

various points in time over the life of the exposure? For example in the case of Ganado, the various hedging alternatives explored in the problem analysis—the forward, money market, and purchased option hedges—were all constructed and evaluated for the dollar value of the combined hedge portfolio only at the *end* of the 90-day period. In some cases, however, Ganado might wish to protect the value of the exposed asset prior to maturity, for example, at the end of a financial reporting period prior to the actual maturity of the exposure.

SUMMARY POINTS

- MNEs encounter three types of currency exposure: transaction exposure, translation exposure, and operating exposure.
- Transaction exposure measures gains or losses that arise from the settlement of financial obligations whose terms are stated in a foreign currency.
- Considerable theoretical debate exists as to whether firms should hedge currency risk. Theoretically, hedging reduces the variability of the cash flows to the firm. It does not increase the cash flows to the firm. In fact, the costs of hedging may potentially lower them.
- Transaction exposure can be managed by contractual techniques and certain operating strategies. Contractual hedging techniques include forward, futures, money market, and option hedges.
- The choice of which contractual hedge to use depends on the individual firm's currency risk tolerance and its expectation of the probable movement of exchange rates over the transaction exposure period.
- Risk management in practice requires a firm's treasury to identify its goals, choose which contractual hedges it wishes to use, and decide what proportion of the currency exposure should be hedged.

MINI-CASE

China Noah Corporation¹

China's voracious consumer appetites are already reaching into every corner of Indonesia. The increasing weight of China in every market is a global trend, but growing Chinese, as well as Indian, demand is making an especially big impact in Indonesia. Nick Cashmore of the Jakarta office of GLSA, an investment bank, has coined a new term to describe this symbiotic relationship: "Chindonesia."

—"Special Report on Indonesia: More Than a Single Swallow," *The Economist*, September 10, 2009.

In early 2010, Mr. Savio Chow, CFO of China Noah Corporation (Noah), was concerned about the foreign exchange exposure his company could be creating by shifting much of its procurement of wood to Indonesia. Noah was a leading floorboard manufacturer in China that purchased more than USD100 million in lumber annually, primarily from

local wood suppliers in China. But now Mr. Chow planned to shift a large portion of his raw material procurement to Indonesian suppliers in light of the abundant wood resources in Indonesia and the increasingly tight wood supply market in China. Chow knew he needed an explicit strategy for managing the currency exposure.

China Noah

Noah, a private company owned by its founding family, was one of the largest floorboard producers in China. The company was established in 1982 by the current chairman, Mr. Se Hok Pan, a Macau resident. Most of the company's senior management team had been with the company since inception.

Noah's primary product was solid wood flooring, which used 100% natural wood cut into floorboards, sanded, and

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protected with a layer of gloss. Rapid Chinese economic growth, together with the rising living standards and the emphasis on environmental conservation in China, had created a consumer preference for timber products for both households and offices. Besides being natural, wood products were considered beneficial for both mental and physical health. Noah operated five flooring manufacturing plants and a distributor/retail network of over 1,500 outlet stores across China.

As shown in Exhibit A, Noah had grown rapidly in recent years, with sales growing from CNY986 million in 2006 to CNY1,603 million in 2009 (approximately USD200 million at the current spot rate of CNY6.92 = USD1.00). Net profit had risen from CNY115 million to CNY187 million (USD27 million) in the same period. Mr. Ghow was a planner, and as is also illustrated by Exhibit A, he and Noah were expecting sales to grow at an annual average rate of 20% for the coming five years. Noah's return on sales was expected to be good this year at 13.5%. But if Ghow's forecasts were accurate, they would plummet to 3.7% by 2015.

Supply Chain

One of the key characteristics of the floorboard industry is that wood makes up the vast majority of all raw material and direct cost. In the past three years Noah had spent between CNY60 and CNY65 on wood purchasing for every square meter of floorboard manufactured. This meant wood was almost 90% of cost of goods sold. Given the competitiveness of the floorboard industry, the ability to control and potentially lower wood cost was the dominant driver of corporate profitability.

