International Capital Structure and the Cost of Capital

Mandeep Barn, Maggie Lo, Timothy Tao, Lucy Tien, Ruby Wang
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2. Analyzing Cost of Capital among Countries
3. Cross Border Listing of Stocks
4. International Asset Pricing Model (IAPM)
5. The Financial Structure of Subsidiaries
6. Case Analysis - AES Corporation
International Capital Structure and the Cost of Capital
International Capital Structure and the Cost of Capital

- Firms are becoming multinational in both scope AND in capital structure
- Fully integrated financial markets = the same cost of capital both domestically and abroad
  - If not, opportunity may exists to decrease cost of capital
Cost of Capital

• The minimum rate of return an investment must generate to cover its financing cost
• Firms will undertake projects if the return is expected to exceed the cost of capital
• Return = Cost of Capital : value unchanged
• Return > Cost of Capital : firm’s value increases
• Return < Cost of Capital : bad investment
When a firm has both debt and equity financing, weighted average cost of capital:

\[ K = (1-\lambda)K_+ + \lambda(1- t)i \]
\[ K = (1-\lambda)K_L + \lambda i(1-t) \]

- \((1-\lambda)\) = weight of cost of capital that is from equity
- \(K_L\) = cost of equity capital
- \(\lambda\) = debt-to-total-market-value ratio (weight of total cost of capital that is from debt)
- \(i\) = before-tax cost of debt capital (borrowing)
- \(t\) = marginal corporate income tax rate
  - Interest payments are tax deductible
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Example

• $K = (1-\lambda)K_L + \lambda(1- t)i$
  - Company is financing 30% of capital by debt ($\lambda$)
    - So they’re financing 70% (1-0.30) by equity (1-$\lambda$)
• Cost of equity capital is 10%
• Before-tax cost of borrowing is 6%
• Marginal corporate tax rate is 15%

$K = (0.70)0.10 + 0.30(1-0.15)0.06$
Example

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$$K = (0.70)0.10 + 0.30(1-0.15)0.06$$

$K = 8.53\%$
Minimizing weighted average cost of capital (WACC)

- Lowest WACC is obtained when the optimal combination of debt and equity are used.
- Increases # of profitable capital expenditures.
  - Firm value is increased as long as the return on new projects exceeds the firm’s WACC.
- Internationalizing the firm’s capital structure helps to decrease the cost of capital.
Firm’s Investment Decision and the Cost of Capital

• A firm that can reduce its cost of capital will be able to increase the profitable capital expenditures that they can invest in
• This results in increasing shareholder wealth
• We can do this by internationalizing our cost of capital
Factors that affect the WACC

**Controllable**

- Capital structure policy
  Proportion of debt and equity
- Investment Policy
  Degree of risk associated with new projects

**Uncontrollable**

- Interest rates
  Increases cost of debt, may indirectly increase cost of equity
- Tax rates
  Increase in corporate tax rate decreases cost of debt decreases WACC
- Economic conditions
Calculating the firm’s equity cost of capital

Usually estimated using the Capital Asset Pricing Model (CAPM):

- \( R_i = R_f + \beta(R_m - R_f) \)
- \( R_i \): Expected return of security \( i \)
- \( R_f \): Risk-free interest rate
- \( \beta \): measures volatility of security \( i \) compared to the market portfolio
- \( R_m \): Market portfolio
Cost of capital in segmented vs. integrated markets

- \( \text{Ri} = \text{Rf} + \beta(\text{Rm} - \text{Rf}) \)
- In segmented markets, \( \text{Rm} \) is usually proxied by the S&P500 for the United States
- In integrated markets, \( \text{Rm} \) can be proxied using the MSCI World index
Cost of capital in segmented vs. integrated markets… continued

- Same future cash flows are likely to be priced differently in different countries in segmented markets, why?
  - $\beta$ is measured against the domestic market portfolio, this differs from country to country

- In fully integrated markets, same future cash flows will be priced the same as $\beta$ is now measured against the same world market portfolio
Analyzing Cost of Capital among Countries
Does the Cost of Capital Differ among countries?

- Researches suggest that although international financial markets are not segmented anymore, they are still not fully integrated.

- The empirical evidence is not clear-cut.

