Chapter 11

11-1

a. The real cost of capital = (1.1/1.025) -1 = 7.317%%

b., c. The real cash flows are obtained by discounting the nominal flows at the rate of inflation. The present values are obtained by discounting the real flows at the rate of 7.317% per year.

Year	Nominal Flows	Real Flows	Present Value
1	115	112.1951	104.5455
2	125	118.9768	103.3058
3	136	126.2895	102.1788
4	144	130.4569	98.35394
5	185	163.513	114.8704

The net present value is the sum of the present values, or $523.2544.

11-2

The cost of capital is (0.2)(1-0.33)(12) + (0.8)(22) = 19.208% in nominal terms or 1.1908/1.08 - 1 = 10.378% in real terms. The NPV of the project is 150/0.10378 - 1000 = 445.396 million reais.

11-3

a. The depreciation each period is 250/25 = $10m. Assuming a tax rate of 40%, the tax benefit is $4m. a year. The present value of this over 25 years is $98.226m. using the 9% cost of capital as a discount rate.

b. If the inflation rate jumps to 5%, the cost of capital would jump to 12%, but the nominal amount of yearly depreciation remains the same. The present value of this now drops to $78.431m.

c. International Harvester could lease its plant; this would shift the risk of losing depreciation tax benefits to the lessor. In addition, if the tax authorities allow depreciation to be indexed to inflation, International Harvester would be protected against the loss in value.

11-4

a. Expected Spot Rate = $0.13 *(1.03/1.35) = 0.0992

b. Expected spot rate in 2 years = $0.13*$(1.03/1.35)^2$ = 0.0757

c. Expected Spot rate if inflation rate drops to 20% = 0.0851

11-5

Country	**Inflation Rate**	**Expected Change**	**Actual Change**
China	12.10%	8.30%	3.35%
Indonesia	20.60%	14.76%	4.96%
Malaysia	10.10%	6.63%	2.39%
Singapore	1.30%	-1.48%	-4.08%
S. Korea	2.40%	-0.39%	-3.39%

Japan	2.00%	-0.78%	-2.96%
Taiwan	2.90%	0.10%	0.41%
Thailand	6.60%	3.56%	2.10%
Philippines	11.00%	7.39%	8.71%
India	10.10%	6.63%	11.90%
United States	2.80%	0.00%	

There is a high correlation between the expected and actual change. The three countries which had currencies that strengthened against the dollar also had inflation rates lower than the United States.

11-6
a. Forward Rate = $ 0.85 (1.05/1.035) = 0.8623

b. If the actual forward contract is $ 0.84, I would sell the forward contract and borrow Swiss francs.

Now
1. Borrow 1 Swiss Franc
2. Buy $ 0.85 and invest at 5%
3. Sell a forward contract

At t = 1
1. Collect on Dollar Loan: $ 0.85 (1.05) = $0.89
2. Convert dollars to Swiss francs at $ 0.84 per franc: $ 0.8925/$0.84 = 1.06
3. Repay the dollar loan with 5% interest: $ 1.00 (1.05) = $1.05
The arbitrage profit is $ 0.0125

11-7
Forward Rate = Spot Rate (1+ Domestic Rate)/(1+ Overseas Rate)
1.55 = 1.56 (1.05) / (1+r)
Solve for r,
r = (1.55/1.56)*(1.05) -1 = 4.33%

11-8
a.

Country	**Exchange Rate**	**1-year Interest Rate**	**Expected Spot Exchange Rate**
Canada	0.73	0.0557	$0.73
France	0.21	0.055	$0.20
Germany	0.71	0.0395	$0.68
Italy	0.06	10.75%	$0.05
Japan	0.99	2.35%	$0.97
UK	1.56	6.69%	$1.46
United States	1	5.00%	

b. The inflation rates may be different from anticipated. There might also be trading noise and speculation that causes the actual exchange rates to vary from expected rates.

11-9

a.

