

# CHAPTER 29:

## RISK MANAGEMENT

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### 29-1

The duration of a zero-coupon bond will always be equal to its maturity. With a zero-coupon bond, all cash flows come at the same horizon (the maturity date) so the weighted average is equal to the maturity.

### 29-2

A firm may prefer a T-bond-based swap or a LIBOR-based swap. It depends on which rate is more correlated with the asset to be kept after the swap is done.

### 29-3

A swaption would allow the company to enter into the swap agreement if the unfavorable events occurred (e.g. if the exchange rates changed to its disadvantage) but would also allow it the flexibility of foregoing the swap if favorable exchange rates or interest rates came about.

### 29-4

Swaps change the cash flows so the cash inflows and cash outflows are matched.

### 29-5

It is possible that the high-quality firm might have more information about the low-quality firm than the market does.

### 29-6

a.

The types of risk that this firm must face are:

1. Estimation Risk that the forecasts made for the store are incorrect: Firm-Specific due to estimation errors.
2. Exchange Rate Risk that the Mexican and Canadian stores cash flows will be different from in dollars: Firm-Specific - anticipated because of unanticipated exchange rate movements.
3. Competitive Risk that a competitor's actions may cause unexpected shifts: Firm-Specific - in the cash flows
4. Economic Risk that the economy may behave differently from anticipated: Market Risk
5. Change in value caused by movements in interest rates: Market Risk

b. I am assuming that the investors in this retail store are well diversified, domestically as well as internationally.

**29-7**

The risk that will be diversified in an acquisition is firm-specific risk. Stockholders can do it themselves without having to pay the premium that the firm has to pay.

**29-8**

Risk management has no effect on value if it has no effect on either the cash flows or the discount rate. For this to be the case, the benefits from risk management (tax benefits, lower default risk etc.) should be offset by the cost of buying the protection against risk. Alternatively, if it costs nothing to hedge risk, there should be no positive feedback effects from risk management.

**29-9**

Yes. Enter into a fixed-fixed swap with a foreign counterparty and interest rate swap with a domestic counterparty. Then give the domestic counterparty the payments from the foreign counterparty.

**29-10**

I would not be quite this categorical about this issue. It is possible that firms may get benefits from hedging firm specific risk. They might reduce their tax burden over time, and their default risk, allowing them to borrow more and have higher value.

**29-11**

Suppose that the bond is an annual bond and has a par value of \$1,000. The YTM is also 10%, the same as the coupon rate. To find the duration of this bond, we construct the following table.

<b>Year</b>	<b>Cash Flow</b>	<b>Present Value</b>	<b>Weight</b>	<b>t *</b>
1	\$100	\$90.91	9.09%	0.091
2	\$100	\$82.65	8.26%	0.165
3	\$100	\$75.13	7.51%	0.225
4	\$100	\$68.30	6.83%	0.273
5	\$1,100	\$683.01	68.30%	3.415
<b>Sum</b>		<b>\$1,000</b>	<b>100%</b>	<b>4.169</b>

So the duration = 4.169 years.

If the interest rate is increased by 2%, then the price of the bond would decline by  $4.169 * 2\% / (1 + 10\%) = 7.58\%$

**29-12**

When the YTM = 12%, the bond price = \$927.90

This is a decline of 7.21% in price from the original \$1,000.

This number is different from the answer to the previous problem. Using duration to find price change would only give approximate answer.

**29-13**

When the YTM increases by one basis-point, the price of the bond would change by -0.0378982%.

When the YTM decreases by one basis-point, the price of the bond would change by 0.0379176%.

$$CX = 10^8 * (-0.0378982\% + 0.0379176\%) = 1,940\%$$

Then the price change caused by a increase of 2% in the interest rate would result in a change of bond price by  $-7.58\% + 1940\% * 0.02^2 / 2 = -7.192\%$ .

This is much closer to the answer in the previous problem.

### 29-14

In most cases, we only need to know the approximate value of change and it is much easier to find the approximate value than the exact value of change.

### 29-15

Level of Interest Rates	Probability of occurrence	Firm Value
3%	5%	\$28,571
4%	10%	\$22,222
5%	20%	\$18,182
6%	30%	\$15,385
7%	15%	\$13,333
8%	10%	\$11,765
9%	5%	\$10,526
10%	3%	\$9,524
11%	2%	\$8,696

a. I would estimate the effect of interest rate changes (risk) on firm value. This will give me a measure of the need for risk management. This table suggests that the firm value is very sensitive to changes in interest rates. If the firm wants to insulate itself against the downside risk, it can partially hedge itself against interest rate changes.

b. Simulations are dependent upon the underlying models used to arrive at the results. In particular, the relationship between interest rates and value in this case are determined by the valuation model used. In addition, the probability distribution for interest rate changes is based upon past data. Flaws in either of these assumptions may cause the results of the simulation to be skewed.

