

Chapter 24

Risk Management: An Introduction to Financial Engineering

Chapter Organization

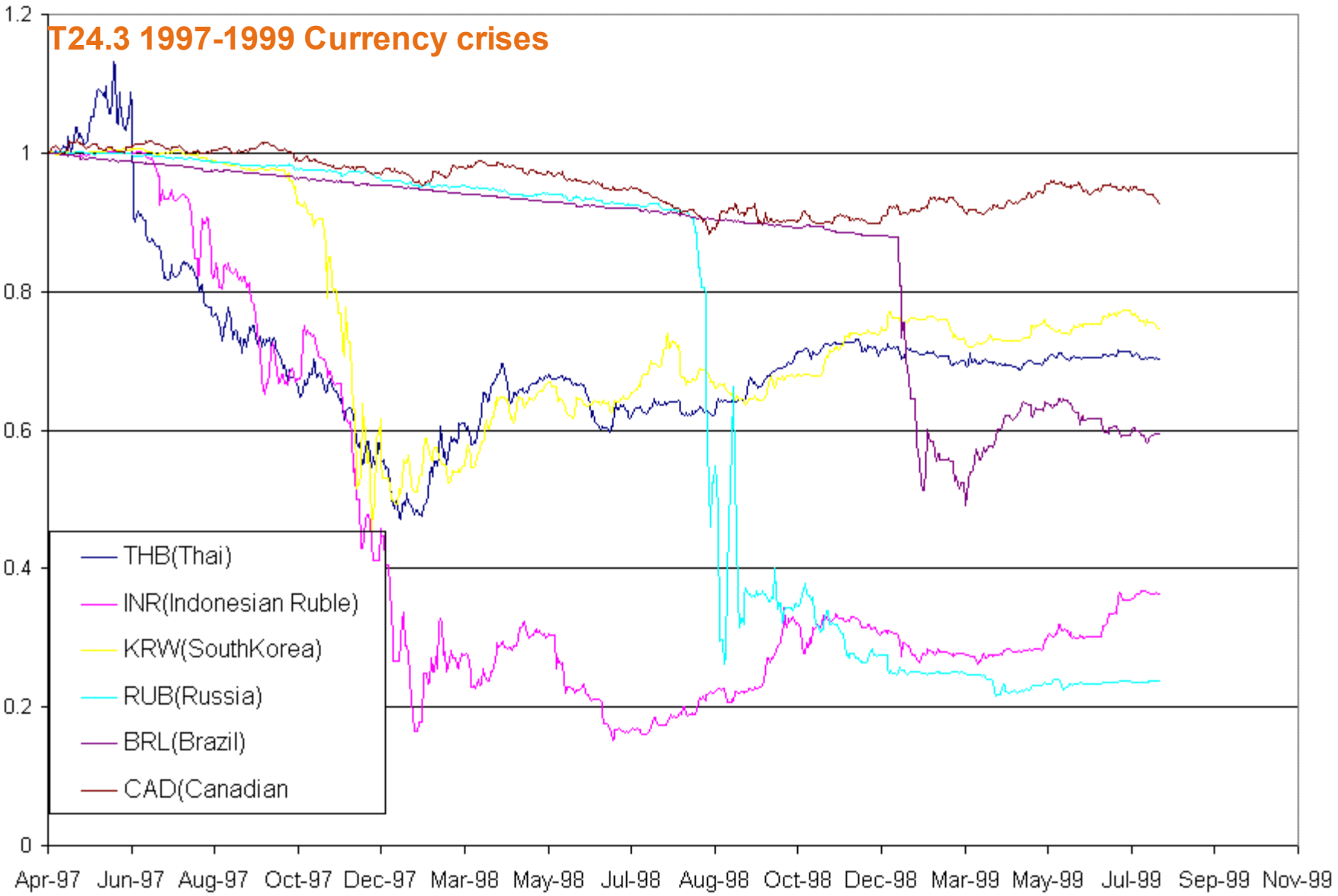
- 24.1 Hedging and Price Volatility
- 24.2 Managing Financial Risk
- 24.3 Hedging with Forward Contracts
- 24.4 Hedging with Futures Contracts
- 24.5 Hedging with Swap Contracts
- 24.6 Hedging with Option Contracts
- 24.7 Summary and Conclusions