Year	CF In DM	Expected $/DM	CF in $
0	-15000	$ 0.6500	$ (9,750)
1	1350	$ 0.6563	$ 886
2	1485	$ 0.6626	$ 984
3	1634	$ 0.6689	$ 1,093
4	1797	$ 0.6754	$ 1,214
5	1977	$ 0.6819	$ 1,348
6	2174	$ 0.6884	$ 1,497
7	2392	$ 0.6950	$ 1,663
8	2631	$ 0.7017	$ 1,846
9	2894	$ 0.7085	$ 2,050
10	3183	$ 0.7153	$ 2,277

b. You might want to adjust this discount rate to reflect differences in inflation (if the analysis is done in the local currency) or differences in risk (exchange rate, political..)
I would not adjust the cost of capital for the Limited if I were doing the analysis in dollars, if the Limited's investors are internationally diversified and can diversify away exchange rate risk.
If I were doing the analysis in DM, I would use a cost of capital of approximately 11%: 1.12*(1.04/1.05) -1 = 10.93%
c. NPV (in dollar terms, using 12% cost of capital) = ($2,132.11)
d. NPV (in DM terms, using 10.93% cost of capital) = (3,278 DM)

11-10

a. We are estimating the cost of equity in dollar terms. Hence the risk free rate is simply the treasury bond rate of 6.5%. The market risk premium is 5.5% for the United States, and the beta is 0.9. The country risk premium is 3(1.8) = 5.4%. Hence the cost of equity is 6.5 + 0.9(5.5+5.4) = 16.31%. The cost of debt is (1.12)(1.03/1.09) – 1 or 5.83%. The cost of capital is (0.75)(16.31) + (0.25)(5.83)(1-0.35) = 13.1807%
b. The cost of equity in pesos is 1.1631(1.09/1.03) –1 = 23.09%; the cost of debt is 12% in pesos. Hence the cost of capital is (0.75)(23.09) + (0.25)(12)(1-0.4) = 19.12%

11-11

a.

Year	**CF (Yuan)**	**$/Yuan**	**CF ($)**
0	-1,600	$0.12	$(188.24)
1	-800	$0.11	$(86.55)
2	-1,000	$0.10	$(99.50)
3	150	$0.09	$13.73
4	300	$0.08	$25.25
5	500	$0.08	$38.69

6	650	$0.07	$46.26
7	800	$0.07	$52.36
8	900	$0.06	$54.17
9	1,000	$0.06	$55.35
10	1,100	$0.05	$56.00
11	1,210	$0.05	$56.65
12	1,331	$0.04	$57.30
13	1,464	$0.04	$57.97
14	1,611	$0.04	$58.66
15	1,772	$0.03	$59.34

b. If Sprint's stockholders cannot diversify away country risk in China, I would try to incorporate it into the cost of capital.
Country risk premium = 3.5%*2 = 7%
Cost of Equity = 10% + 7% = 17%
I would use a cost of equity of 17% (in dollar terms) to discount this project. The premium of 7% reflects the higher risk of investing in China.
c. NPV (in dollar terms, at 17%) = ($180.72)
d. It should not matter. If the discount rate is also in terms of Yuan, the net present value should be the same.

11-12. a.

Year	CF (Yuan)	$/Yuan	CF ($)	CF (with withdrawal restrictions)	PV(at 11.5%)
0	-1,600	$0.12	($188.24)	($188.24)	($188.24)
1	-800	$0.11	($86.55)	($86.55)	($73.97)
2	-1,000	$0.10	($99.50)	($99.50)	($72.69)
3	150	$0.09	$13.73		
4	300	$0.08	$25.25		
5	500	$0.08	$38.69		
6	650	$0.07	$46.26		
7	800	$0.07	$52.36		
8	900	$0.06	$54.17	$230.46	$65.63
9	1,000	$0.06	$55.35	$55.35	$13.47
10	1,100	$0.05	$56.00	$56.00	$11.65
11	1,210	$0.05	$56.65	$56.65	$10.07
12	1,331	$0.04	$57.30	$57.30	$8.71
13	1,464	$0.04	$57.97	$57.97	$7.53
14	1,611	$0.04	$58.66	$58.66	$6.51
15	1,772	$0.03	$59.34	$59.34	$5.63
					($205.69)