### 29-16

Year	Operating Income	Long Bond Rate	% Change in OI	Change in Long Bond Rate
1980	\$150	11.90%		
1981	\$130	14.20%	-13.3%	2.30%
1982	\$138	13.80%	6.2%	-0.40%
1983	\$165	12.00%	19.6%	-1.80%

1984	\$155	12.70%	-6.1%	0.70%
1985	\$180	11.40%	16.1%	-1.30%
1986	\$220	9.00%	22.2%	-2.40%
1987	\$205	9.40%	-6.8%	0.40%
1988	\$200	9.70%	-2.4%	0.30%
1989	\$210	9.30%	5.0%	-0.40%
1990	\$215	9.30%	2.4%	0.00%
1991	\$230	8.80%	7.0%	-0.50%
1992	\$270	8.10%	17.4%	-0.70%
1993	\$315	7.20%	16.7%	-0.90%
1994	\$300	8.00%	-4.8%	0.80%

a. The results of regressing percentage changes in operating income against the long bond rate are as follows:

$$\% \text{ Change in Operating Income} = 0.03 - 9.08 (\text{Change in Long Bond Rate})$$

This firm is negatively affected by increases in the long bond rate.

b. This regression is handicapped by a few factors

1. It is based upon past data. To the extent that the firm has changed its risk profile and business mix over time it may not provide an accurate picture of risk.

2. The limited data that is available will also make the regression noisy - the estimates will have large errors associated with them.

## 29-17

Year	Stock Price	Interest Rate	Inflation Rate	Exchange Rate	% Change in Price	differential Interest Rate	differential Inflation rate	% change in exchange rate
1980	\$2.22	11.90%	13.50%	99.37				
1981	\$1.82	14.20%	10.30%	110.47	-18.02%	2.30%	-3.20%	11.17%
1982	\$4.31	13.80%	6.10%	123.14	136.81%	-0.40%	-4.20%	11.47%
1983	\$7.06	12.00%	3.20%	128.65	63.81%	-1.80%	-2.90%	4.47%
1984	\$7.57	12.70%	4.30%	138.89	7.22%	0.70%	1.10%	7.96%
1985	\$9.66	11.40%	3.50%	125.95	27.61%	-1.30%	-0.80%	-9.32%
1986	\$14.06	9.00%	1.90%	112.89	45.55%	-2.40%	-1.60%	-10.37%
1987	\$18.82	9.40%	3.70%	95.88	33.85%	0.40%	1.80%	-15.07%
1988	\$25.25	9.70%	4.10%	95.32	34.17%	0.30%	0.40%	-0.58%
1989	\$21.75	9.30%	4.80%	102.26	-13.86%	-0.40%	0.70%	7.28%
1990	\$13.32	9.30%	5.40%	96.25	-38.76%	0.00%	0.60%	-5.88%
1991	\$14.06	8.80%	4.20%	98.82	5.56%	-0.50%	-1.20%	2.67%
1992	\$21.44	8.10%	3.00%	104.58	52.49%	-0.70%	-1.20%	5.83%
1993	\$32.25	7.20%	3.00%	105.22	50.42%	-0.90%	0.00%	0.61%
1994	\$27.88	8.00%	2.60%	98.6	-13.55%	0.80%	-0.40%	-6.29%
1995	\$28.88	7.00%	2.80%	102.3	3.59%	-1.00%	0.20%	3.75%

a. The results of the regression are as follows:

% Change in Stock Prices = 0.20 - 15.99 (Change in Long Bond Rate): Very negatively affected by increases in interest rates.

% Change in Stock Prices = 0.16 - 13.42 (Change in Inflation Rate): negatively affected by higher inflation.

% Change in Stock Prices = 0.25 + 0.89 (Change in Exchange Rate): Exchange rates do not seem to impact stock prices much.

b. The exposure of Ford's equity to these risk sources might be different from the exposure of Ford as a firm to the same risk sources because the exposure of Ford's debt to these same sources may be different from that of its equity. (The only condition under which the equity and firm exposures will be similar is if the value of debt moves with the value of the firm.

### **29-18**

a. I would expect the duration of the equity to go up. The duration of floating rate debt is low and it is being used to finance assets with long duration. This will increase the exposure of the equity investor to interest rate risk.

b. Only if the duration of the debt is set equal to the duration of the assets.

### **29-19**

a. Forward contracts provide the most complete protection because they can be tailored to a firm's precise needs.

b. Option contracts provide downside protection while preserving upside potential. They are also more expensive.