \$100 million = \$700 million.

If a firm makes new operating investments that have the same degree of risk as the existing enterprise, the stream of future expected incremental operating cash flows should represent an expected rate of return of at least the firm's ECC.

This point may be obvious when the investment requires new external financing, but is also the case for organic growth by reinvesting operating cash flows. If the rate of return on new operating investments is not expected to be at least the ECC, the firm is not making a good investment and the firm's intrinsic enterprise value will fall.

In general, the Present Value in US dollars of the Stream of Expected Operating Cash Flows is expressed as the sum of the present values of each of the operating cash flows expected from year 1 through year N:

$$V^{\$} = \sum_{t=1}^{N} \frac{E\left(O_t^{\$}\right)}{(1 + k_V^{\$})^t}$$

Where: $E(O_t^{\$})$ = the expected operating cash flow in US dollars at time t.
$k_V^{\$}$ = the enterprise cost of capital in US dollars.
$V^{\$}$ = the firm's intrinsic enterprise value in US dollars.
N = the number of years that operating cash flows are expected.

It will be easier for us for now to use the Standard Constant Growth Model for Valuation, which assumes that the expected operating cash flow stream grows at a constant rate into perpetuity. The firm's Intrinsic Enterprise Value can be expressed as the present value in US dollars of the expected future operating cash flow stream using the constant growth formula in equation (7.2):

Intrinsic Enterprise Value: $$V^{\$} = \frac{E\left(O^{\$}\right)}{(k_V^{\$} - g^{\$})} \qquad (7.2)$$

Where: $g^{\$}$: constant rate at which firm's operating cash flows (in \$) are expected to grow (perpetually)
$k_V^{\$}$ = the enterprise cost of capital in US dollars.
$E(O^{\$})$: be the initial operating cash flow of the enterprise.

Example: RPC's future operating cash flows are expected to start with \$200 and grow perpetually at an annual rate of 6%. RPC's managers estimate the firm's ECC in US dollars is $k_V^{\$}$ = 11%. We can apply equation (7.2) to find RPC's intrinsic enterprise value in US dollars: \$200/(0.11 – 0.06) = \$4,000.

ANC Company expects future operating cash flows of \$1000 initially and a growth rate of 5% per annum. The enterprise cost of capital in US dollars is 7.5%. What is ANC's intrinsic enterprise value in US dollars?

Answer: $1000/(0.075 – 0.05) = $40,000.

A firm's overall cost of capital is different from the firm's ECC partly because of the firm's holdings of cash and marketable securities. Other things equal, the more cash and marketable securities a firm holds, the lower the firm's overall cost of capital, i.e., the lower the firm's WACC.

A firm's overall cost of capital is different from the firm's ECC also because of off-balance sheet financial risk management positions. The forward FX contracts you learned about in Chapter 3 are examples of off-balance sheet risk management positions, as are other financial derivatives we cover later like currency swaps. Options are another kind of financial derivative that companies use to manage risk. If a firm has off-balance sheet financial risk management positions, its overall cost of capital is likely to be different than if it does no financial risk management.

The firm as a whole is a portfolio made up of:

1. the enterprise, i.e., the business operations;
2. cash and marketable securities holdings; and
3. off-balance sheet financial risk management positions.

The expected rate of return an investor in the firm requires on this overall portfolio, i.e., the portfolio's cost of capital, depends on the risk of the overall portfolio. The risk of the enterprise stripped away from the portfolio is different than the risk of the overall portfolio, so the ECC is different than the overall cost of capital for the firm as a whole.

Example: consider three different firms:
Firm A is just the enterprise and has no cash and marketable securities, and no risk management positions.
Firm B is the same as Firm A except that Firm B has a large "cash" buffer of US dollar marketable treasury securities.
Firm C is the same as Firm B except that Firm C has a large long forward FX position on euros.

Think in terms of the CAPM. Other things the same, Firm B has a lower beta than Firm A because of its treasury securities holdings. So Firm B has a lower overall cost of capital than Firm A. If the euro's currency beta > 0, Firm C will have a higher beta than Firm B. So Firm C has a higher overall cost of capital than Firm B.

