THE UNIVERSITY OF QUEENSLAND
AUSTRALIA
CREATE CHANGE

Lecture 7: International Capital Budgeting

Reading: Eun & Resnick Ch.18 (10th ed.)

The Issues

- How do we decide whether a firm should proceed with foreign project(s)?
- In what way international capital budgeting differ from the domestic setting?
- What role does the exchange rate play?
- What are the complications with estimating the cost of capital for a foreign project?

Net Present Value*

- The NPV is the present value of future cash flows discounted at an appropriate rate minus the initial net cash outlay for the project.
- In mathematical terms, the formula for net present value is:

$$NPV = -I_0 + \sum_{t=1}^{\infty} \frac{CF_t}{(1+r)^t}$$

- Projects with a positive NPV should be accepted; negative NPV projects should be rejected.
- The discount rate is the expected rate of return on projects of similar risk.

*assumed knowledge

Free Cash Flow Definitions*

Gross cash flow

NOPLAT

EBIT

Free cash flow to firm	Free cash flow to equity
Sales	Sales
- Costs (operating costs)	- Costs (operating costs)
- Depreciation and Amortization	- Depreciation and Amortization
- Taxes	-Taxes
+Depreciation and Amortization	+Depreciation and Amortization
- Capital Expenditure	- Capital Expenditure
- Change in Working Capital	- Change in Working Capital
- Increase in other assets	- Increase in other assets
- Decrease in other liabilities	- Decrease in other liabilities
=Free cash flow of the firm	=Free cash flow of the firm
	-Interest expenses
	- Preferred dividends
	- Principal repayments
	+Proceeds with new debt issues
	=Free cash flow to equity

*assumed knowledge

Cash Flows to Claimholders*

Claimholder	Cash flow to claimholder	Discount rate
Equityholders	Shareholder distribution –change in additional paid in capital	Cost of equity
Debtholders	Interest expenses+ Principal repayments- New debt issues	Cost of debt
Preferred stockholders	Preferred dividends	Cost of preferred stocks
Total	Free cash flow to equity +Interest expenses + Principal repayments - New debt issues + Preferred dividends	Weighted average of capital

For non-domestic projects, these may need to be modified

*assumed knowledge

Adjusted Present Value

- An alternative valuation method is

$$APV = NPV(100\%\ equity\ financed) + PV(Tax\ Shields) + PV(other\ imperfections)$$

- It is a series of present value calculations

Stage 1: Project is 100% Equity Financed

- Cash-flows: Need *Free* Cash Flows.

- You need the rate that would be appropriate to discount the firm's cash flows as if the firm/project were 100% equity financed.
  - This rate, r_A, is the expected return on equity if the firm were 100% equity financed.

- To determine the return on assets (r_A), you need to:
  - Find comparables, i.e., publicly traded firms in same business.
  - Estimate their expected return on equity if they were 100% equity financed by unlevering.

Stage 2: PV of Tax Shields

- The expected tax saving is $\tau_c r_d D$ where τ_c is the corporate tax rate
  - If D (i.e., the amount of borrowing) is expected to remain stable, then discount $\tau_c r_d D$ using r_d.

$$PV(TS) = \frac{\tau_C r_D D}{r_D} = \tau_C D$$

  - If leverage ratio (i.e., D/V) is expected to remain stable, then discount $\tau_c r_d D$ using r_A.

$$PV(TS) = \frac{\tau_C r_D D}{r_A}$$

    - Intuition:
      - If D/V is constant, $\tau_c r_d D$ moves up/down with V
      - The risk of $\tau_c r_d D$ is similar to that of the firm's assets, so use r_A

Stage 3: PV of Other "Imperfections"

1. PV of Distress Costs
   - These arise when firms take on debt
     - Direct costs of financial distress
     - Indirect costs of financial distress
   - They tend to be difficult to estimate
     - Usually ignored.
2. The Costs of Issuing Securities
3. PV of Subsidised Financing

Parent vs Subsidiary Cash flows

- Whose perspective should the analysis take?
  - Substantial difference between the parent vs subsidiary (project) cash flows
    - Royalty payments
    - Licensing agreements
    - Overhead management fees
    - The purchase of inputs from the parent
  - The role of taxation and exchange controls
  - The effect of exchange rates.