If the international financial markets = less than fully integrated, then there can be systematic differences.
To illustrate that capital markets are less than fully integrated, McCauley and Zimmer (1994) provided a direct comparison of the cost of capital among the 4 major countries: Germany, Japan, UK and US

Method:
1. estimate the cost of debt and equity capital
2. compute the cost of funds (weighted average cost of capital) - using capital structure in each country as the weight
3. compute the cost of capital in real terms after adjusting for the inflation rate
Effective Real After-Tax Cost of Debt

Cost of Equity

Debt-to-Equity Value Ratios

Real After-Tax Cost of Funds

Example – Novo Industri

- Produces industrial enzymes and health care products
- 1970s, management decided to finance planned future growth of company by entering international capital markets

- Danish stock market was small and illiquid – company needed to internationalize

- Novo management felt they were facing a higher cost of capital than competitors because of the segmented nature of the Danish stock market
Example – Novo Industri

Went international by:

• Increased transparency by presenting financial and technical statements in Danish and English
• Cross-listed on the London Stock Exchange,
• Listed ADRs (so that US investors can invest in US dollars rather than Danish)

The Result:

• Novo Industri’s stock price increased while other Danish stocks didn’t
Firms operating in small, segmented domestic capital market can gain access to new capital and lower the cost of capital by listing their stocks on large, liquid capital markets like the New York and London Stock Exchanges.
Cross border listing of stocks
Firms can potentially benefit from cross-border listings

Why?

- Gain access to additional sources of capital while lowering cost of capital by increasing investor base
- Increase in stock prices due to more demand and trading of the stock
Cross-Border Listings of Stocks

• Firms seem to prefer to list in neighbouring markets

• Why?
  o Similarities in markets
  o A “home bias”
Cross-Border Listings of Stocks

• Generally,
  o Potentially expand investor base, which leads to a higher stock price and lower cost of capital
    ▪ lower transaction costs
    ▪ improvement in quality and quantity of firm specific information available to investors
  o Creates a secondary market for the company’s shares and facilitates raising new capital in foreign markets
  o Enhance liquidity of a company’s stock
Cross-Border Listings of Stocks

• Generally,
  o Enhances the visibility of the company and it’s products in foreign markets
  o Cross-listed shares may be used as the “acquisition currency” for taking over foreign companies
  o May improve the company’s corporate governance and transparency
“May improve the company’s corporate governance and transparency”

• Once companies cross-lists its shares on foreign exchanges (NYSE, LSE), they are required to follow strong disclosure and listing requirements

• On average, foreign companies listed on U.S. exchanges are valued ~17% higher
Cross-Border Listings of Stocks

• Disadvantages
  
  o Meeting disclosure and listing requirements can be costly (U.S. GAAP)

  o Volatility in overseas markets

  o Foreigners may take a controlling interest in the company and challenge domestic control
International Asset Pricing Model
IAPM
• For understanding the effects of international cross-listings.

• assuming cross-listed assets are internationally tradable assets and internationally non-tradable assets.
\[ R_i = R_f + (R_M - R_f) B_i \]

\[ B_i = \frac{\text{Cov}(R_i, R_M)}{\text{Var}(R_M)} \]

\[ A^M \text{ is a measure of aggregate risk aversion} \]

\[ M \text{ is aggregate market value of market portfolio} \]

\[ \Rightarrow R_i = R_f + A^M \text{MM} \text{ Cov}(R_i, R_M) \]
Asset pricing mechanism under:

- Complete integration – assets are trade internationally according to world systematic risk

- Complete segmentation – assets are trade respected to country systematic risk.
  - Suppose two countries: Domestic Country and Foreign Country
IAPM

Complete Segmentation

- Domestic Country E(R):
  \[ R_i = R_f + A^D D \text{ Cov} (R_i, R_D) \]

- Foreign Country E(R):
  \[ R_g = R_f + A^F F \text{ Cov} (R_g, R_F) \]

Complete Integration

Both Domestic and Foreign:

\[ R_i = R_f + A^w W \text{ Cov} (R_i, R_W) \]

In reality, assets are priced as partially integrated world financial markets.
Internationally tradable assets are priced as if world financial markets were completely integrated.

Non-tradable assets will be priced by world systematic risk (pricing spillover effect) and a country-specific systematic risk.

