

# CHAPTER 11: UNCERTAINTY AND RISK IN CAPITAL BUDGETING: PART II

---

## 11-1

<i>Risk</i>	<i>Analysis</i>
a. Project analyst might have overestimated revenue	This is project-specific risk which should be diversified across projects. It should not be factored into investment analysis.
b. Natural Disaster	This is firm-specific risk that should be diversifiable across investments. It should not be factored into investment analysis.
c. Competitor's Store	This is again firm-specific risk that should be diversifiable. It should not be factored into investment analysis.
d. Plant closes	This is also firm-specific risk that should not affect investment analysis.
e. Economic Recession	This is market risk; it should be considered while estimating discount rates and value.
f. National Sales Tax	This is market risk and should be considered while doing investment analysis.
g. Increase in inflation	This is market risk and it should be reflected in the discount rate.

---

## 11-2

If this firm was a private firm, items (b), (c) and (d) which were classified as firm-specific risk and were ignored in project analysis, might have been considered as relevant risk and affected discount rates.

### 11-3

a. Cost of Equity =  $7\% + 1.40(5.5\%) = 14.70\%$

I would use this as my cost of equity to evaluate or discount cash flows on a new store.

b. In the previous section, I assumed that the stockholders in the firm would not care about exchange rate risk since they can diversify it away themselves. If the stockholders in the Limited were not capable of being well diversified (for e.g, the stock might be closely held), I would have added a premium to the estimated cost of equity to reflect exchange rate and political risk. The Brady bond premium can be added to the U.S. risk premium (5.5%) to arrive at the premium for South American stores.

### 11-4

a. Cost of Equity =  $7\% + 0.8(7.5\%) = 13.00\%$

[I am using a higher risk premium to reflect the riskiness of the economy in Thailand.]

b. After-tax Cost of Debt = 4.5%

Cost of Capital =  $13\%(0.4) + 4.5\%(0.6) = 7.90\%$

c. If the analysis had been done in the local currency, the risk-free rate and the after-tax cost of debt would both have been in the local currency.

### 11-5

a. Unlevered beta for multimedia business =  $1.30 / (1+(1-.4)(.50)) = 1.00$

b. Beta for the multimedia division =  $1.00(1+(1-.4)(1.00)) = 1.60$

Cost of Equity for the multimedia division =  $7\% + 1.60(5.5\%) = 15.80\%$

Cost of Capital for the multimedia division =  $15.80\%(0.5) + 4.25\%(0.5) = 10.03\%$

c. If the multimedia division were financed with a debt/equity ratio of 40%,

Beta for the multimedia division =  $1.00(1+(1-.4)(.40)) = 1.24$

Cost of Equity for the multimedia division =  $7\% + 1.24(5.5\%) = 13.82\%$

Cost of Capital for the multimedia division =  $13.82\%(100/140) + 4.25\%(40/140) = 11.09\%$

### 11-6

a. Unlevered Beta for Automobile Component Business =  $0.90 / (1+(1-.36)(.40)) = 0.72$

Beta for Automobile Component Business =  $0.72(1+(1-.36)(30/70)) = 0.92$

b. Cost of Equity for Auto Component Business =  $7\% + 0.92(5.5\%) = 12.06\%$

Cost of Capital for Auto Component Business = 12.06% (.70) + 5% (.3) = 9.94%

c. If Intel uses its current cost of equity and capital on this project, it will make it more likely to reject the project - the current cost of equity and capital are very high.

**11-7**

a. Unlevered Beta =  $0.95 / (1 + (1 - .36)(12/88)) = 0.87$

New Beta based upon Debt ratio of 20% (D/E ratio is 25%) = 1.01

Cost of Equity = 7.5% + 1.01 (7.5%) = 15.08%

[ I charged a higher premium to reflect the higher risk of the Malaysian economy]

Cost of Capital = 15.08% (.8) + 8% (1-.36) (.2) = 13.09%

b. No. I did not charge a premium for currency risk, since Hershey is a widely-held stock with institutional investors who are capable of handling exchange rate risk on their own.

c. I did charge a premium for the underlying economic risk in the Malaysian economy (by using a higher risk premium) but I did not explicitly charge a premium for the political risk.

d. If Hershey had been privately held, I would have charged premiums for both currency and political risk.

**11-8**

Unlevered Beta for Cosmetics Firms =  $1.75 / (1 + (1 - .4)(.10)) = 1.65$

Beta for Cosmetics Division of The Gap = 1.65

Cost of Equity for Cosmetics Division = 7% + 1.65 (5.5%) = 16.08%

**11-9**

a. and b.