As we have said, a standard way to estimate a firm's overall cost of capital is to use information about the capital sources and the weighted average cost of capital, or WACC. WACCs are often used for many purposes in corporate finance, and thus many companies compute WACCs. But we know that a firm's WACC is an estimate the firm's overall cost of capital, not the firm's ECC.

That is, say we estimate WACCs (in US dollars) of 10% for Firm A, 8% for Firm B, and 9% for Firm C. This does not mean that these firms should use these rates to discount expected operating cash flows. Instead, as we have said, the firms should discount expected operating cash flows at the ECC, which will be the same for all three firms because the firm's have the same operating assets and thus the same risk in the operating cash flow. (Actually, Firm A's WACC is equal to its ECC in this example, because Firm A has no cash and marketable securities and no off-balance sheet financial risk management positions.)

The WACC is the correct discount rate with which to value a firm's expected total cash flows, including those from its financial risk management activities, to find the firm's overall value.
The ECC is the correct discount rate with which to value a firm's expected operating cash flows to find the firm's enterprise value.

ENTERPRISE BETA

Estimating an ECC is not as easy as estimating a WACC, so we have to be more creative when we estimate ECCs. Our approach to estimating an ECC is to use the global CAPM. To do this, we need to estimate an enterprise beta. Estimating a firm's enterprise beta is not as easy as estimating the equity beta of a publicly traded firm, because there are no direct observations of enterprise value.

One method is to create a time series of a firm's historical enterprise values using equity market cap plus net debt. To do this requires balance sheet information that you have to gather. With your time series of historical enterprise values, you would then create a corresponding time series of enterprise rates of return. Then estimating the enterprise beta would use the same procedure as in Interactive Exercise 7.1. This is the direct method for estimating an enterprise beta.

If a firm has an estimated equity beta, an indirect approach may be used, called **UNLEVERING**. The unlevering method requires the same balance sheet information as the direct method, and more. We need to know if the firm's net debt, and off-balance sheet financial risk management positions have any systematic risk.

We'll get into the details of this, but to get the basic idea, assume for now that the firm's net debt and off-balance sheet financial risk management positions have no systematic risk. In this case, the formula for unlevering an estimated equity beta to find an estimated enterprise beta is fairly simple…

Assume that the equity beta has been estimated from the perspective of US dollars, $\beta_S^{\$}$.

For the rest of the text, we'll use the global CAPM and the corresponding global beta. So for convenience, we'll use the term beta to mean global beta. And we'll use the notation $\beta_i^{\$}$ to mean $\beta_{iG}^{\$}$. As said, the subscript notation S is used in this text to denote equity, or stock.

Let $ND^{\$}$ represent the firm's net debt, each element having been converted into US dollars

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at the current spot FX rate, if necessary. The formula for estimated enterprise beta in US dollars, $\beta_V^{\$}$, is given in equation (7.3):

Estimated Enterprise Beta in US \$: $$\beta_V^{\$} = \beta_S^{\$}\left(1 - \frac{ND^{\$}}{V^{\$}}\right) \qquad (7.3)$$

Example:
ANC's estimated equity beta (in US dollars) be 1.20.
ANC's equity market cap is $60 million
ANC's net debt is $20 mil ($30 mil of debt and $10 million of cash and marketable securities). Estimated Enterprise Value is $80 million.
The Ratio of Net Debt to Enterprise Value, $ND^{\$}/V^{\$}$, is $20 million/$80 million = 0.25.
ANC has no off-balance sheet risk management positions, and its debt and cash are denominated entirely in US dollars and have no systematic risk.
ANC's estimated enterprise beta (in US dollars) is 1.20(1 – 0.25) = 0.90. (Eq. 7.3)

A firm's net debt and off-balance sheet financial risk management positions may have systematic risk if interest rate changes or FX rates are correlated with the market portfolio. We'll ignore the systematic risk in interest rate changes. The items in net debt or the off-balance sheet financial risk management positions will thus have no systematic FX risk if they are denominated in US dollars or if the currency has a zero currency beta. If the firm's net debt and off-balance sheet financial risk management positions have systematic FX risk, the formula for unlevering an estimated equity beta to find an estimated enterprise beta is more complex than equation (7.3), and we'll come back to that later.

Once you have an estimated enterprise beta in US dollars, you can find the enterprise cost of capital in US dollars from the global CAPM in equation (7.1).