- **Spillover effect** - externalities of economic activity or processes those who are not directly involved in it.
- Pollution, technology, even financial markets.
Nontradable assets of the domestic country:

\[ R_f = R_f + A^W W \text{ Cov}^*(R_i, R_W) + A^D D \left[ \text{ Cov}(R_i, R_D) - \text{ Cov}^*(R_i, R_D) \right] \]

**Indirect world systematic risk**

\( \text{ Cov}^*(R_i, R_W) \) is the *indirect* covariance between the \( i \)th non-tradable asset and world market portfolio.

**Poor domestic systematic risk**

\( \text{ Cov}(R_i, R_D) - \text{ Cov}^*(R_i, R_D) \) is *indirect* covariance between the future returns on the \( i \)th non-tradable asset and domestic country’s market portfolio that is induced by tradable assets.
1. International listing (trading) of assets in otherwise segmented markets directly integrates international capital market by making these asset tradable.

2. Firms with non-tradable assets get **free ride** from firms with tradable assets in sense that former indirectly benefit from international integration in terms of a lower cost of capital and higher asset prices.
Effect of Foreign Equity Ownership Restrictions

• Restrictions on maximum % ownership of local firms by foreigners
  • Mexico and India: limited to 49%

• Two different classes of equity
  • Chinese firms issue A shares and B shares

• Ensuring domestic control of local firms
Pricing-to-market (PTM) phenomenon

• Constraint is effective in limiting desired foreign ownership
  
  eg. Korean firm’s restriction on foreigners is 20%
  
  Foreigners want to buy 30%

• Foreign and domestic investors may face different market share prices
A firm’s cost of capital depends on which investors, domestic or foreign, supply capital.

A firm can reduce its cost of capital by internationalizing its ownership structure.
• Nestlé used to issue two different classes of common stock:
  – Bearer shares: foreigners
  – Registered shares: Swiss citizens
  – The bearer stock was more expensive.
Nestlé
An Example of Foreign Ownership Restrictions: Nestlé

- On November 17, 1988, Nestlé lifted restrictions imposed on foreigners, allowing them to hold registered shares as well as bearer shares.
- A major transfer of wealth from foreign shareholders to Swiss shareholders.
- The total value of Nestlé increased substantially when it internationalized its ownership structure.
- Nestlé’s cost of capital therefore declined.
The Nestlé episode illustrates:

- The importance of considering market imperfections
- The peril of political risk
- The benefits to the firm of internationalizing its ownership structure
The Financial Structure of Subsidiaries
The Financial Structure of Subsidiaries
Three different approaches to determining:

1. Conform to the parent company’s norm
   - where the parent company is fully responsible for the subsidiary’s financial obligations
   - not necessarily consistent with minimizing the parent’s overall cost of capital
The Financial Structure of Subsidiaries
Three different approaches to determining:

2. Conform to the local norm of the country where the subsidiary operates

   – When the parent company is willing to let its subsidiary default, or the guarantee of obligations becomes difficult to enforce across national borders
   
   – Not the optimal one approach (immature nature of local financial markets)
3. Vary judiciously to capitalize on opportunities to reduce financing costs and risks

- Most reasonable and consistent with minimizing firm’s overall cost of capital
- Take advantage of subsidized loans
- Taxes deduction of interest payment
- Take advantage of various market imperfections (ex. political risks)
CASE:

Globalizing the Cost of Capital and Cost Budgeting at AES
BRIEF BACKGROUND
• Founded in 1981
• Publically traded since 1991
• In 2003
  – Leading independent supplier of electricity in the world
  – $33 Billion in asset (eg. Power plants, generation facility, other energy related businesses) stretched across 30 countries and 5 continents
AES

Early Success

- 1983: 1st cogeneration facility is built in Houston, Texas
- 1988: Net income = $1.6 million
- 1991: AES goes public, net income = $42.6 million
- 1991-1992: AES initiates international expansion
- 1996-1998: estimated 80%-85% capital investment is overseas
- 2000: Revenue = $4.958 billion
  Net Income = $778 million
AES