Noah had never owned any forests of its own, buying wood from Chinese forest owners or lumber traders. Chinese wood prices had long been quite cheap by global standards, partly as a result of a large-scale illegal logging industry. But wood supplies had now tightened dramatically as forest resources became increasingly scarce due to China's shift toward environmental protection, and this tightening supply was sending wood prices upward.

The World Wildlife Fund estimated that domestic wood supplies met only half of the country's current timber

EXHIBIT A China Noah's Consolidated Statement of Income (actual and forecast, million Chinese yuan)

(CNY million)	2007	2008	2009	2010e	2011e	2012e	2013e	2014e	2015e
Sales revenue	1,290.4	1,394.6	1,602.7	1,923.2	2,307.9	2,769.5	3,323.4	3,988.0	4,785.6
Cost of goods sold	(849.4)	(943.4)	(1,110.0)	(1,294.0)	(1,610.3)	(2,000.7)	(2,491.1)	(3,096.8)	(3,848.2)
Gross profit	441.0	451.2	492.7	629.3	697.6	768.8	832.2	891.2	937.4
Gross margin	34.2%	32.4%	30.7%	32.7%	30.2%	27.8%	25.0%	22.3%	19.6%
Selling expense	(216.0)	(208.0)	(201.8)	(242.3)	(290.8)	(349.0)	(418.7)	(502.5)	(603.0)
G&A expense	(19.6)	(20.0)	(20.1)	(24.1)	(28.9)	(34.7)	(41.7)	(50.0)	(60.0)
EBITDA	205.7	223.6	271.1	362.8	377.9	385.1	371.8	398.7	274.4
EBITDA margin	15.9%	16.0%	16.9%	18.9%	16.4%	13.9%	11.2%	8.5%	5.7%
Depreciation	(40.3)	(45.3)	(49.4)	(57.5)	(60.8)	(64.0)	(67.3)	(70.5)	(73.7)
EBIT	165.6	178.4	221.9	305.3	317.1	321.1	304.5	268.2	200.7
EBIT margin	12.8%	12.8%	13.8%	15.9%	13.7%	11.6%	9.2%	6.7%	4.2%
Interest expense	(7.1)	(12.0)	(15.1)	(15.9)	(13.9)	(11.2)	(7.7)	(4.4)	(2.2)
EBT	158.5	166.4	206.8	289.4	303.2	309.9	296.8	263.8	198.5
Income tax	(8.4)	(18.0)	(20.0)	(28.9)	(30.3)	(31.0)	(29.7)	(26.4)	(19.9)
Net income	150.1	148.4	186.8	260.5	272.9	278.9	267.1	237.5	178.7
Return on sales	11.6%	10.8%	11.7%	13.5%	11.8%	10.1%	8.0%	6.0%	3.7%

Assumes sales growth of 20% per year. Estimated costs assume INR 1344 = 1.00 RMB. Projected selling expenses assumed 12.6% of sales, G&A expenses at 1.3% of sales, and income tax expenses at 10% of EBT. Cost of goods sold assumptions for 2010e-2015e are based on Exhibit C, which follows.

consumption, and a variety of price forecasts had quite honestly frightened Chow. For example, Morgan Stanley was forecasting Chinese wood prices to rise by 15% to 20% over the coming five years. Major Chinese floorboard producers, including Noah, were now looking at countries like Brazil, Russia, and Indonesia for more sustainable, legal, and cheaper sources of wood.

Noah's Indonesia Deal

Over the past few months Chow had been pursuing a number of Indonesian wood supplier deals to replace a portion of its Chinese sourcing. Preliminary price quotes were encouraging, prices of CNY62.6/m² coming in roughly 8% cheaper than current Chinese prices. The previous week he had presented a potential Indonesian supplier's term sheet (Exhibit B) to Noah's board of directors. The term sheet was based on 30% Indonesian sourcing of the total 172 million square meters of flooring Noah expected to sell in 2010.