Example: assume that AEM's enterprise beta in US dollars is 0.75. If the risk-free rate in US dollars, rf$, is 5%, and if the global risk premium in US dollars, GRP$, is 4%, the company's **ENTERPRISE COST OF CAPITAL** in US dollars is:

$$k_V^{\$} = r_f^{\$} + \beta_V^{\$}(GRP\$) = 0.05 + 0.75(0.04) = 0.08, \text{ or } 8\%.$$

GRF's estimated equity beta in US dollars is 0.80. GRF's equity market cap is $100 million and its net debt is $25 million ($35 million of debt and $10 million of cash). GRF has no off-balance sheet financial risk management positions, and its debt and cash are denominated entirely in US dollars and have no systematic risk. Find GRF's estimated enterprise beta in US dollars.

Answer: *GRF's estimated enterprise value is $125 million. The ratio of net debt to enterprise value is $25 million/$125 million = 0.20. From equation (7.3), GRF's estimated enterprise beta in US dollars is 0.80(1 – 0.20) = 0.64.*

The US firm BBX Co. exports widgets to the Eurozone. BBX has an enterprise beta in US dollars of 0.80. Use the global CAPM to estimate BBX's enterprise cost of capital (ECC) in US dollars if the risk-free rate in US dollars is 5% and the global risk premium in US dollars is 4%.

***Answer**: Using the global CAPM in equation (7.1), BBX's **ECC** in US dollars is 0.05 + 0.80(0.04) = 0.082, or 8.2%.*

*ECC*s for OVERSEAS DIVISIONS

The ENTERPRISE COST OF CAPITAL OF A DIVISION is the rate of return that would be required on investing in the division by the global financial market as compensation for risk if the division were an independent entity.

If a division has a higher enterprise beta than the firm's enterprise beta, the division's ECC should be higher than the firm's ECC.

If the firm's ECC were used as the division's ECC, the manager may make investments that do not offer enough reward to compensate for risk. If a division's enterprise beta is lower than the firm's enterprise beta, the division's ECC should be lower than the firm's ECC. Multinational managers who do not recognize this may miss out on profitable foreign expansion opportunities by setting the ECC too high for some overseas investments.

One reason an overseas division's enterprise beta may differ from the company's enterprise beta is that the division and the rest of the company are likely to have different basic relationships with the global economy.

Example: the sales volume or the operating cost of a Japanese division may have a different correlation with the global market index than the rest of the company has. Thus the enterprise beta of a Japanese division may be different from the enterprise beta of the firm, even when both enterprise betas are measured in US dollars.

Estimating a division's enterprise beta has its own problems, since the enterprise beta is not directly observable and there are typically no historical divisional price data to use in statistical estimation. So we have to be somewhat creative when estimating division-specific enterprise betas. Two simple approximation methods for estimating a division's enterprise beta are reviewed in this chapter, the **ACCOUNTING BETA METHOD** and the **COUNTRY BETA METHOD**. Neither of the methods is perfect, but should be helpful. There is a third method that we cover later in the text.

We first show how to estimate the enterprise beta and ECC for a division in a developed country. In this case, we simply plug the estimated enterprise beta into the global CAPM equation to estimate the ECC for the overseas division. Then we show adjustments that may be appropriate if the division is in an emerging market country. Because emerging markets tend to be less integrated with the global markets than are developed markets, estimating the cost of capital for an investment in an emerging market country has other considerations in addition to the enterprise beta. A given emerging market country may have considerable sovereign risks, like expropriation risk, risk of war or civil disturbance, risk of policy changes, and so forth.

ACCOUNTING BETA METHOD

Our first simple approach to estimating the enterprise beta for a division is the accounting beta method. An **ACCOUNTING BETA** is estimated by a regression of a time series of return on assets (ROA) observations against the corresponding returns of the global market index. ROA is operating profit divided by the total assets. Although an accounting construction of profit per dollar of assets, ROA is conceptually similar to the market rate of return usually used to calculate a beta. We presume that firms have ROA data for their individual divisions.
We have said that a Japanese division's enterprise beta may be different than the multinational's enterprise beta because of fundamental economic differences between the particular operations in Japan and the multinational's other operations in the rest of the world. The accounting beta method suggests that we can capture that difference by looking at the accounting betas.

