COST OF CAPITAL IN INTERNATIONAL MKTS

Capital Structure and Cost of Capital

• **Cost of Capital**

- Country Risk affects discount rates
- Different countries will have different risk free rates (k_f).
- High CR, high risk k_f.

Q: How do MNCs set discount rates for projects in foreign countries?

• **Brief Review: Capital Structure**

• A firm can raise new capital by:

- Issuing new equity (E) –a firm gives away ownership; pays dividends

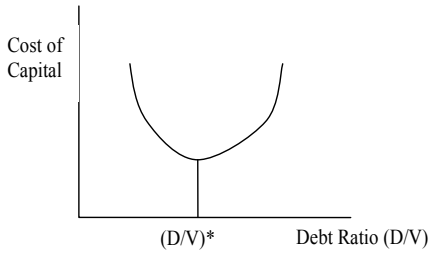
- Issuing debt (D) –a firm borrows; pays interest.

A firm can also use retained earnings, which we will consider E. (According to the *pecking order theory*, retained earnings are the first source of funds for a company.)

• **Trade-off Theory of Capital Structure**

- Debt has its (tax) advantages (reduces taxes), but also its disadvantages (cost: bankruptcy).

- Firms will use the E & D mix that minimizes the cost of capital. There is a U-shape relation between cost of capital and the amount of debt relative to the total value of the firm (V=E+D).



- There is an optimal Debt Ratio, (D/V)*. Before (D/V)*, the tax advantage dominates and decrease the cost of capital; after (D/V)*, the increased probability of bankruptcy dominates and increases the cost of capital.

- The capital structure that a firm desires is called their *target structure.* It should be close to (D/V)*.

• Measuring the cost of capital

We will use weighted average cost of capital (WACC).

WACC: $k_c = D/(E+D)\, k_d\, (1-t) + E/(E+D)\, k_e$

• k_d

- The cost of debt of a project (k_d): the interest a firm has to pay to borrow from a bank or the bond market to fund a project.

- Easy to determine: A firm calls a bank or an investment bank to find out the interest rate it has to pay to borrow capital.

Q: How does a bank set the interest rate for a given firm?

A: Base rate (say, a risk free rate like T-bills, k_f) + spread (reflecting the risk of the company/project, which includes CR).

Note: Interest payments are tax deductible

$\Rightarrow$ After-tax cost of debt = $k_d*(1-t)$

• Measuring the cost of capital

• k_e

- The cost of equity of a project (k_e): Required (expected) return on equity a firm has to pay to investors.

- A model is needed to determine required (equilibrium) rates of return on equity. There are many models. We can use the CAPM or the popular extended version, with the 3 Fama-French factors.

- Let's use the CAPM to value the cost of equity:

$$k_e = k_f + \beta\,(k_M - k_f)$$

k_f: Risk-free rate (in practice, a government rate).

k_M: Expected return on a market portfolio (in practice, the long-run return on a well-diversified market index).

β: Systematic Risk of the project/firm = $Cov(k_e,k_M)/Var(k_M)$ (in practice, a coefficient estimated by a regression against risk premium, $(k_M - k_f)$).

Notes:

- Dividends are not tax deductible. There is an advantage to using debt!
- Time-consistency with k_f. The same maturity should be used for k_e and k_d. That is, if you use long-term bonds to calculate k_d, you should also use long-term bonds to calculate k_e.
- In Chapter 16 we discussed country risk. For practical purposes, many emerging market governments bonds may not be considered risk-free. Thus, the government bond rate includes a default spread, which, in theory, should be subtracted to get k_f.
- β is estimated by the slope of a regression against a market index. There are many issues associated with the estimation of β: choice of index, noisy data, adjustment by leverage, mean reversion, etc. We will not get into these issues..

- **Issues:**

Q: Real or Nominal?

If CFs are nominal (usual situation) $\Rightarrow$ k_e should be in nominal terms.

Q: Which k_f to use? Local or Foreign?

The k_f that reflects the risk of the cash flows.