Chow wished to move quickly to try to control—and possibly reduce—Noah's wood costs for the current year and possibly for years to come. The current price quote from the consortia of Indonesian wood producers was 84,090 Indonesian rupiah per square meter (IDR/m²), which translated into a price in Chinese yuan per square meter (CNY/m²) of 62.6.

$$\text{Price}^{\text{CNY}} = \frac{\text{IDR}84,080/\text{m}^2}{\text{IDR}1,344/\text{CNY}} = \text{CNY}62.6/\text{m}^2.$$

At CNY 62.6, this was a 77% discount to the current Chinese price of 678 for the same wood. Since Chinese prices were expected to rise 4% to 5% per year for the foreseeable future, but the Indonesian consortia was willing to contractually limit annual price increases to just 4% per annum, the discount might increase if the IDR/CNY exchange rate remained the same.

Chow expected Noah's production to more than double over the next five years, from 172 million square meters in

2010 to 42.8 million in 2015, as shown in Exhibit C. If he sourced 30% of Noah's wood from Indonesia in 2010, and then increased that proportion 10% per year, Indonesia would account for roughly half of Noah's wood sourcing by 2015.

Indonesian Growth

Indonesia's forests covered 60% of the country. In recent years, the country's high population and rapid industrialization had already led to serious environmental issues, including large-scale deforestation, and like that in China, much of it illegal. That said, Indonesia was rapidly emerging as an important exporter of wood.

In terms of macroeconomics, Indonesia had been less affected by the recent global recession, in comparison to its neighbors. Statistics indicated that Indonesia's GDP grew by 4.5% in 2009, and that it was expected to grow by nearly 7% per year over the coming decade. Indonesia could soon move to economic parity with the BRICs (Brazil, Russia, India, and China). Stable political conditions, despite the 2009 elections and strong domestic demand, could deliver that growth.

Foreign Currency Risk

Indonesia had been one of countries hardest hit by the Asian financial crisis of 1997–1998. Against the U.S. dollar, the Indonesian rupiah dropped from about IDR2,600/USD to a low point of IDR14,000/USD, its economy shrinking a shocking 14%—although it did rebound in the following years. The rupiah had since stabilized in the IDR8,000/USD to IDR10,000/USD range.

As illustrated by Exhibit D, the rupiah had traded in a relatively narrow range of IDR1,000/CNY to IDR1,400/CNY over the past 10 years, with the exception of the recent global credit crisis. Because the Indonesian rupiah was a free-floating currency and the Chinese renminbi a highly controlled and managed currency, crisis had always hit the rupiah much harder. Since Noah was considering

EXHIBIT B

Term Sheet from an Indonesian Wood Consortium

Buyer	China Noah Corporation
Seller	An Indonesian wood supply consortium
Quantity	5.16 million m ² , 30% of Noah's wood production in 2010
Unit price	IDR84,090/m ² (equivalent to CNY62.6/m ² , exchanged at spot rate)
Total payment	IDR433,840 million
Payment schedule	The payment must be settled in Indonesian rupiah (IDR) in 6 months.