We first find a division's **ACCOUNTING BETA RATIO**, which is the ratio of the division's accounting beta to the overall firm's accounting beta. Then we assume that the accounting beta ratio is equal to the **ENTERPRISE BETA RATIO**, the ratio of the division's enterprise beta (the unknown that we want to find) to the multinational's enterprise beta (which we have estimated by methods covered previously in this chapter.) By knowing the accounting beta ratio and the multinational's enterprise beta, we can estimate the division's enterprise beta.

Let $\beta_A^\$$ and $\beta_V^\$$ represent the overall firm's accounting beta and enterprise beta. Let $\beta_{iA}^\$$ and $\beta_{iV}^\$$ represent the ith division's accounting beta and enterprise beta, in US dollars. Then the ith division's accounting beta ratio is $\beta_{iA}^\$/\beta_A^\$$ and its **ESTIMATED ENTERPRISE BETA** is given in equation (7.4):

ESTIMATED ENTERPRISE BETA: $$\beta_{iV}^\$ = \beta_V^\$\left(\frac{\beta_{iA}^\$}{\beta_A^\$}\right) \quad (7.4)$$

Example: Suppose the US Global Corporation is the multinational parent of divisions in the United States, Europe, and Japan. Assume the accounting beta of the US division is 0.40, the accounting beta of the European division is 0.50, the accounting beta of the Japanese division is 0.60, and the accounting beta of US Global Corporation as a whole is 0.50. We assume that all of these accounting beta estimates are from the perspective of rates of return in US dollars.

Thus the accounting beta ratios are 0.80, 1.00, and 1.20 for the US, European, and Japanese divisions, respectively. Say we estimate US Global Corporation's overall enterprise beta to be 0.90. With the accounting beta approach, the estimated enterprise beta for the US division is 0.90(0.80) = 0.72; for the European division is 0.90(1) = 0.90; and for the Japanese division is 0.90(1.20) = 1.08.

To find the ECCs for these developed market divisions, we use the global CAPM in

equation (7.1). If the risk-free rate in US dollars is 5% and the global risk premium in US dollars is 4%, then the ECCs from the US dollar perspective are: US division, 0.05 + 0.72(0.04) = 0.079; European division, 0.05 + 0.90(0.04) = 0.086; and Japanese division, 0.05 + 1.08(0.04) = 0.093.
The logic of the accounting beta method is that managers have the information to estimate the accounting betas of a division and the overall firm. That is, they know from the inside about a division's fundamentals that would underlie the division's enterprise beta if the division were independent and traded. Generally, it has been thought that we cannot directly plug an accounting beta into the CAPM to estimate the division's cost of capital. The reason is that accounting betas are different from market return betas, because market sentiment and other factors enter into market returns. This is why we suggest the ratio approach here.

In US dollars, the accounting beta of Special Chemical Company (SCC) as a whole is 0.45 and for its Australian division is 0.90. Assume the enterprise beta for SCC is 0.80. What is the ESTIMATED ENTERPRISE BETA OF THE AUSTRALIAN DIVISION according to the accounting beta method? Assume the US dollar risk-free rate is 5% and the global risk premium is 4%. What is the AUSTRALIAN DIVISION'S ECC IN US DOLLARS ACCORDING TO THE GLOBAL CAPM?

Answers:

Accounting Beta Method:
The enterprise beta of the Australian division is estimated to be 0.80(0.90/0.45) = 1.60.

Global CAPM Method:
SCC-Australia's estimated ECC in US dollars is 0.05 + 1.60(0.04) = 0.114, or 11.4%.

COUNTRY BETA METHOD

An alternative to the accounting beta method for overseas divisions is the country beta method. A country (equity) beta in US dollars, denoted $\beta_C^{\$}$, may be estimated by regressing the returns of a country's equity index against the returns of the global market index, expressing both index returns in US dollars, as reported in Table 7.1 for a number of developed countries. The (global) country betas in Table 7.1 are calculated with monthly data from the period December 1998 through December 2003, as in Interactive Exercise 7.2.