Q: Which maturity for k_f to use?

The maturity that reflects the duration of CFs. In practice, the duration of the project is matched to the maturity of k_f (potentially a problem for many emerging markets where there is no long-term debt market).

Q: Which β to use? The β of the company or the β of the project?

The β should reflect the systematic risk of the project.

Example: GE wants to do an investment in Brazil.

Equity investment: BRR 100M

Debt issue: BRR 150

Value of Brazil investment = D + E = BRR 250

Brazilian Tax Rate = t = 35%

Risk-free rate in Brazil = k_f = 7.40%

Return of the Brazilian market (BOVESPA) in the past 10 years: 12% (k_M = 12%)

Cost of project = k_c = ?

• Cost of debt (k_d)

GE can borrow in Brazil at 60 bps over Brazilian Treasuries (R_f)

$k_d = k_f$ + spread = .0740 + .60 = **.08** (8%)

• Cost of debt (k_d)

$k_d = k_f$ + spread = .0740 + .60 = **.08** (8%)

• Cost of equity (k_e)

Similar projects in Brazil have a beta of 1.1 ($\beta_{GE\text{-}Brazil}$ = 1.1)

$k_e = k_f + \beta (k_m - k_f)$ = .0740 + 1.1 * (.12 - .0740) = **0.1246** (12.46%)

• Cost of Capital –WACC- (ke)

$k_c = D/(E+D)\ k_d\ (1-t) + E/(E+D)\ k_e$

k_c = (.6) x **.08** x (.65) + (.4) x **0.1246** = **.08104** (8.104%)

Note: This is the discount rate that GE should use to discount the cash flows of the Brazilian project. That is, GE will require an 8.104% rate of return on the investment in Brazil. ¶

Remark: Every time the cost of capital increases, the NPV of projects goes down. Anything that affects k_c, it will also affect the profitability (NPV) of a project.

Application: Argentina defaults in some of its debt. Argentine country risk increases, $k_{f,Arg}$ goes up and $k_{c,Arg}$ also goes up. Then, NPV projects in Argentina can become negative NPV projects.

$\Rightarrow$ MNCs may suddenly abandon Argentine projects.

Estimating k_M:

We use as many years as possible to build the long-run average. Remember that using averages comes with an associated standard error: More data $\Rightarrow$ lower S.E. -i.e., more precision. This may be a problem for emerging markets, where there is limited reliable data.

For a market with limited return history, say Country J, it is sometimes easier to adjust a k_M from a well-established, mature market, say, the U.S., to estimate that market $k_{M,J}$. Several ways to do this adjustment:

◊ *Relative Equity Market Approach*:

The U.S. risk premium is modified by the volatility of the Country J's equity market, σ_J, relative to the volatility of the U.S equity market, σ_{US}:

$$(k_M - k_f)_J = (k_M - k_f)_{US} * \sigma_J / \sigma_{US}$$

(Potential problem: σ_J is also an indicator of liquidity!)

Estimating k_M:

A similar adjustment can be done using bonds and the implied country risk, CR –i.e., bond spread over a safe yield, say U.S. yields.

◊ *Country Bond Approach*:

The bond spread is added to the U.S. market risk premium

$$(r_M - r_f)_J = (r_M - r_f)_{US} + CR_J \text{ (bond spread)}$$

◊ *Mixed Approach*:

Since we expect equity spreads to be higher than debt spread, we adjust the CR upward using volatilities as a measure of risk:

$$(r_M - r_f)_J = (r_M - r_f)_{US} + CR_J * \sigma_J / \sigma_{J,bond}.$$

Note: We may have very different numbers from these three approaches.

Estimating r_M:

◊ Judgement calls/adjustments may be needed to pick $E[r_m - r_f]_J$.