Typical Investment Structure

<table>
<thead>
<tr>
<th>AES Parent Corporation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td><strong>Liabilities</strong></td>
</tr>
<tr>
<td>Equity subsidiary</td>
<td>US Bank Debt</td>
</tr>
<tr>
<td>Equity holding co.</td>
<td>Corporate Debt</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Local AES Holding Company</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td><strong>Liabilities</strong></td>
</tr>
<tr>
<td>Equity subsidiary</td>
<td>$-denominated debt</td>
</tr>
<tr>
<td></td>
<td>(non-recourse to parent)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AES Subsidiary A</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td><strong>Liabilities</strong></td>
</tr>
<tr>
<td>Fossil fuel power plant</td>
<td>$-denominated debt</td>
</tr>
<tr>
<td></td>
<td>(non-recourse to parent)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AES Subsidiary B</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td><strong>Liabilities</strong></td>
</tr>
<tr>
<td>Hyrdo power plant</td>
<td>$-denominated debt</td>
</tr>
<tr>
<td></td>
<td>(non-recourse to parent)</td>
</tr>
</tbody>
</table>
AES

AES stock price (market cap in 2000 reached $28 billion @ $70/share)
AES stock price (market cap in 2002 fell 95% to $1.6 billion @ $1/share
AES

What Happened?

- It's recipe for success (international exposure) became their recipe for disaster
  - Much of AES' expansion took place in developing countries (there was more unmet demand vs. developed countries)
- Main factors:
  - Devaluation of key South American currencies
    - Argentine, Brazilian, Venezuelan currency crises
  - Adverse changes in energy regulatory requirements
    - Government mandated energy rationing and competition
  - Decline in energy commodity prices
AES
AES

AES Net Income (in millions of $)


-4500 -3500 -2500 -1500 -500 500 1500


-4500 -3500 -2500 -1500 -500 500 1500
12% discount rate was used for all contract generation projects
   - all dividend flows from projects were deemed equally risky
     - fair assumption because businesses had similar capital structures
   - most risks could be hedged in the domestic market
• Worked well initially, when they first expanded to Northern Ireland
  o had many of the same characteristics as domestic projects
• Model became increasingly strained in Brazil and Argentina
  o Hedging key exposures was not feasible (currency, regulatory..)
SO… AES needed of a methodology for calculating cost of capital for valuation & capital budgeting at AES businesses in diverse locations around the world

Solution by AES
Rob Venerus, director of Corporate Analysis & Planning questioned whether the traditional CAPM would suffice.

He did not advocate the use of a world CAPM:
- AES owned businesses in poorly integrated capital markets.

He did not advocate the use a local CAPM either:
- Countries such as Tanzania and Georgia did not have any meaningful capital markets.
• So Rob Venerus developed a new model:

**Step 1**

• Calculate the cost of equity using U.S. market data for each of AES' projects
  o Average the unlevered equity betas from comparable U.S. companies
  o Relever the beta to reflect the capital structure of each of AES' projects
  o Cost of equity = Rf + β(Rm − Rf)
Step 2

- Calculate the cost of debt by adding the U.S. risk free rate and a "default spread"
  - Cost of Debt = Rf + Default Spread
  - The "default spread" is based on the relationship between EBIT ratios for comparable companies and their cost of debt.
<table>
<thead>
<tr>
<th>Credit Rating</th>
<th>EBIT Coverage Ratio</th>
<th>Default Spread</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aaa</td>
<td>21.1x</td>
<td>0.2%</td>
</tr>
<tr>
<td>Aa1</td>
<td>15.1x</td>
<td>0.3%</td>
</tr>
<tr>
<td>Aa2</td>
<td>10.9x</td>
<td>0.4%</td>
</tr>
<tr>
<td>Aa3</td>
<td>8.1x</td>
<td>0.6%</td>
</tr>
<tr>
<td>A1</td>
<td>6.3x</td>
<td>0.7%</td>
</tr>
<tr>
<td>A2</td>
<td>5.2x</td>
<td>0.9%</td>
</tr>
<tr>
<td>A3</td>
<td>4.6x</td>
<td>1.2%</td>
</tr>
<tr>
<td>Baa1</td>
<td>4.2x</td>
<td>1.5%</td>
</tr>
<tr>
<td>Baa2</td>
<td>3.9x</td>
<td>1.9%</td>
</tr>
<tr>
<td>Baa3</td>
<td>3.6x</td>
<td>2.3%</td>
</tr>
<tr>
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<td>3.2x</td>
<td>2.9%</td>
</tr>
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<tr>
<td>B1</td>
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<td>5.2%</td>
</tr>
<tr>
<td>B2</td>
<td>0.8x</td>
<td>6.2%</td>
</tr>
<tr>
<td>B3</td>
<td>0.6x</td>
<td>7.4%</td>
</tr>
<tr>
<td>Caa1</td>
<td>0.4x</td>
<td>8.6%</td>
</tr>
<tr>
<td>Caa2</td>
<td>0.1x</td>
<td>10.0%</td>
</tr>
<tr>
<td>Caa3</td>
<td>0.1x</td>
<td>11.4%</td>
</tr>
</tbody>
</table>
Step 3