The country beta method (equation (7.5)) assumes that a division's enterprise beta is equal to the overall firm's enterprise beta times the ratio of the country beta for the country of the division to the (weighted) average country beta of all the firm's divisions, denoted avg($\beta_C^{\$}$).

Country (Equity) Beta: $$\beta_{iV}^{\$} = \beta_V^{\$}\left(\frac{\beta_C^{\$}}{\textbf{avg}(\beta_C^{\$})}\right) \qquad (7.5)$$

Example: multinational company ASU Corporation has an overall enterprise beta of 0.75 and have three divisions, in Australia, Sweden, and the United States.
Australian operations represent 20% of the overall firm, country beta for Australia is 0.86
Swedish division is 30%, and the country beta for Sweden is 1.67
US division is 50% and the country beta for the United States is 1.
Weighted average country beta for ASU: avg($\beta_C^{\$}$), is 0.20(0.86) + 0.30(1.67) + 0.50(1) = 1.17.
From equation (7.5):
Estimated Enterprise Beta for the Australian division is 0.75(0.86/1.17) = 0.55,
Estimated Enterprise Beta for the Swedish division is 0.75(1.67/1.17) = 1.07,
Estimated Enterprise Beta for the US division is 0.75(1/1.17) = 0.64.

We can use a shortcut if the overall firm is extremely internationally diversified, so that it is reasonable to assume that the firm's average country beta is 1.

Since the overall world beta is the average of all country betas and is equal to 1 by definition, the **country beta short-cut method** would boil down to estimating division i's enterprise beta, $\beta_{iV}^{\$}$, by multiplying the overall company's enterprise beta times the country beta for the country in which the division is domiciled,

$$\beta_{iV}^{\$} = \beta_V^{\$}(\beta_C^{\$}).$$

Example: an internationally well-diversified US multinational has an overall enterprise beta of 0.50. Using the short-cut method, what would be the estimated enterprise beta for the division in Sweden where the estimated country beta is 1.67 (see Table 7.1)? Since Sweden's country beta is higher than 1, it is reasonable that the Swedish division has a division-specific enterprise beta that is higher than the enterprise beta of the multinational as a whole. Since the Swedish country beta estimate is 1.67 times the world beta (average country beta) of 1, you can reason that the Swedish division's estimated enterprise beta is 1.67 times the overall enterprise beta of the multinational, 0.50. Thus, the Swedish division's enterprise beta is estimated to be 1.67(0.50) = 0.835.

Assume that Special Chemical Company (SCC) is an internationally well-diversified US multinational firm with an estimated overall enterprise beta relative to the global market index of 1.45, in US dollars.

[well diversified means you can assume the average country beta is 1]

Assume the country beta in US dollars of the Australian equity market index in US dollars is 0.862 (Table 7.1). Assume the US dollar risk-free rate is 6% and the global risk premium is 4%.
Using the short-cut country beta method, what is the estimated enterprise beta of SCC's Australian division?
What is the Australian division's estimated ECC in US dollars?

Answers:

In US dollars, the estimated enterprise beta of the Australian division is 1.45(0.862/1) = 1.25.

SCC-Australia's ECC in US dollars is estimated to be 0.06 + 1.25(0.04) = 0.11, or 11%.

EMERGING MARKET PROJECTS

For the COST OF CAPITAL for projects and divisions in EMERGING MARKET COUNTRIES, many companies add a premium for POLITICAL RISK to the usual premium for systematic risk. Political risk is a catch-all term used to describe the additional risks posed by emerging market investments in terms of illiquidity, civil disruptions, corruption, political intervention, expropriation, imposition of controls on funds repatriation, irresponsible economic management by the country's policymakers, and the like.

We may think of the POLITICAL RISK PREMIUM for emerging market **country *C***, denoted $\boldsymbol{PRP_C^{\$}}$, as a premium, above the global CAPM systematic risk premium ($GRP^{\$}$), that global investors require for the political risk of investing in the country's equity index portfolio.

The political risk premium for an emerging market country is somewhat **difficult to measure**. Many managers and analysts estimate a country's political risk premium by the country's **SOVEREIGN RISK PREMIUM**, if one exists. Country *C*'s sovereign risk premium, denoted $SRP_C^{\$}$, is also called country C's **SOVEREIGN YIELD SPREAD**. The spread between the yield on a US dollar-denominated sovereign bond issued by country *C*'s government (denoted $r_{SC}^{\$}$) and the yield on a US Treasury bond. Alternatively, they may use the yield spread between euro-denominated sovereign bonds issued by the country's government and euro-denominated bonds issued by a Eurozone government.

