Chapter 21: Risk Management

Content based on Chapter 21 in: Berk, J., DeMarzo, P., Harford, J., Stangeland, D., & Marosi, A. (2020). *Fundamentals of Corporate Finance*. Pearson Canada Inc.

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Table 1: Notation

r_L	Cost of capital for an insured loss
Pr (Loss)	Probability of a loss
E	Payment in the event of loss
PV	Present value
NPV	Net present value

21.1 Insurance

Insurance is the most common method that firms use to reduce risk.

Types of insurance:

- **Property insurance**: a type of insurance that companies purchase to compensate them for losses to their assets due to fire, storm damage, vandalism, earthquakes, and other natural and environmental risks.
- **Business liability insurance**: a type of insurance that covers the cost that results if some aspect of a business causes harm to a third party or someone else's property.
- **Business interruption insurance**: a type of insurance that protects a firm against the loss of earnings if the business is interrupted due to fire, accident, or some other insured peril.
- **Key personnel insurance**: a type of insurance that compensates a firm for the loss or unavoidable absence of crucial employees in the firm.

Table 2: The Role of Insurance

Event	Probability	Loss ($ millions)
No fire	99.98%	0
Fire	0.02%	150

Firm's expected loss from fire each year is = (99.98% * $0) + (0.02% * $150M) = $30,000

Insurance premium: the fee a firm pays to an insurance company for the purchase of an insurance policy.

$$\frac{\text{Pr}Pr\ (Loss)\ *E(Payment\ in\ the\ Event\ of\ Loss)}{1+r_L(cost\ of\ capital\ for\ insured\ loss)}$$

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In ***perfect capital markets,*** insurance will be priced so that it has an NPV of zero for both the insurer and the insured.
Deductible: a provision in an insurance policy in which an initial amount of loss is not covered by the policy and must be paid by the insured.
Policy limits: provisions in an insurance policy that limit the amount of loss that the policy covers regardless of the extent of the damage.

- Insurance is most likely to be attractive to firms that are currently financially healthy, do not need external capital, and are paying high current tax rates.

21.2 Commodity Price Risk

Hedge: risk reduction achieved by using contracts or transactions which provide the firm with cash flows that offset its losses from price changes.

Common hedging strategies:

- **Vertical integration:** the merger of two companies in the same industry that makes products required at different stages of the production cycle – does not always increase value.
- **Storage:** long-term storage of inventory can help offset future increases in the price of a commodity; however, storage costs are often too high for this strategy to work, and it requires a substantial cash outlay upfront – firm locks in its costs at today's prices + storage costs.

a) **Forward contract:** a customized agreement between two parties who are known to each other, whereby they agree to trade an asset on some future date at a price that is fixed today.
   - **Disadvantages**: another party may default, cannot be entered into anonymously, the market value of the long-term contract is difficult to determine, challenging to cancel the contract

Buyer's profit of a forward contract = (# of contracts) * (contract size) * (expiration market price – forward price)
Seller's profit of forward contract = (# of contracts) * (contract size) * (forward price – expiration market price)

b) **Futures contract:** a standardized agreement between two anonymous parties that is traded on an organized futures exchange and contracts the two parties to trade an asset on some future date at a price that is fixed today.
   - Futures contracts aim to avoid the disadvantages of forward contract
   - If you have a ***long position***, you are agreeing to buy the asset at a future date (buyer)
   - If you have a ***short position***, you are agreeing to sell the asset at a future date (seller)
   - Futures exchanges use two mechanisms to prevent buyers or sellers from defaulting: margin and marking to market.

Margin: collateral that investors are required to deposit into their brokerage account when entering a transaction that could generate losses beyond the initial investment.
Marking to market: the daily exchange of cash flows based on computing gains and losses due to the daily change in the market prices of a futures contract.
Margin call: a requirement for investors to inject new cash into their brokerage account when their account balances fall below a maintenance margin requirement due to marking to market cash flows.

Future's contract profit (long) = (# of contracts) * (contract size) * (expiration price – futures price)
Future's contract profit (short) = (# of contracts) * (contract size) * (futures price – expiration price)

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Table 3: Hedging Price Risk using Futures vs. Options

Firm's exposure to a change in the commodity price	Futures Strategy	Options Strategy
Firm concerned about a price increase (buy the commodity in the future)	Long futures contract	Buy a call option
Firm concerned about a price decrease (sell the commodity in the future)	Short futures contract	Buy a put option

- A **futures contract** allows a firm to lock in a price received or paid for an asset in the future – if a firm uses one, they are not able to take advantage of favourable price changes in the market.
- **Options** allows firms to take advantage of favourable price changes in the market at the cost of an option premium that reduces the amount the firm receives from either selling or buying an asset.

21.3 Interest Rate Risk

- Debt is a key component of many firms' capital structures. Firms that do borrow must pay interest on their debt.
- An increase in interest rates raises firms' borrowing costs and can reduce their profitability.
- Many firms have fixed long-term future liabilities; therefore, a decrease in interest rates increases the present value (PV) of these liabilities and, in turn, lowers the value of the firm.

Duration: the sensitivity to interest rate changes of an asset or a liability.
Duration mismatch: significant difference between the durations of a firm's assets and liabilities.
Interest rate swap: a contract in which two parties agree to exchange the coupons from two different types of loans.
Notional principal: the calculated amount of the coupon payments in an interest rate swap.

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