- Add the sovereign spread to both the cost of equity and the cost of debt
  - this accounts for country-specific market risk, which is the difference between local government bond yields and corresponding U.S. Treasury yields.
- These steps allow AES to calculate a WACC that reflects the systematic risk associated with each project in its local market.
BUT...

- Most of these local markets are developing markets where "access to capital was limited and information less than perfect" --> project-specific risk could not be diversified away
- "Project-specific risk" must be accounted for!

AES

How did AES deal with it?
Example of project-specific risk:

• There are 2 hydro plants in Brazil that are identical in every aspect, except for the rivers that feed them. River #1 produces cash flows that vary +/- 50%, River #2 by +/- 10%. If they are financed by 100% equity, CAPM says they are worth the same.

• Rob Venerus thought this was unconvincing
Seven types of "Project-specific risk":

1. Operational/Technical
2. Counterparty credit/performance
3. Regulatory
4. Construction
5. Commodity
6. Currency
7. Contractual Enforcement/Legal

Weights estimated from AES' ability to anticipate and mitigate risk. Then given a grade between 0 (lowest exposure) and 3 (highest exposure), multiplied by their weights to yield a "business-specific risk score"
AES

Example Risk Score Calculation for Lal Pir Project (Pakistan)

<table>
<thead>
<tr>
<th>Categories of Risk</th>
<th>Weight</th>
<th>Grade for Lal Pir</th>
<th>Risk Scores (grade x weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational/Technical</td>
<td>3.5%</td>
<td>1</td>
<td>0.035</td>
</tr>
<tr>
<td>Counterparty Credit/Performance</td>
<td>7.0%</td>
<td>1</td>
<td>0.070</td>
</tr>
<tr>
<td>Regulatory</td>
<td>10.5%</td>
<td>2</td>
<td>0.210</td>
</tr>
<tr>
<td>Construction</td>
<td>14.5%</td>
<td>0</td>
<td>0.000</td>
</tr>
<tr>
<td>Commodity</td>
<td>18.0%</td>
<td>1</td>
<td>0.180</td>
</tr>
<tr>
<td>Currency</td>
<td>21.5%</td>
<td>2</td>
<td>0.430</td>
</tr>
<tr>
<td>Contractual Enforcement/Legal</td>
<td>25.0%</td>
<td>2</td>
<td>0.500</td>
</tr>
<tr>
<td><strong>Sum of individual scores = business-specific risk score</strong></td>
<td></td>
<td></td>
<td>1.425</td>
</tr>
</tbody>
</table>
Business-specific risk score

- Used to calculate an adjustment to the initial cost of capital
  - 0 = no adjustment to WACC
  - 1 = +500 basis points (5%)
  - 2 = +1000 basis points (10%)
  - 3 = +1500 basis points (15%)

- Overall (exhibit 8 from case):
  1. calculate cost of equity and cost of debt using U.S. market data
  2. add sovereign spread to each
  3. calculate WACC
  4. Add a business-specific risk adjustment to WACC
SUGGESTION & RECOMMENDATION FOR AES CORPORATION
AES Corporation’s current method of valuing risk is clearly inadequate.

- Not enough risks were being considered in their model, especially political and economic risks in developing countries that the company expanded to. Under this current model, country-specific risk is also difficult to measure.

This new model to value cost and risk should be implemented by AES.

- It gives the company a more realistic projection of the risks that they may face with projects that they take on internationally.
- Risks such as political, economic, country-specific and business-specific risks are now considered, where in the previous model they were neglected.
THANK YOU!