Example

- A firm is considering an investment in a manufacturing facility in Europe.
  - The initial investment is €178.66m

Plant/Factory: €100m
Equipment: € 73m
Working Capital: € 5.66m

  - A European government is willing to provide a subsidised loan of €30m at 3%. Should the firm decide to borrow in European bond market, the interest rate is 6%
  - The cost of capital is estimated to be 11.1% (4.5% + 1.2×5.5%)
  - European subsidiary pays the parent:
    - Dividend which is the free cash flow of the subsidiary
    - Royalty of 5% of revenue
    - Overhead Allocation fees for accounting and managerial assistance is 2% of revenue
  - Current European demand is 40,000 units
  - Overhead expenses (a fixed cost) in the first year is €1.59m and then increases in line with European inflation

➢ ***See Excel file for full calculations and assumptions.***

Cash flows of Subsidiary (1)

❖ Revenue Forecasts for European Subsidiary

	1	2	3	4	5	6	7	8	9	10
Real growth rate of unit sales	10%	11%	12%	10%	8%	6%	4%	3%	2%	1%
Unit Sales	22,000	48,840	54,701	60,171	64,985	68,884	71,639	73,788	75,264	76,017
Euro Inflation Rates	3%	4%	3%	2%	2%	2%	2%	2%	2%	2%
Euro Price per Unit	2,524	2,624	2,703	2,757	2,812	2,869	2,926	2,985	3,044	3,105
Total Euro Revenue in millions	55.53	128.16	147.86	165.89	182.74	197.63	209.62	220.26	229.10	236.03

❖ Forecasts of Costs

	1	2	3	4	5	6	7	8	9	10
Variable Costs										
Labour	702	730	752	767	782	798	814	830	847	864
Inputs sourced in Europe	665	692	712	727	741	756	771	786	802	818
Parts purchased from Parent	407	423	436	445	454	463	472	481	491	501
Total Variable cost	39.03	90.11	103.93	116.67	128.48	138.94	147.36	154.73	161.06	165.95
Royalty Fees (5% of Revenue)	2.78	6.41	7.39	8.29	9.14	9.88	10.48	11.01	11.46	11.80
Overhead Allocation (2% of revenue)	1.11	2.56	2.96	3.32	3.65	3.95	4.19	4.41	4.58	4.72
Overhead Expenses	1.59	1.65	1.7	1.74	1.77	1.81	1.84	1.88	1.92	1.96
Depreciation	10.28	10.9	11.56	12.23	12.92	13.62	14.33	15.06	15.81	16.57
Total Cost	54.78	111.63	127.54	142.25	155.96	168.20	178.20	187.09	194.83	201.00

Cash flows of Subsidiary (2)

- Forecasts of **After-Tax Profit**

	1	2	3	4	5	6	7	8	9	10
Total Revenue	55.53	128.16	147.86	165.89	182.74	197.63	209.62	220.26	229.10	236.03
Total Cost	54.78	111.63	127.54	142.25	155.96	168.20	178.20	187.09	194.83	201.00
EBIT	0.74	16.53	20.31	23.64	26.78	29.43	31.41	33.17	34.27	35.04
Local Corporate Tax (Tax Rate in Europe 35%)	0.26	5.78	7.11	8.27	9.37	10.30	10.99	11.61	11.99	12.26
Earnings After Tax (NOPLAT)	0.48	10.74	13.20	15.36	17.41	19.13	20.42	21.56	22.28	22.77