T24.2 Example: Statement of Risk Management Policy at Walt Disney Company

“The company’s foreign currency revenues continue to grow and thus, Disney’s management believes it is prudent to reduce the risk associated with fluctuations in the value of the US dollar in the foreign exchange markets. *The Company uses foreign currency forward and option contracts to reduce the impact of changes in the value of its existing foreign currency assets and liabilities, commitments and anticipated foreign currency revenues denominated in Japanese yen, French francs, German marks, British pounds, and other currencies. The primary focus of the company’s foreign exchange risk management program is to reduce earnings volatility. By policy, the company maintains hedge coverages between minimum and maximum percentages of its anticipated foreign exchange exposures for each of the next five years.*” (Emphasis added)

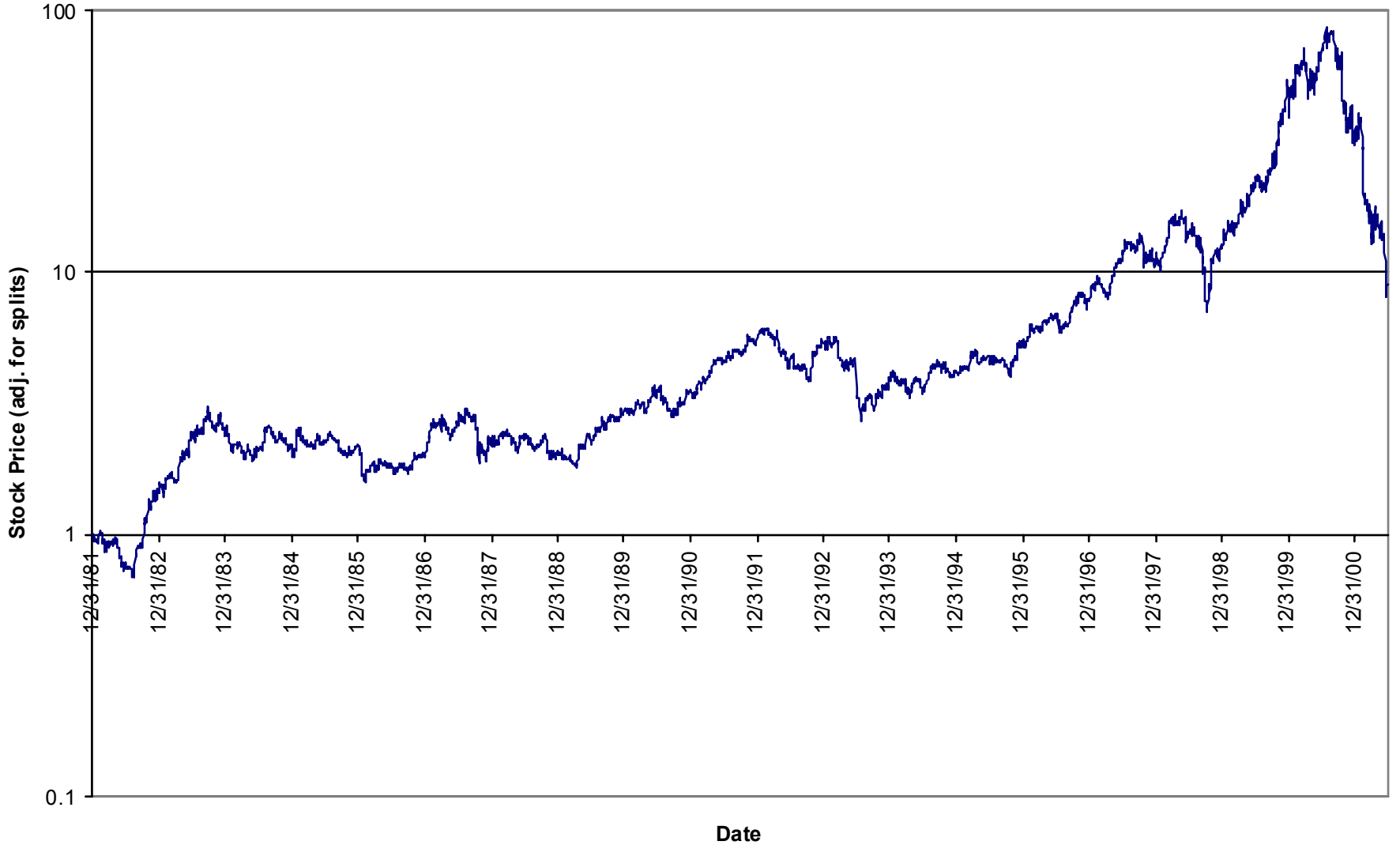
Excerpt from the Walt Disney Company 1995 Annual Report

T24.3 1997-1999 Currency crises



Nortel Networks

T24.4 Nortel Networks stock price (logarithmic scale)



T24.5 The Risk Management Process

- Step 1: Identify the source of the risk exposure.