◊ Following the idea of CR from bond markets, a *country equity risk premium* (*CER*) can be easily derived for Country J:

$$CER_J = E[r_m - r_f]_J - E[r_m - r_f]_{US}.$$

◊ We construct a market risk premium for Country J based on USD rates. To change to a local currency premium, we can use IFE combined with relative PPP to estimate $E[e_f]$. Using the linearized version of both formulas, we get:

$$E[r_m - r_f]_J \text{ (in local currency)} \approx E[r_m - r_f]_J + (I_J - I_{US}).$$

Example: GE's wants to adjust $(r_M - r_f)_{Brazil}$ using different methods, using the U.S. as a benchmark. GE uses the following data:

$(r_M - r_f)_{US} = 3.65\%$

$\sigma_{US} = 15.2\%$

$\sigma_{Brazil} = 34.3\%$ (based on past 15 years)

$\sigma_{Brazil,bond} = 23.1\%$ (based on past 15 years)

$CR_{Brazil} = 2.80\%$

◊ *Relative Equity Market Approach*:

$(r_M - r_f)_{Brazil} = .0365*.343/.152 =$ **0.08236**

$\Rightarrow k_{e,Brazil} = k_f + \beta\,(k_M - k_f)_{Brazil} = .0740 + 1.1 *$ **0.08236** $=$ **0.1646**.

◊ *Mixed Approach*:

$(r_M - r_f)_{Brazil} = .0365 + .028 *.343/.231 =$ **0.07807**

$\Rightarrow \quad k_{e,Brazil} = r_f + \beta\,(r_M - r_f)_{Brazil} = .0740 + 1.1 *$ **0.07807** $=$ **0.1599**.

Example (continuation): Suppose GE decides to use the Relative Equity Market Approach. Now, GE's wants to translate the market risk premium from USD to BRL, using linearized PPP.

Data for average inflation rates:

$E[I_{Brazil}] = 7.5\%$

$E[I_{US}] = 3\%$

◊ *Relative Equity Market Approach*:

$E[r_M - r_f]_{Brazil} = .0365*.343/.152 =$ **0.08236**

$E[r_m - r_f]_{Brazil}$ (in BRL) $\approx$ **0.08236** + (0.075-0.03) = **0.12736** . ¶

• Target Debt-Equity Ratio in Practice

Suppose that GE's target debt-equity ratio is 70%-30%. It is unlikely that GE will raise funds with a 70-30 debt-equity split for every project. For example, for the Brazilian project, GE is using a 60-40 D/E split.

The target (D/V)* reflects an *average*; it is not a hard target for each project. That is, for other projects GE will use D/E to compensate and be close to the (D/V)*.

Determinants of Cost of Capital for MNCs

Intuition: Economic factors that make the CFs of a firm more stable reduce the k_c.

1) Size of Firm (larger firms get better rates from creditors and have lower βs)

2) Access to international markets (better access, more chances of finding lower rates)

3) Diversification (more diversification, more stable CFs, lower rates. Also, βs closer to β_M)

4) Fixed costs (the higher the proportion of fixed costs, the higher the β)

5) Type of firm (cyclical companies have higher βs)

6) FX exposure (more exposure, less stable CFs, worse rates)

7) Exposure to CR (again, more exposure to CR, less stable CFs, worse rates).

Example: Cost of Capital (Nov 2014)**:**

General Electric (GE): Huge, internationally diversified company

Disney (DIS): Large, moderate degree of international diversification

The GAP (GPS): Medium cap, low international diversification.

US Treasuries (k_f): 1.63% (5-year T-bill rate, from Bloomberg)

S&P 500 return (k_m): 8.433% (30 years: 1984-2014, from Yahoo)

tax rate (t): 27.9% (effective U.S. tax rate, according to World Bank)

Recall: $k_c = D/(E+D)\, k_d\,(1 - t) + E/(E+D)\, k_e$

	E	D	Rating	Spread	β	k_d	k_e	WACC
GE	135B	313B	AA-	27	1.24	1.90	10.07	**3.99**
DIS	45.5B	16.1B	A+	30	0.96	1.93	8.16	**6.39**
GPS	3B	1.4B	BBB-	168	1.65	3.31	12.86	**9.53**