- **Free Cash flows** of the European subsidiary

	0	1	2	3	4	5	6	7	8	9	10
Earnings After Tax (NOPLAT)		0.48	10.74	13.20	15.36	17.41	19.13	20.42	21.56	22.28	22.77
Depreciation		10.28	10.9	11.56	12.23	12.92	13.62	14.33	15.06	15.81	16.57
Change in NWC	5.66	0.17	7.63	2.07	1.89	1.77	1.56	1.26	1.12	0.93	0.73
Capital Expenditure	173.00	10.58	11.01	11.34	11.56	11.8	12.03	12.27	12.52	12.77	13.02
Free Cash Flow	-178.66	0.01	3.01	11.36	14.14	16.76	19.15	21.22	22.98	24.39	25.60
Discount Factor (11.1% pa)	1.00	0.90	0.81	0.73	0.66	0.59	0.53	0.48	0.43	0.39	0.35
PV of Free Cash Flow	-178.66	0.01	2.44	8.28	9.28	9.90	10.18	10.16	9.90	9.46	8.93
Terminal Value in Year 10											286.95
Terminal Value in Year 0	100.15										
Net Present Value	0.03										

$$\frac{25.60 \times 1.02}{(0.111 - 0.02)}$$

Cash flows of Parent

- **After-Tax Dividend** received by parent company

	1	2	3	4	5	6	7	8	9	10
Dividend to Parent	0.01	3.01	11.36	14.14	16.76	19.15	21.22	22.98	24.39	25.60
European withholding tax (10%)	0.00	0.30	1.14	1.41	1.68	1.92	2.12	2.30	2.44	2.56
After-tax dividend received by parent	0.01	2.71	10.22	12.73	15.08	17.24	19.10	20.68	21.95	23.04

- Impact of **Taxes** could include the effect of **CREDITS** on a portion of (withholding & income) taxes paid in Europe. The portion of foreign tax that becomes tax credit depends on *deemed paid credit* – The tax office recognises that the subsidiary is **not** paying out the ***full*** after-tax income as dividend.

	1	2	3	4	5	6	7	8	9	10
NOPLAT of the Subsidiary	0.48	10.74			.41	19.13	20.42	21.56	22.28	22.77
Dividend received from Subsidiary	0.01	**3.01**			.76	19.15	21.22	22.98	24.39	25.60
Tax paid by subsidiary	0.26	5.78		8.27	9.37	10.30	10.99	11.61	11.99	12.26
Deemed Paid Credit	0.01	1.62	6.11	7.61	9.02	10.30	10.99	11.61	11.99	12.26
Withholding Tax paid by Parent	0.00	0.30	1.14	1.41	1.68	1.92	2.12	2.30	2.44	2.56
Foreign Tax Credit	0.01	1.92	7.25	9.03	10.70	12.21	13.12	13.91	14.43	14.82

$$\frac{3.01}{10.74} \times 5.78$$

Cash flows of Parent (1)

- **NPV of Dividends** received by parent company

	0	1	2	3	4	5	6	7	8	9	10
After-Tax Value of Dividends		0.01	2.71	10.22	12.73	15.08	17.24	19.10	20.68	21.95	23.04
Discount Factor (11.1%)	1.00	0.90	0.81	0.73	0.66	0.59	0.53	0.48	0.43	0.39	0.35
PV of After-Tax Dividends		0.01	2.19	7.45	8.35	8.91	9.17	9.14	8.91	8.51	8.04
Terminal value of dividends in Year 10											258.20
Terminal value of dividends in Year 0	90.12										
NPV of After-Tax Dividends	160.81										

$$\frac{23.04 \times 1.02}{(0.111 - 0.02)}$$

- Similar approach to determining PV of royalties and overhead allocation expenses, export sales to subsidiary – see spreadsheet!

Cash flows of Parent (2)

- The firm has a subsidised loan of €30m at 3% per annum. In year 11, the parent issues perpetual debt of €30m at 6% per annum. What about the tax benefits of debt?