Is the nature of the risk financial, currency, commodity, energy?

- Step 2: Quantify the risk exposure.

What is the extent of the potential loss?

- Step 3: Assess the impact of the exposure(s) on the firm's business and financial strategies.

Is hedging always beneficial? To whom, and under what conditions?

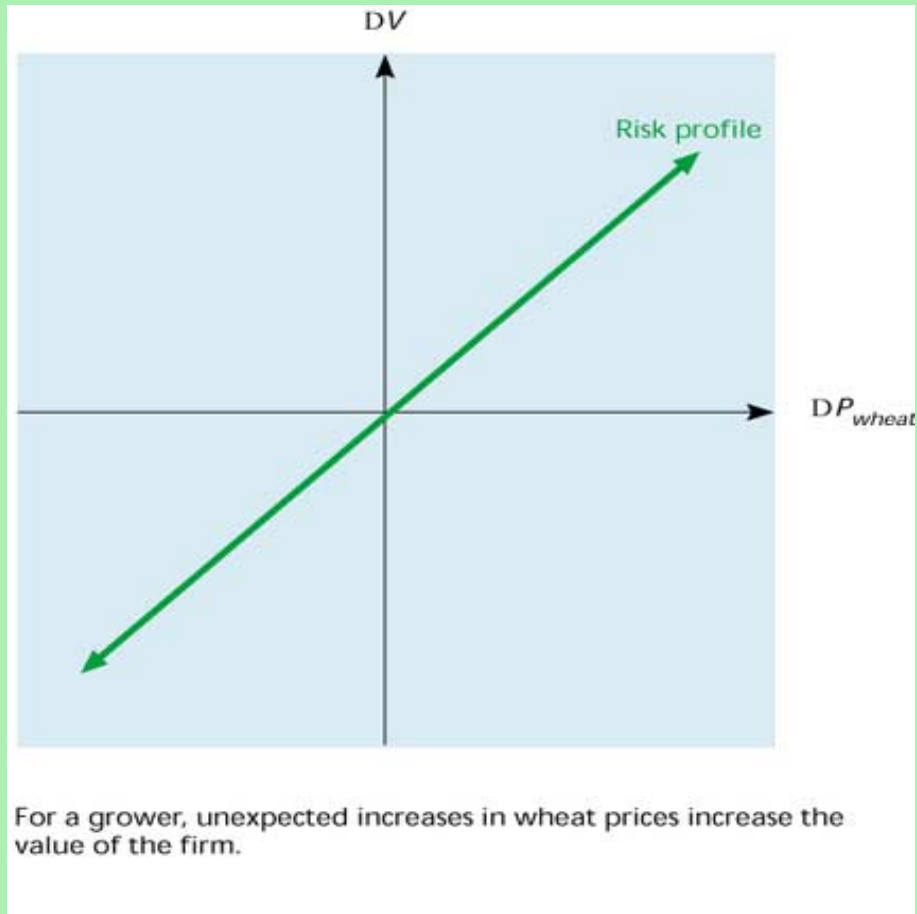
- Step 4: Assess honestly your firm's ability to design and implement a risk management program.

Does enough expertise exist within the firm to operate the program (or to hire someone to do so)?