Year	CF	PV at 16.08%	Cert. Eq. CF	PV at 7%
0	\$(10,000,000)	\$(10,000,000)	\$(10,000,000)	\$(10,000,000)
1	\$3,500,000	\$3,015,162	\$3,226,223	\$3,015,162
2	\$4,000,000	\$2,968,556	\$3,398,699	\$2,968,556
3	\$4,500,000	\$2,877,003	\$3,524,452	\$2,877,003
4	\$5,000,000	\$2,753,851	\$3,609,737	\$2,753,851
5	\$5,000,000	\$2,372,373	\$3,327,376	\$2,372,373
	<b>Sum</b>	<b>\$3,986,945</b>		<b>\$3,986,945</b>

**11-10**

a. Beta for apparel firms = 1.15

Cost of Equity for apparel firms = 7% + 1.15 (5.5%) = 13.33%

[I am assuming that this project will be financed using the same mix of debt and equity as the typical apparel firms.]

b. There should be a premium for the fact that the Yankees are a privately owned business, reflecting the fact that the owners of the Yankees will be exposed to some risk over and beyond that estimated by the beta.

### 11-11

a. Cost of Equity for the Grocery Store =  $7\% + 1.40 (5.5\%) = 14.70\%$

Cost of Capital for the Grocery Store =  $14.70\% (100/170) + 5.5\% (70/170) = 10.91\%$

b. I would not charge a higher cost of capital for the New York City store, because estimation risk is firm-specific risk and should not be built into the discount rate.

### 11-12

a. Unlevered Beta for Workstation Business =  $1.20 / (1 + (1 - .36)(.20)) = 1.06$

Beta for Workstation Business =  $1.06 (1 + (1 - .36)(10/90)) = 0.99$

Cost of Equity for Workstation Business =  $7\% + 0.99 (5.5\%) = 12.45\%$

Cost of Capital for Workstation Business =  $12.45\% (.9) + 7.5\% (1 - .36)(.1) = 11.69\%$

b. No. I would not. The fact that the business is intensely competitive will be reflected in my estimates of profit margins and cash flows for the project, but not in the discount rate. This risk is industry risk and should not be reflected in the beta.

### 11-13

a. Unlevered Beta for tobacco firms =  $1.10 / (1 + (1 - .4)(.2)) = 0.98$

Beta for tobacco division =  $0.98 (1 + (1 - .4)(25/75)) = 1.18$

Cost of Equity for tobacco division =  $7\% + 1.18 (5.5\%) = 13.49\%$

Cost of Capital for tobacco division =  $13.49\% (.75) + 8\% (1 - .4)(.25) = 11.32\%$

b. Unlevered Beta for food firms =  $0.80 / (1 + (1 - .4)(.4)) = 0.65$

Beta for food division =  $0.65 (1 + (1 - .4)(25/75)) = 0.78$

Cost of Equity for food division =  $7\% + 0.78 (5.5\%) = 11.29\%$

Cost of Capital for food division =  $11.29\% (.75) + 8\% (1 - .4)(.25) = 9.67\%$

c. The cost of capital for Philip Morris as a firm will be the weighted average of the two costs of capital, weighted by the relative market values of the divisions.

Cost of Capital for firm =  $11.32\% (.5) + 9.67\% (.5) = 10.50\%$

### 11-14

The risk associated with the tobacco lawsuits is firm-specific risk and should be diversifiable in a portfolio concept. It will not affect the cost of equity. The effect that these suits have on default risk do affect the cost of debt and thus do affect the cost of capital, at least on the margin.

**11-15**

a. If debt is allocated on the basis of the relative market values of the divisions, the costs of capital will be the same as those calculated in problem 13.

b. If the tobacco division is assigned the debt,

Debt/Equity Ratio for tobacco division =  $25/25 = 100.00\%$

Beta for tobacco division =  $0.98 (1 + (1-.4) (1.00)) = 1.57$

Cost of Equity for tobacco division =  $7\% + 1.57 (5.5\%) = 15.64\%$

Cost of Capital for tobacco division =  $15.64\% (25/50) + 10\% (1-.4)(25/50) = 10.82\%$

Beta for the food division = 0.65

Cost of Equity for food division =  $7\% + 0.65 (5.5\%) = 10.58\%$

Cost of Capital for food division = 10.58%

**11-16**

a.

<i>Division</i>	<i>Beta</i>	<i>Cost of Equity</i>
Comm. Banking	1.05	12.78%
Real Estate	0.70	10.85%
Inv. Banking	1.40	14.70%

b. If I used First Global's beta to estimate the cost of equity for all three divisions, I would under estimate the cost of equity for the commercial and investment banking arms and over estimate it for the real estate division.