EXHIBIT C

China Noah Corporation's Cost of Goods Sold Composition

CNY/m ² Floorboard	2007	2008	2009	2010e	2011e	2012e	2013e	2014e	2015e
Wood Cost									
Chinese wood cost	59.9	61.8	65.2	67.8	70.5	73.3	76.3	79.3	82.5
Percent Chinese	100%	100%	100%	70%	67%	64%	60%	56%	52%
Indonesian wood cost (IDR/m ²):				84,090	87,454	90,952	94,590	98,373	102,308
Cost in CNY/m ²				62.6	65.1	67.7	70.4	73.2	76.1
Percent Indonesian	0%	0%	0%	30%	33%	36%	40%	44%	48%
Weighted wood cost	59.9	61.8	65.2	66.2	68.7	71.3	73.9	76.6	79.4
Other Cost									
Packaging	2.9	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6
Utilities	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5
Labor	1.0	1.0	1.1	1.1	1.2	1.2	1.2	1.3	1.3
Delivery	1.4	1.4	1.5	1.5	1.6	1.6	1.7	1.7	1.8
Sand	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.9	0.9
Other	2.0	2.0	2.0	2.1	2.1	2.2	2.3	2.3	2.4
Total COGS (CNY/m²)	68.5	70.4	74.0	75.2	78.0	80.8	83.8	86.8	89.9
Flooring Output (million m ²)	12.4	13.4	15.0	17.2	20.6	24.8	29.7	35.7	42.8
Wood/COGS	87.4%	87.8%	88.1%	88.0%	88.1%	88.2%	88.2%	88.3%	88.3%
Total COGS (million CNY)	849.4	943.4	1,110.0	1,294.0	1,610.3	2,000.7	2,491.1	3,096.8	3,848.2

Assumes INR 1344 = 1.00 CNY for 2010–2015; flooring output growth at 20%, Chinese wood prices increasing 4% per year, Indonesian wood prices increasing 4% per year, percentage increase in Indonesian sourcing 10% per year from 30% in 2010.

a fundamental change in its wood-sourcing strategy and structure, the exchange rate between the rupiah and the yuan over the long-term was considered critical.

Hedging Foreign Exchange Exposure

The Indonesia wood sourcing contract would expose Noah to exchange rate risk over a series of 6-month periods (March 2010, September 2010, March 2011, etc.). Chow, having little experience in managing exchange rate risk, had obtained some detailed advice from Noah's financial advisors, Morgan Stanley.

Morgan Stanley had noted that the Chinese government was under constant pressure from many countries, including the United States, to revalue the yuan. Unlike the yuan, the rupiah floated in value, although its value often tracked closely against the U.S. dollar. If the Chinese yuan was indeed revalued against the U.S. dollar, and the Indonesian rupiah tracked the dollar "down," a weaker rupiah could result.

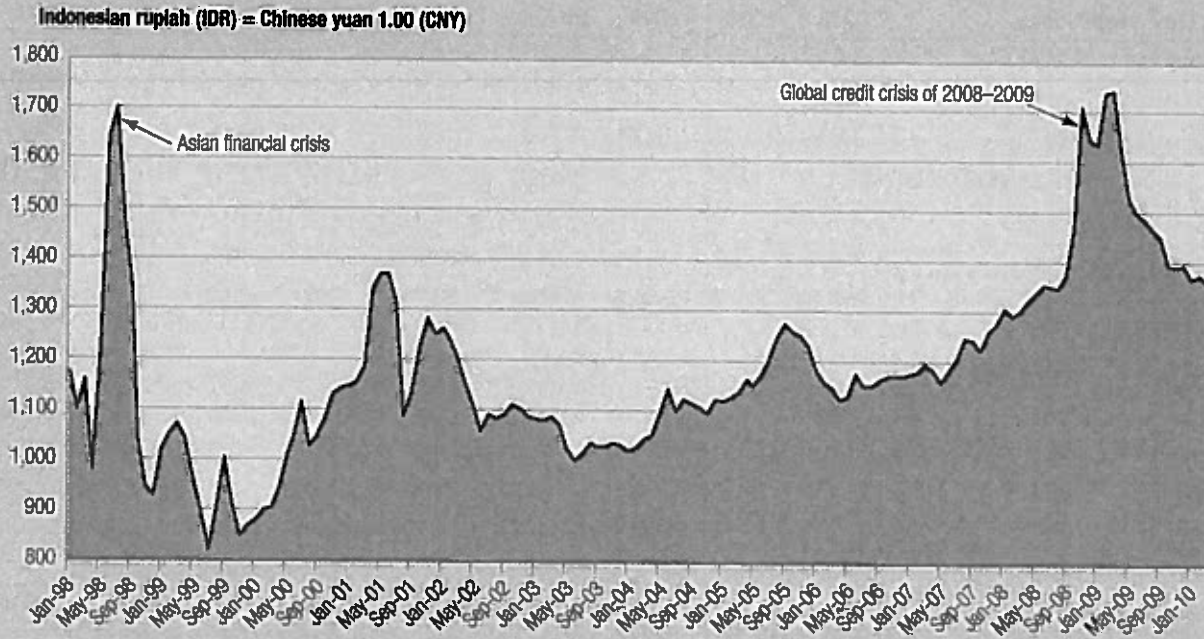
Chow's first step in considering hedging alternatives was to collect currency and derivative quotes on the Indonesian rupiah/Chinese yuan spot rate into the immediate future.