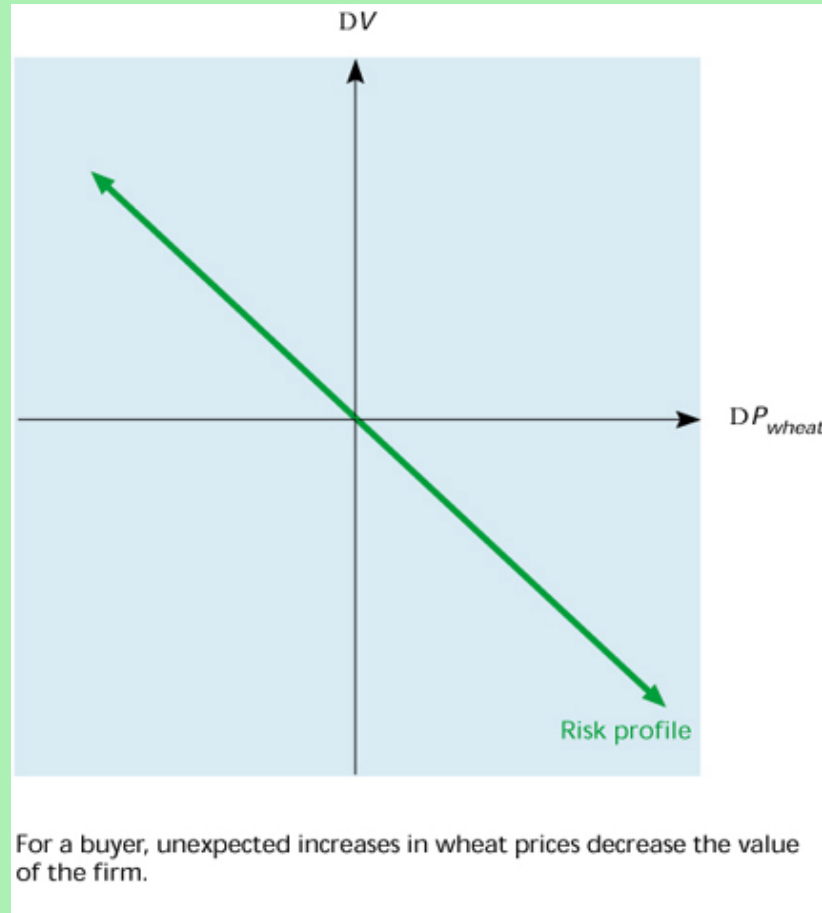
- Step 5: Select the appropriate risk management products.

Adapted from Financial Risk Management by Tim Campbell and William Kracaw, HarperCollins Publishing, 1993

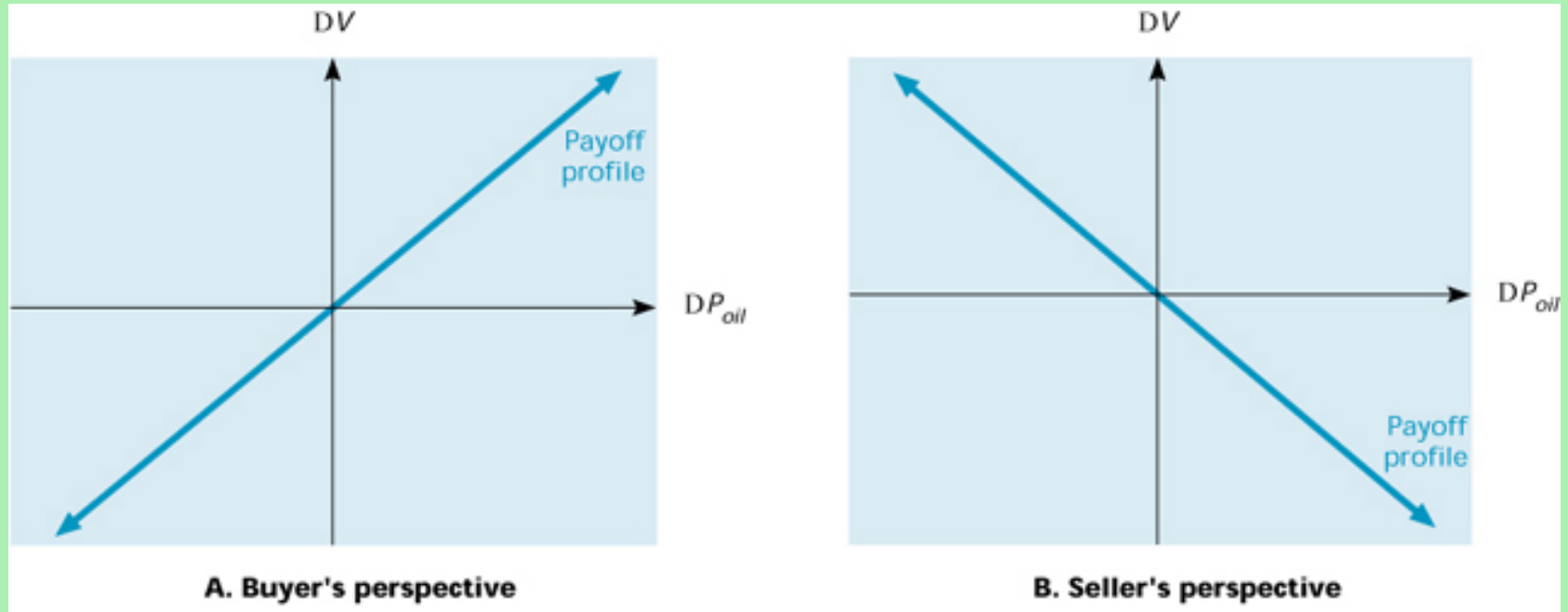
T24.6 Risk Profile for a Wheat Grower (Figure 24.6)