	0	1	2	3	4	5	6	7	8	9	10
Tax Rate × Interest Paid	315000	315000	315000	315000	315000	315000	315000	315000	315000	315000	315000
Discount Factor (6%)		0.94	0.89	0.84	0.79	0.75	0.70	0.67	0.63	0.59	0.56
PV of Interest Tax Shields			30349	264480	249510	235386	222063	209493	197635	186448	175894
Terminal Value of Tax Shields (Year 10)											16.065m
Terminal Value of Tax Shields (Year 0)	8.97m										
NPV of Tax Shields	**11.289m**										

$0.35 \times (30m \times 0.03)$

$$\frac{0.35 \times (30m \times 0.06) \times 1.02}{(0.06 - 0.02)}$$

- The fact that the firm pays 3% rather than the market rate of 6% (i.e. an interest subsidy) confers a benefit to the parent. See spreadsheet for calculations

APV of Parent

- The APV from the parent company's point-of-view is the sum of the present value of cash flows and the impact of side-effects.

Initial Investment	- €178.6
Dividends	+ €160.81
Royalties & Fees	+ €111.42
Export Sales	+ €22.99
Interest Tax Shield	+ €11.29
Interest Subsidy	+ €6.62
Adjusted PV of Parent	**€134.47**

Will pay below market interest on €30m

- What other issues could be included?
  - Cannibalisation of export sales: Setting up manufacturing facilities in Europe reduces parent's CFs. It reduces exports from parent company if it doesn't have another market for those 40K in lost sales.
    This should *reduce* APV by the amount of the lost profit (€81.55).
    See worksheet.

What about exchange rates?

- Firms have revenues and costs in multiple currencies.
- **First Approach: Local Currency NPV**
  - Perform revenue and cost projections using local currency figures and then discount cash flows at the local currency cost of capital. Then convert local currency NPV to dollars (home currency) using current spot rate.
  - Denoted as $\left(\frac{E_t[X_{(t+k)}]}{[1+r(FC,k)]^k}\right) \times S_{(t)}$
  - This approach is useful when revenues and costs are in local currency, when investment capital is raised locally, and cash flow will be reinvested locally.
  - Upside: Don't have to forecast exchange rates.

What about exchange rates? (2)

- **Second Approach: Period-by-Period Conversion**
  - Use local currency projections and convert each periods cash flow into dollars using the forward rate or exchange rate projections.
  - Denoted as $$\frac{E_t\left[X_{(t+k)}\right] E_t\left[S_{(t+k)}\right]}{[1 + r(DC, k)]^k}$$
  - Discount the dollar cash flows with a dollar (or home country) discount rate with adjustments for country and project risks.
  - Explicit about exchange rate movements and discount rate adjustments.
  - Easier to perform sensitivity analysis.

What about exchange rates? (3)

- Equating the **two** approaches

$$\left(\frac{E_t[X_{(t+k)}]}{[1+r(FC,k)]^k}\right) \times S_{(t)} = \frac{E_t[X_{(t+k)}]\, E_t[S_{(t+k)}]}{[1+r(DC,k)]^k}$$

$S_{(t)}$ – spot rate (domestic per unit of foreign currency); X – cash flows in foreign currency, r – discount rate; FC (DC) – foreign (domestic) currency

The above equation can be simplified by dividing both sides by $S_{(t)}$ and $E_t[X_{(t+k)}]$ & multiplying both sides by the two denominator terms

$$[1+r(DC,k)]^k = [1+r(FC,k)]^k \frac{E_t[S_{(t+k)}]}{S_{(t)}}$$

- The two approaches are the same when the discount rates satisfy *International Fisher Effect*.
- Keep in mind: Discount rates should be different for different time periods.

Discount Rate: Horses for Courses

- Investment banker/ Fund manager/ Executive of domestic firm: **Focus on domestic firm/project**

- Local, single country CAPM

Market Risk Premium

$$E(r_i) = r_{f,Local} + \beta_i E\left(r^M_{Local} - r_{f,Local}\right)$$

A real-world application of the above

$$E(r_{BHP}) = r_f^{Aust.} + \beta_{BHP,ASX200} E\left(r_{ASX200} - r_f^{Aust.}\right)$$

The issue is it assumes that the assets of a country are held only by local (Australian) investors, hence there would be no international diversification of risk.

- Alternative: Use World CAPM

$$E(r_i) = r_f + \beta_{i,World} E\left(r_{World} - r_f\right)$$

- How would an Australian fund manager evaluate a foreign firm to include in his portfolio?
- How would a manager estimate the cost of capital for an overseas project? Say in Chile.
- Should there be an additional risk premium for country (political) risk?