Sovereign risk is that the country's government will not service its debt obligations properly, whereas political risk applies to the country's private sector. However, the two risks are so related that **analysts often use the sovereign risk premium to estimate the political risk premium**, even though some emerging market governments could be more likely to default than companies, in which case the sovereign risk premium would overstate the political risk premium of a country's equity index.

If the **emerging market country** has no sovereign bonds denominated in US dollars or euros, then the country's political risk premium is often estimated as a function of a **COUNTRY RISK RATING**. Country risk ratings may be found in several places, including ***Standard and Poors*** (S&P), the ***Institutional Investor magazine***, and ***Euromoney*** magazine. Researchers have found a high correlation between these ratings and sovereign risk premiums.

Table 7.2 shows some sovereign risk premia, S&P country risk ratings, and ***Institutional Investor*** ratings for March 2003. Figure 7.2 shows the correlation between the sovereign risk premia (sovereign yield spread) and the ***Institutional Investor ratings*** for March 2003.

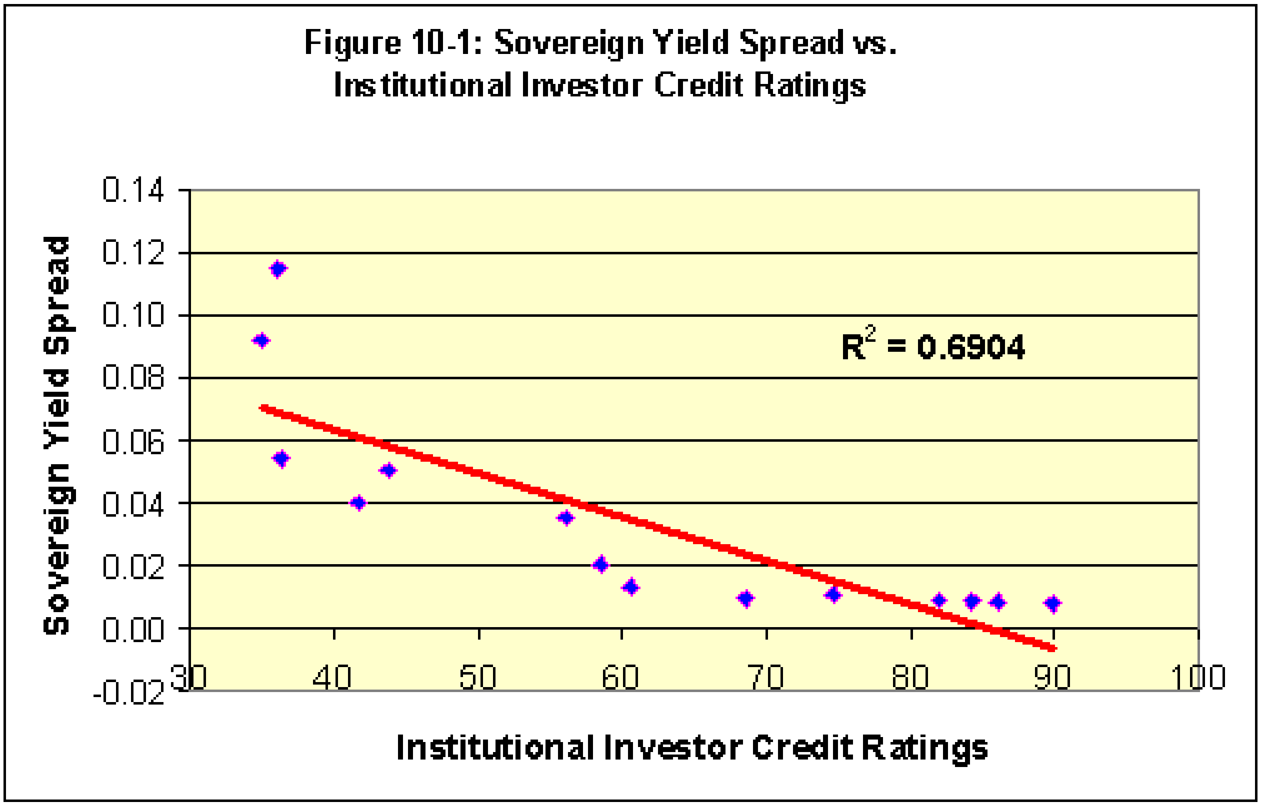

Figure 7.2 shows a scatter diagram and a line fitting data points between sovereign yield spread and the *Institutional Investor* Country Credit Ratings. The *Institutional Investor* Country Credit Ratings explain about 69% variation in sovereign yield spread.

There is also a fee-based service called the ***International Country Risk Guide (ICRG)***, whose country risk ratings are explained at the website http://www.icrgonline.com/. Professor Campbell Harvey of Duke University provides a nice java tool to graph country risk ratings at the following website: http://www.duke.edu/~charvey/applets/CountryRisk/test.html.

For a given emerging market country, individual operations may pose different degrees of political risk. Some operations may be relatively free of political risk. An example would be a large company with wide access to global capital markets, **especially a company whose shares have American Depository Receipts (ADRs)**. Another example might be a tomato plant in the stable Korean food market. At the other end of the spectrum are emerging market projects in industries that are highly susceptible to political intervention, like the power and oil industries, or have relatively high potential for corruption.