T24.7 Risk Profile for a Wheat Buyer (Figure 24.7)



T24.8 Payoff Profiles for a Forward Contract (Figure 24.8)



T24.9 Sample National Post Futures Price Quotations (Figure 24.11)

FUTURE PRICES

Thursday, June 1, 2000

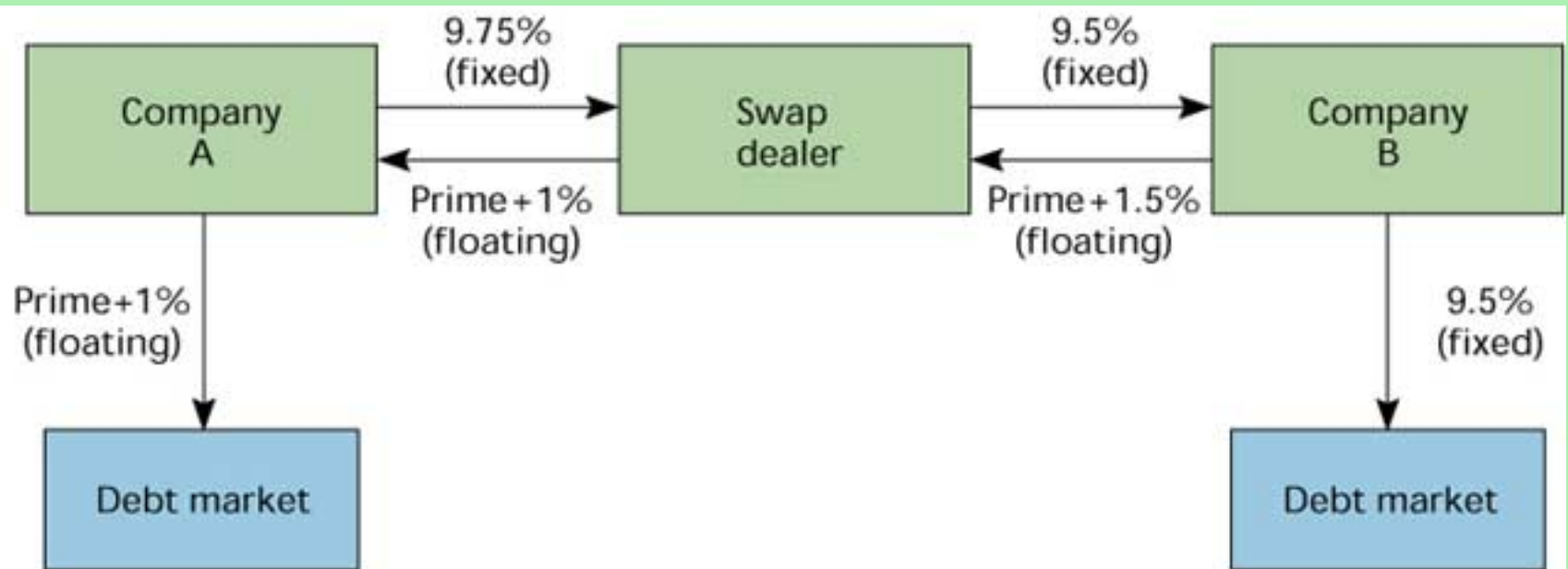
High	-Lifetime- Low	Mth	Open	-----Daily-----			Chg	Prev op.Int
				High	Low	Settle		
Coffee (CSCE)								
37,500 lbs US cents per lb; 0.01 cent=\$3.75 per contract								
149.00	87.50	Jul-00	101.10	101.70	92.60	93.00	-7.40	26,134
148.50	89.75	Sep-00	104.20	104.50	96.00	96.20	-7.10	14,732
150.50	92.00	Dec-00	107.90	108.00	100.00	99.85	-7.00	5,168
153.85	93.50	Mar-01	111.50	111.70	103.50	103.60	-6.80	2,027