  It depends in whether the risk is diversifiable or not. To answer this the manager needs to know

  - Who the marginal investor is and what type of portfolio they hold?
  - Is the country risk country specific, i.e., are the correlations between countries low?

Country Risk

- If country risk matters, how would they estimate the risk premium?
- Historical Risk Premiums

  Calculate the average equity market risk premiums ($\overline{R_M - R_f}$) over a period of time.

  What are the problems with this approach?
- Modified Historical Risk Premiums

  $$Equity\ Risk\ Premium = Base\ premium\ for\ developed\ market + \boldsymbol{Country\ Equity\ Risk\ Premium}$$

  Country equity risk premium reflects the additional risk of investing in a specific emerging market (e.g., Chile). This needs to be estimated.

- Measures of country risk

  1. Sovereign rating from S&P & co. The S&P rating for Chile is A (investment grade).
  2. Country risk scores from International Country Risk Guide.
  3. Do own research by studying economic fundamentals, state of the country's equity market.

- Now we need to estimate the premium this risk would command.

Measures of Country Risk Premiums

- Bond default spreads: $Yield_{USD}^{Emerging\ market} - Yield_{USD}^{Developed\ market}$

  Requires: (a) yields on country bonds issued by the emerging market (e.g., Chile) denominated in USD or other hard currencies; (b) yield on developed market bonds of the same maturity in the same hard currency. The US market is usually used as a proxy for the developed market.

  For example,

  $$Country\ Premium = Bond\ Yield_{USD}^{Chile} - Bond\ Yield_{USD}^{US}$$

- Relative Equity Market Standard Deviations: Incorporates equity risk (standard deviation of stock returns). Higher risk implying higher premiums.

  $$Risk\ Premium_{Emerging\ mkt} = Risk\ Premium_{Developed\ mkt} \times \frac{\sigma_{Emerging\ mkt}}{\sigma_{Developed\ mkt}}$$

  $$Country\ Premium = Risk\ Premium_{Emerging\ mkt} - Risk\ Premium_{Developed\ mkt}$$

  For example,

  $$Country\ Premium_{Chile} = Risk\ Premium_{Chile} - Risk\ Premium_{US}$$

Measures of Country Risk Premiums (2)

- Bond Default Spreads + Relative Equity Market Standard Deviations:

  Default spreads only captures default risk. The risk associated with investing in equity has to be greater than default risk. So, we would expect equity risk premium to be LARGER than bond default spreads. The premium will increase is the country's sovereign rating is downgraded or if the relative volatility of the equity market increases.

$$Country\ Premium = Default\ Spread \times \frac{\sigma_{Equity}}{\sigma_{Country\ Bond}}$$

The Cost of Equity Capital

- For valuing emerging market firms/projects – the options are varied

- The brute force method

$$E(r_i) = r_f + \beta_i E\left(r^M_{Developed} - r_f\right) + Country\ risk\ premium$$

Say you are valuing BHPs Chile based copper mine Escondida. It would be

$$E(r_i) = r_f + \beta_i E\left(r^M_{Australia} - r_f\right) + Country\ risk\ premium$$

- The beta method:

$$E(r_i) = r_{f,US} + \beta_i\left[E\left(r^M_{Developed} - r_f\right) + Country\ risk\ premium\right]$$

  - Use this approach if the belief is that not all companies in the developing market is equally exposed to country risk.

The Cost of Equity Capital (2)

- Local country risk exposure model:

$$E(r_i) = r_f + \beta_i E\left(r^M_{Developed} - r_f\right) + \lambda \times Country\ risk\ premium$$

Lambda (λ) = firm's exposure to local country risk. This could be estimated as the % of revenues the firm derives from the local country relative to the % of revenues in the country for the average company.

Takeaways

- Revisiting the basics of free cash flows
- Parent versus subsidiary cash flows
- The impact of exchange rates on cash flows
- Cost of equity capital – the variants