Spot Rate Forecast. Morgan Stanley's forecast of the IDR/CNY spot rate through 2015 showed a rupiah that slowly appreciated against the yuan over the coming five years, as illustrated in Exhibit E.

Forward Rates. Chow had also requested forward rate quotes from several of its bankers. An average of their quotes is also presented in Exhibit E. Unlike the spot rate forecast, the forward rate quotes, based on interest rate differentials, locked in a rapidly discounted rupiah against the yuan out over the same 5-year period.

Currency Options. Forward hedging would eliminate Noah's downside risk, but would also eliminate any opportunity to benefit from an even weaker Indonesian rupiah—if that

EXHIBIT D Indonesian Rupiah to Chinese Yuan Spot Rate (monthly)



were to occur. Given Chow's limited experience with foreign exchange derivatives, currency options made him nervous. But, as he told his controller, he was determined to consider all appropriate techniques available.

Exhibit E lists possible option positions for Noah with varying strike prices, based on currently available market data. The quotes in Exhibit E are of course only for the first 6-month payment; longer maturities

EXHIBIT E Forecast and Forward Rates on the IDR/CNY Spot Rate

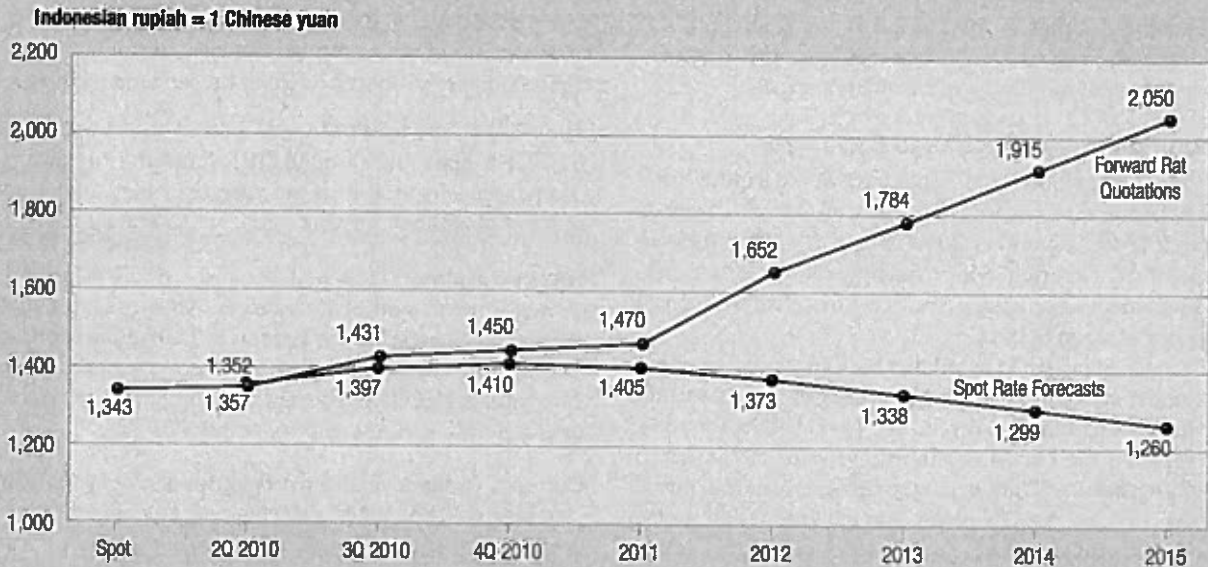


EXHIBIT F

Currency Option Strike Rates and Premiums

Strike Rate (IDR/CNY)	CNY Put Option Premium (per CNY)	CNY Call Option Premium (per CNY)
1300	2.82%	30.59%
1350	3.20%	28.16%
1400	3.73%	25.89%
1450	4.41%	23.77%
1500	5.23%	21.79%
1550	6.19%	19.94%
1600	7.32%	18.27%
1650	8.58%	16.73%
1700	9.98%	15.33%
1750	11.50%	14.05%
1800	13.13%	12.88%

Note: Quotes are for options of a 1 million CNY notional principal

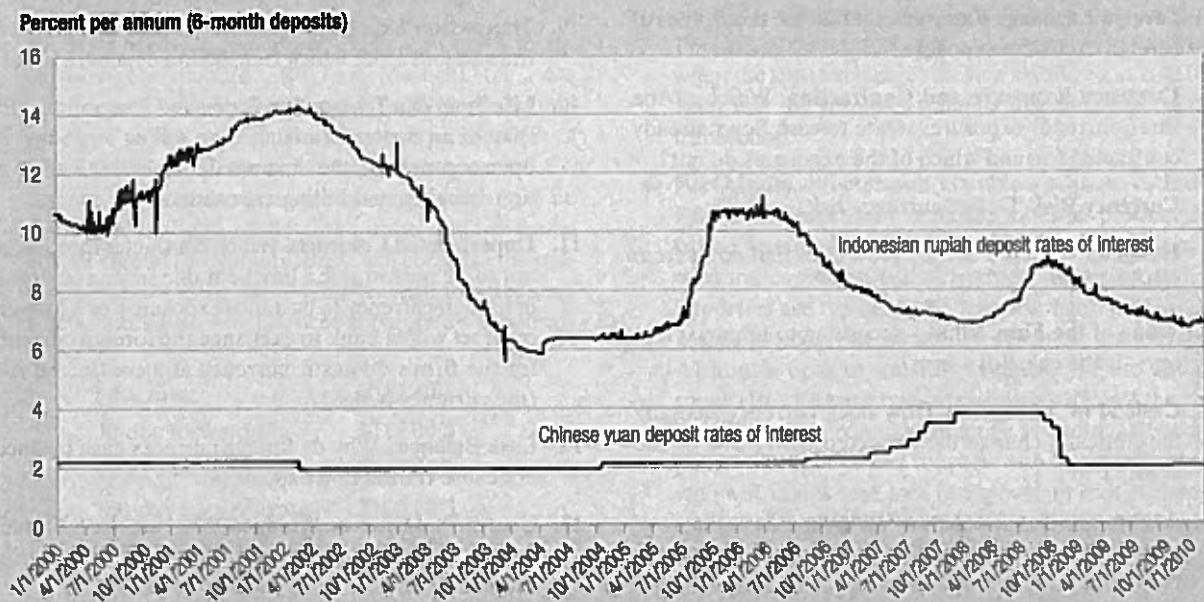
would be needed for the hedging of future rupiah exposures.

Money Market Hedging. Since Noah's foreign exchange exposure was a payable, Indonesian rupiah at 6-month intervals into the future, money market hedging would

entail depositing funds now into Indonesian rupiah-denominated accounts bearing rupiah interest. Indonesian interest rates were consistently higher than comparable rates in China, where rates were subject to government regulations and restrictions. As illustrated in Exhibit G, the 6-month deposit rate in China on CNY was currently

EXHIBIT G

Indonesian and Chinese Deposit Rates of Interest



1.98%, while the same rate in Indonesia was a hefty 6.74%.