Prev. vol 4,817

Prev. open int. 48,432

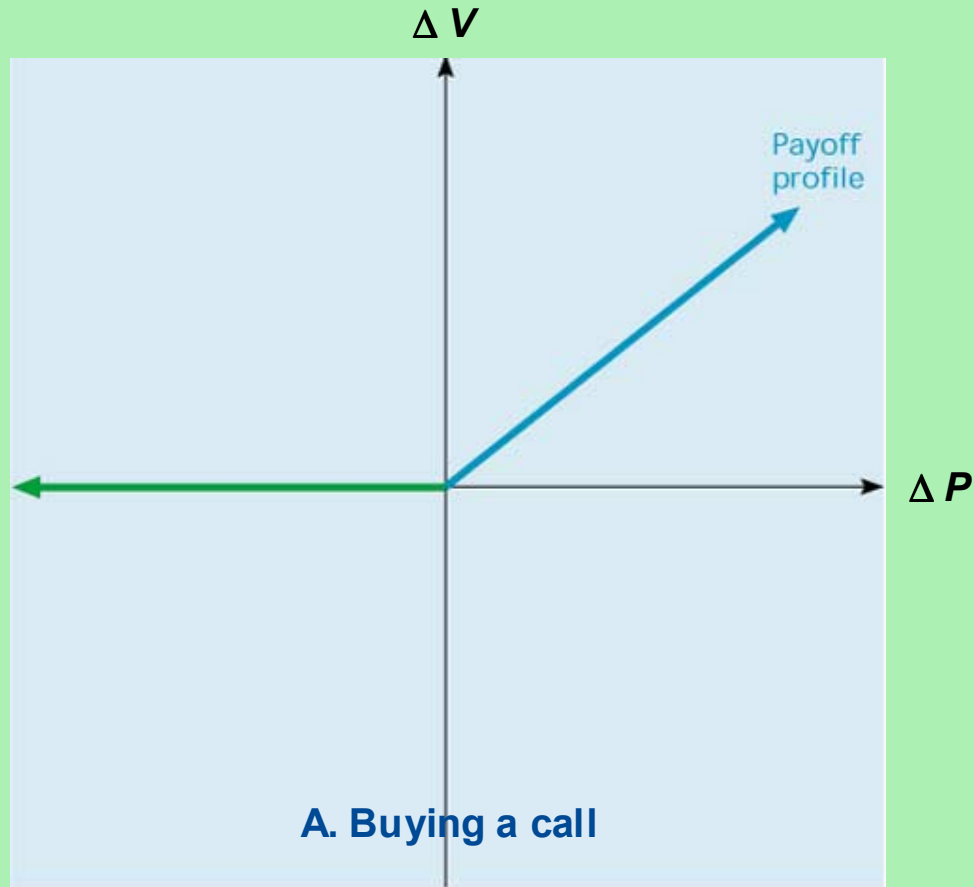
Source: *The National Post*, June 3, 2000. Used with permission.

T24.10 Illustration of an Interest Rate Swap (Figure 24.12)