An emerging market operation's ***Political Risk Exposure***, denoted $\Phi_i^{\$}$, is the operation's degree of political risk, relative to the overall country's political risk. If an operation has the average political risk of the emerging market country, or if the manager has no opinion about the operation's relative political risk exposure, then $\Phi_i^{\$} = 1$. **For operations with higher than average political risk exposure for the emerging market country, $\Phi_i^{\$}$ should be higher than 1**. For investments judged to have half the **average political risk exposure** of operations in the country, $\Phi_i^{\$} = 0.50$.

The **Required Rate of Return** for an individual emerging market asset (in US dollars) is given in equation (7.6):

Required Rate of Return: $k_i^{\$} = r_f^{\$} + \beta_i^{\$}(GRP^{\$}) + \Phi_i^{\$}(PRP_C^{\$})$ **(7.6)**

AKA: ECC

Example: a US multinational wants to **estimate the *ECC*** in US $ for its subsidiary in Argentina.

Yield on long-term **US dollar denominated Argentine sovereign bonds** is 9.5%.
Yield on long-term **US Treasury bonds** is 3.5%.
Argentina's **political risk premium** = **sovereign risk premium** = 9.5% – 3.5% = 6%.
Assume the subsidiary is in an industry that has about average **political risk** for Argentina. Assume the subsidiary's **enterprise beta** in US dollars is 1.25.
The **risk-free rate** in US dollars is equal to the long-term US Treasury bond yield, 3.5%.
The **global risk premium** in US dollars is 4%.
The Argentine subsidiary's ***ECC*** in US dollars, from equation (7.6), is:

$$k_{iEV}^{\$} = 0.035 + 1.25(0.04) + 1(0.06) = 0.145, \text{ or } 14.5\%.$$

BDG is a US-based multinational firm wanting to estimate the ECC in US dollars of its division in Chile. The division is in an industry that has above average political risk for Chile and thus $\Phi_i^{\$}$ is estimated to be 1.50. The subsidiary's enterprise beta (in US dollars) is 0.75, the long-term risk-free rate in US dollars is equal to the long-term Treasury bond yield, 3%, and the global risk premium in US dollars is 4%. Assume the yield on long-term US dollar denominated Chilean sovereign bonds is 8% and that Chile's political risk premium is equal to its sovereign risk premium. What is the Chilean division's estimated ECC in US dollars?

***Answer**: $k_{iV}^{\$} = 0.03 + 0.75(0.04) + 1.50(0.05) = 0.135$, or 13.5%.*

If a country's political risk premium is equal to the sovereign risk premium, the cost of capital for an operation with **average political risk** for the country (**$\Phi_i^{\$}$ = 1**) is equal to

$$k_i^{\$} = r_{sC}^{\$} + \beta_i^{\$}(GRP^{\$}).$$

Recall that $r_{sC}^{\$}$ is the **yield on the US dollar-denominated sovereign debt** issued by **country *C***'s government. So when estimating the required return for a country's equity index or for an asset with average political risk, you can use the global CAPM with the country's yield on sovereign US dollar-denominated debt in place of the US dollar risk-free rate.