Currency Adjustment Clauses. Chow was encouraged to also consider a *Currency Adjustment Clause* or CAC as his banker termed it. Noah's bankers argued that if the Indonesian sourcing was to become a long-term partnership between Noah and the Indonesian consortia, then a CAC would basically allow the two parties to share the currency risks, up or down. The rationale for the CAC was similar to a profit/risk-sharing program, where buyers/sellers initially agree to lock in a local currency price on a settlement denominated in a foreign currency—in this case the Indonesian rupiah purchase price. As long as the exchange rate stays within some defined boundary around a central foreign exchange rate, say $\pm 5\%$ around the current spot rate of IDR1344/CNY, the rupiah price would remain fixed. If, however, the spot rate at the time of payment had moved beyond the $\pm 5\%$ boundary, the two parties could share the difference between the current spot rate and the original central rate.

Mr. Ghow estimated that a 4% fluctuation around the spot FX rate would be a reasonable benchmark to trigger the profit/risk sharing. In this sense, a possible CAC for Noah will initially lock in its payment obligation at CNY62.6/M2. Once the exchange rate movement exceeded the $\pm 4\%$ boundary, the CAC would call for an automatic price recalculation by predetermined methods such as using the mid-point between the spot exchange rate and the

exchange rate on the settlement date. Mr. Ghow thought that the Indonesian suppliers were likely to respond positively to a CAC because of the many forecasts that the IDR was likely to fall against the CNY.

Time was running short. China Noah's Board was waiting on a currency management strategy proposal from Mr. Ghow.

Mini-Case Questions

1. What is the business reason for China Noah's potential currency exposure? Does the company really need to subject itself to substantial exchange rate risk? Is the risk "material" to China Noah? Do you think China Noah should hedge?
2. How does China Noah's profitability (using return on sales as the primary metric) change depending on whether the IDR/CNY exchange rate follows (a) forecast spot rates, (b) forward rate quotes, or (c) fixed rate baseline assumption?
3. Assuming Noah made 6-month payments on its wood purchases from Indonesia, what is the schedule of foreign currency amounts over time?
4. What would be your outlook on the future direction of the Indonesian rupiah and the Chinese renminbi? Should this influence the hedging approach used by Noah?
5. Which of the hedging choices would you recommend?

QUESTIONS

These questions are available in MyFinanceLab.

1. **Foreign Exchange Exposure.** Define the three types of foreign exchange exposure.
2. **Currency Exposure and Contracting.** Which of the three currency exposures relate to cash flows already contracted for, and which of the exposures do not?
3. **Currency Risk.** Define currency risk.
4. **Hedging.** What is a hedge? How does that differ from speculation?
5. **Value of the Firm.** What—according to financial theory—is the value of a firm?
6. **Cash Flow Variability.** How does currency hedging theoretically change the expected cash flows of the firm?
7. **Arguments for Currency Hedging.** Describe four arguments in favor of a firm pursuing an active currency risk management program.
8. **Arguments against Currency Hedging.** Describe six arguments against a firm pursuing an active currency risk management program.
9. **Transaction Exposure.** What are the four main types of transactions from which transaction exposure arises?
10. **Life Span of a Transaction Exposure.** Diagram the life span of an exposure arising from selling a product on open account. On the diagram define and show quotation, backlog, and billing exposures.
11. **Unperformed Contracts.** Which contract is more likely not to be performed: a payment due from a customer in foreign currency (a currency exposure), or a forward contract with a bank to exchange the foreign currency for the firm's domestic currency at a contracted rate (the currency hedge)?
12. **Cash Balances.** Why do foreign currency cash balances not cause transaction exposure?
13. **Contractual Currency Hedges.** What are the four main contractual instruments used to hedge transaction exposure?

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