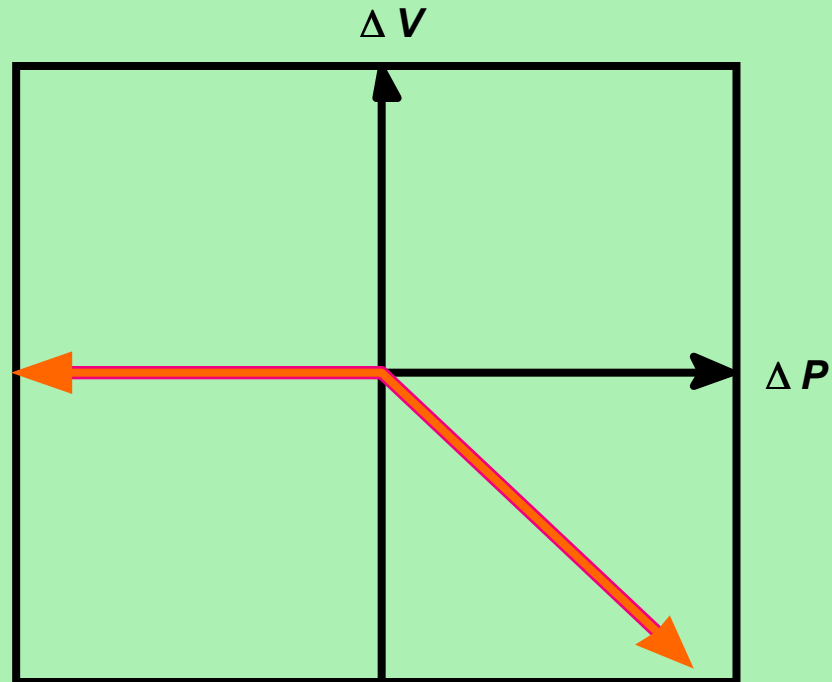


Company A borrows at prime plus 1% and swaps for a 9.75% fixed rate. Company B borrows at 9.5% fixed and swaps for a prime plus 1.5% floating rate.

T24.11 Option Payoff Profiles (Figure 24.14)

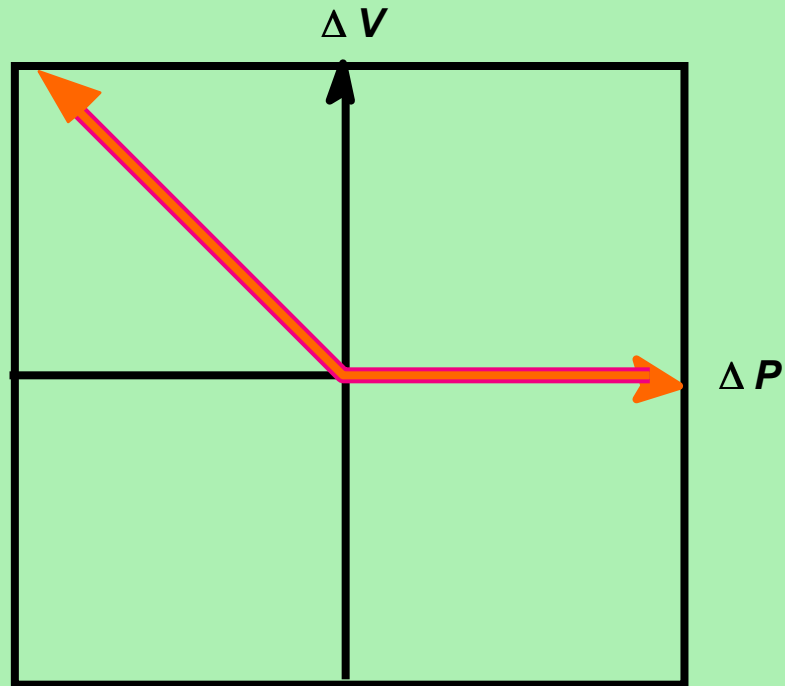


T24.11 Option Payoff Profiles (Figure 24.14) (continued)



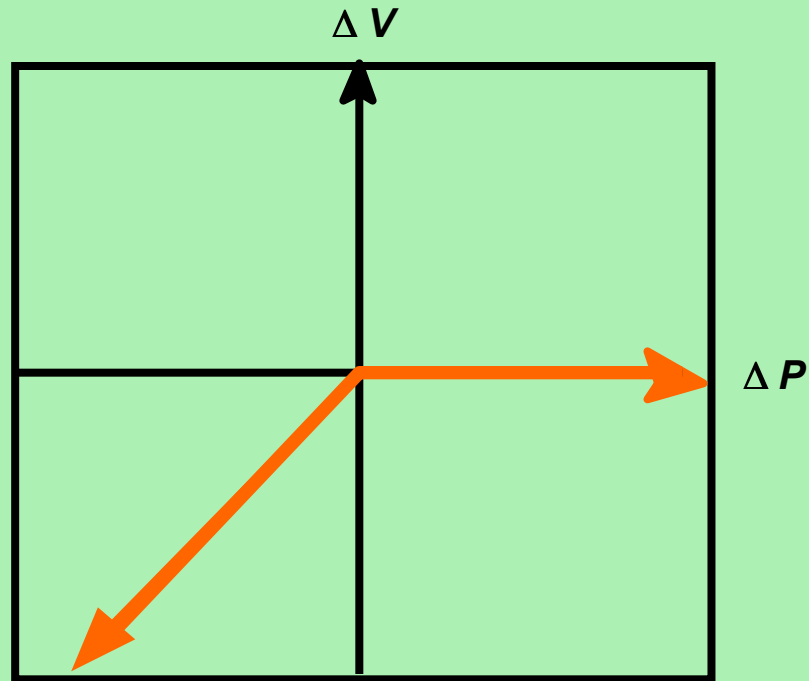
B. Selling a call

T24.11 Option Payoff Profiles (Figure 24.14) (continued)