In the Argentina example, $k_{iV}^{\$}$ **= 0.095 + 1.25(0.04) = 0.145, or 14.5%.**

This **short cut** is often used when an analyst does not know $\Phi_i^{\$}$, and assumes it to be 1 by default.

The COUNTRY RISK PREMIUM (in US dollars) for country *C*, denoted $CRP_C^{\$}$, is the **required rate of return** (in US dollars) **for an investment into country *C*'s equity index minus the US** DOLLAR RISK-FREE RATE. A country risk premium is determined by both the country (equity) index's systematic risk relative to the global index and the country's political risk premium, $PRP_C^{\$}$.

If $\beta_C^{\$}$ denotes the **country beta of country *C* in US dollars**, then the **required rate of return** for an investment into **country *C*'s equity index** is:

$$k_C^{\$} = r_f^{\$} + \beta_C^{\$}(GRP^{\$}) + PRP_C^{\$}.$$

Country Risk Premium is: $CRP_C^{\$} = k_C^{\$} - r_f^{\$} = \beta_C^{\$}(GRP^{\$}) + PRP_C^{\$}$.

Example, a country's global beta is 0.80
Its political risk premium is 5%.
The risk-free rate in US dollars is 3.5%
The global risk premium is 4%,
The required **rate of return on the country index** (in US dollars) is:

rate of return on the country index = 0.035 + 0.80(0.04) + 0.05 = 0.117, or 11.7%.

The **country risk premium** (in US dollars) would is:

country risk premium = 0.117 – 0.035 = 0.082, or 8.2%.

Often, the political risk premium of a developed country is assumed to be zero. In this case, the **country risk premium** (in US dollars) is determined only by the index's systematic risk relative to the global market index, i.e., by using the country beta (in US dollars) in the global CAPM equation (7.1). Estimates of country risk premiums for some developed market countries (where the political risk is assumed to be zero) are shown Table 7.1, based on the estimated country betas and a global risk premium of 4%.

*LONG-TERM RISK-FREE RATE

Rather than use a straight Treasury bond yield for the risk-free rate in cost of capital calculations using the global CAPM equation (7.1), an adjustment may be advantageous. Since Treasury bond returns fluctuate with interest rate levels, and since interest rate levels affect the overall economy, it is reasonable to think that Treasury bond returns may be related somewhat to the market portfolio. Indeed, studies have shown the beta of long-term Treasury bonds to be between 0.10 and 0.20, so let's assume a long-term Treasury bond beta of 0.15. Assume further that the current 30-year US Treasury bond rate is 5%.

Now what is the long-term risk-free rate?
To answer this question, we apply the global CAPM as if the long-term Treasury bond is asset *i*. The required return on the asset is observable, 0.05.
Put this required rate of return on the left-hand side of equation (7.1).
On the right-hand side, plug in the bond's global beta of 0.15 and an assumed global risk premium of 0.04.
We see from equation (7.1) that the required rate of return of 0.05 equals the risk-free rate plus 0.15(0.04), or 0.006.
Thus the long-term US dollar risk-free rate is about 60 basis points lower than the long-term US Treasury bond rate.
If the long-term T-bond rate is 5%, then the long-term risk-free rate is 0.050 – 0.006 = 0.044, or 4.40%;
If the long-term T-bond rate is 4%, then the long-term risk-free rate is 0.040 – 0.006 = 0.034, or 3.40%.

Warning: the analysis in this section of the long-term risk-free rate is not commonly used. Most analysts simply use a US Treasury Bond yield as the US dollar risk-free rate for long-term investments.

Given a long-term US Treasury bond rate of 6.40%, a global beta of 0.15 for the long-term US Treasury bond, and a global market risk premium of 4% in US dollars, what is the long-term US dollar risk-free rate?

Answer: *The long-term US dollar risk-free rate is 0.064 – 0.15(0.04) = 0.058, or 5.80%.*

long-term US dollar risk-free rate = long term us treasury bond rate – global beta*MRP_G