At time zero, Sprint will have to send $188.24, and the same for years 1 and 2. However, from years 3 to 8, the monies will accumulate at zero interest, so that the amount that can

be repatriated at time 8 is the sum of the cashflows from year 3 to year 8, i.e. $230.46, with the rest of the cashflows as before (see last column). Computing the sum of the present values of the sums in the last column, we see that the project NPV (at 17%) drops to -$205.69

b.
If the project were allowed to earn 5%, the computations for the first two years (including the initial inflow into China) would remain the same. However, for year 3, we would take the $13.73 flow, compound it at 5% to obtain the value in year 8, and then discount it back to year 0 at 17%. This gives $4.99. A similar computation is done for years 4 through 8 as well. The computation for the others remains unchanged from the previous subquestion. The NPV increases from -$205.69 to -$174.53

Year	CF (Yuan)	$/Yuan	CF ($)	CF (with withdrawal restrictions)	PV(at 17%)
0	-1,600	$0.12	($188.24)	($188.24)	($188.24)
1	-800	$0.11	($86.55)	($86.55)	($73.97)
2	-1,000	$0.10	($99.50)	($99.50)	($72.69)
3	150	$0.09	$13.73		
4	300	$0.08	$25.25		
5	500	$0.08	$38.69		
6	650	$0.07	$46.26		
7	800	$0.07	$52.36		
8	900	$0.06	$54.17	$339.89	$96.80
9	1,000	$0.06	$55.35	$55.35	$13.47
10	1,100	$0.05	$56.00	$56.00	$11.65
11	1,210	$0.05	$56.65	$56.65	$10.07
12	1,331	$0.04	$57.30	$57.30	$8.71
13	1,464	$0.04	$57.97	$57.97	$7.53
14	1,611	$0.04	$58.66	$58.66	$6.51
15	1,772	$0.03	$59.34	$59.34	$5.63
					($174.53)

c. In this case, the NPV would be the same as with no restrictions at all.

11-13.
a. The project is relatively small in Sprint's balance sheet, and Sprint is in no danger of going bankrupt if the project turns out unfavorably. Hence Sprint should not hedge against the risk in the project.
b. I would sell 150 yuan forward at the forward rate of 12 yuan per dollar to guarantee myself 150/12 or $12.5. However, this is not a perfect hedge to the extent that there is uncertainty regarding the number of yuan that Sprint will receive in year 3.
c. If I borrowed $150/1.15^3 = 98.63$ yuan today, I could repay the loan with the flows from the project. This could be converted into dollars today at the current exchange rate of 8.5 yuan per dollar to realize $11.6 today, or in year 3 terms, $11.6(1.06)^3 = \$13.82$. This would be better than using the forward contract in part b.
d. Strictly from a risk management point of view, it would be better to just wait for the realization of the yuan in year 3, and then convert them into dollars at that time, at the hopefully more advantageous rate. If I wanted to speculate (use my information to make a bet), I could buy yuan forward, but that would increase my yuan exposure, and hence make for a riskier position.
If I desired to protect myself against the downside, I could buy a put contract giving me the right to sell 150 yuan in three years time at a strike price of perhaps 12 yuan to the dollar, which is the current forward price, and may, therefore, be taken as an estimate of the future spot yuan-dollar rate.. Since I expect the yuan to appreciate, say from 8.5 per dollar to 7.5 per dollar, if my expectations are realized, I would obviously not exercise my put – I would simply sell my yuan in three years time at the spot rate. On the other hand, if the yuan actually deteriorates even more than the market's expected future spot rate, I would be covered.