C. Buying a put

T24.11 Option Payoff Profiles (Figure 24.14) (concluded)



D. Selling a put

T24.12 Sample *National Post* Future Option Price Quotations (Figure 24.16)

FUTURE OPTION PRICES

Thursday, June 1, 2000

Strike	Calls-Settle			Puts-Settle		
Canola (WPG)						
20 metric tons, C\$ per metric ton						
Strike	July	Aug	Sept	July	Aug	Sept
240	18.80	23.40	s	r	1.10	s
250	9.50	15.40	18.30	1.00	3.00	4.00
260	3.00	9.10	12.10	3.90	6.60	7.60
270	1.00	4.80	7.40	11.70	12.20	12.80
280	0.50	2.20	4.20	21.20	19.60	19.50
290	r	0.90	2.20	31.10	28.20	27.40
300	r	0.30	1.10	41.10	37.50	36.10
310	r	0.10	0.50	51.10	47.20	45.40
320	r	r	0.20	61.00	57.10	55.00
Prev. open int. 9,580			Prev. open int. 9,943			

The National Post, June 1, 2000. Used with permission.

T24.13 Chapter 24 Quick Quiz

1. Why is risk management more important now than it was in the 1960s?

Interest rates, energy prices, and exchange rates are more volatile today than in the 1960s due to structural changes in their respective markets.

2. What is a short-run exposure? A long-run exposure?

A short-run exposure involves risk due to temporary price changes; a long-run exposure arises from permanent changes in economic fundamentals.

3. How does a forward contract differ from a futures contract?

A forward contract is not standardized, not generally traded on an organized exchange, and doesn't involve margin.

A futures contract is highly standardized, traded on an organized exchange, and requires margin.

T24.14 Solution to Problem 24.1

- Refer to Figure 24.1 in the text to answer this question. Suppose you purchase a September 2000 cocoa futures contract on June 1, 2000. What will your profit or loss be if cocoa prices turn out to be \$1,500 per metric ton at expiration?

The initial contract value is equal to:

(price per ton)(number of tons specified in the contract)

$$\begin{aligned}\text{Initial contract value} &= (\$871 \text{ per ton})(10 \text{ tons per contract}) \\ &= \$8,710\end{aligned}$$

$$\begin{aligned}\text{Final contract value} &= (\$1,500 \text{ per ton})(10 \text{ tons per contract}) \\ &= \$15,000\end{aligned}$$

So our *gain* on the futures contract is

$$\$15,000 - \$8,710 = \$6,290.$$

T24.15 Solution to Problem 24.4

- Suppose a financial manager buys call options on 50,000 barrels of oil with an exercise price of \$30 per barrel. She simultaneously sells a put option on 50,000 barrels of oil with the same exercise price of \$30 per barrel. Consider her gains and losses if oil prices are \$25, \$28, \$30, \$32, and \$34. What do you notice about the payoff profile?

T24.15 Solution to Problem 24.4 (continued)

- Suppose a financial manager buys call options on 50,000 barrels of oil with an exercise price of \$30 per barrel. She simultaneously sells a put option on 50,000 barrels of oil with the same exercise price of \$30 per barrel. Consider her gains and losses if oil prices are \$25, \$28, \$30, \$32, and \$34. What do you notice about the payoff profile?
- The call options give the manager the right (but not the obligation) to purchase oil futures contracts at a futures price of \$30 per barrel. The manager will exercise the option if the price rises above \$30.
- Selling put options obligates the manager to buy oil futures contracts at a futures price of \$30 per barrel. The put holder will exercise the option if the price falls below \$30. The payoffs are:

T24.15 Solution to Problem 24.4 (concluded)

Oil price:	<u>\$25</u>	<u>\$28</u>	<u>\$30</u>	<u>\$32</u>	<u>\$34</u>
Value of call option position:	0	0	0	2	4
Value of put option position:	<u>-5</u>	<u>-2</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total value	-\$5	-\$2	\$0	\$2	\$4

The payoff profile is identical to that of a forward contract with a \$30 strike price.