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CFA Institute

Level III

Currency Management: An Introduction

2020 Exam

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Overview

1. Introduction
2. Review of Foreign Exchange Rates
3. Currency Risk and Portfolio Return and Risk
4. Currency Management: Strategic Decisions
5. Currency Management: Tactical Decisions
6. Tools of Currency Management
7. Currency Management for Emerging Market Currencies

2. Review of Foreign Exchange Rates

- In professional FX markets, currencies are identified by standard three-letter codes, and quoted in terms of a price and a base currency (P/B).
- The spot exchange rate is typically for T + 2 delivery, and forward rates are for delivery for later periods. Both spot and forward rates are quoted in terms of a bid–offer price. Forward rates are quoted in terms of the spot rate plus forward points.
- An FX swap is a simultaneous spot and forward transaction; one leg of the swap is buying the base currency and the other is selling it. FX swaps are used to renew outstanding forward contracts once they mature, to “roll them forward.”
- A hedge ratio is the ratio of the nominal value of the derivatives contract used as a hedge to the market value of the hedged asset.

3. Currency Risk and Portfolio Return and Risk

1. Return Decomposition
2. Volatility Decomposition

3.1 Return Decomposition

- Domestic Asset and Domestic Currency
- Foreign Asset and Foreign Currency
- $R_{DC} = (1+R_{FC})(1+R_{FX}) - 1$

3.2 Volatility Decomposition

Example 1: Portfolio Risk and Return Calculations

The following table shows current and future expected asset prices, measured in their domestic currencies, for both eurozone and Canadian assets (these can be considered “total return” indices). The table also has the corresponding data for the CAD/EUR spot rate.

	Eurozone		Canada	
	Today	Expected	Today	Expected
Asset price	100.69	101.50	101.00	99.80
CAD/EUR	1.2925	1.3100		

- 1 What is the expected domestic-currency return for a eurozone investor holding the Canadian asset?
- 2 What is the expected domestic-currency return for a Canadian investor holding the eurozone asset?
- 3 From the perspective of the Canadian investor, assume that $\sigma(R_{FC}) = 3\%$ (the expected risk for the foreign-currency asset is 3%) and the $\sigma(R_{FX}) = 2\%$ (the expected risk of exchange rate movements is 2%). Furthermore, the expected correlation between movements in foreign-currency asset returns and movements in the CAD/EUR rate is +0.5. What is the expected risk of the domestic-currency return [$\sigma(R_{DC})$]?

Solution to 1:

For the eurozone investor, the $R_{FC} = (99.80/101.00) - 1 = -1.19\%$. Note that, given we are considering the eurozone to be “domestic” for this investor and given the way the R_{FX} expression is defined, we will need to convert the CAD/EUR exchange rate quote so that the EUR is the *price* currency. This leads to $R_{FX} = [(1/1.3100)/(1/1.2925)] - 1 = -1.34\%$. Hence, for the eurozone investor, $R_{DC} = (1 - 1.19\%)(1 - 1.34\%) - 1 = -2.51\%$.

Solution to 2:

For the Canadian investor, the $R_{FC} = (101.50/100.69) - 1 = +0.80\%$. Given that in the CAD/EUR quote the CAD is the price currency, for this investor the $R_{FX} = (1.3100/1.2925) - 1 = +1.35\%$. Hence, for the Canadian investor the $R_{DC} = (1 + 0.80\%)(1 + 1.35\%) - 1 = 2.16\%$.

Solution to 3:

Because this is a single foreign-currency asset we are considering (not a portfolio of such assets), we can use Equation 5:

$$\sigma^2(R_{DC}) \approx \sigma^2(R_{FC}) + \sigma^2(R_{FX}) + 2\sigma(R_{FC})\sigma(R_{FX})\rho(R_{FC}R_{FX})$$

Inserting the relevant data leads to

$$\sigma^2(R_{DC}) \approx (3\%)^2 + (2\%)^2 + 2(3\%)(2\%)(0.50) = 0.19\%^2$$

Taking the square root of this leads to $\sigma(R_{DC}) \approx 4.36\%$. (Note that the units in these expressions are all in percent, so in this case 3% is equivalent to 0.03 for calculation purposes.)

4. Currency Management: Strategic Decisions



1. The Investment Policy Statement
2. The Portfolio Optimization Problem
3. Choice of Currency Exposures
4. Locating the Portfolio along the Currency Risk Spectrum
5. Formulating a Client-Appropriate Currency Management Program

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4.1 Investment Policy Statement

The currency risk management segment of the IPS could cover:

- target proportion of currency exposure to be passively hedged
- latitude for active currency management around this target
- frequency of hedge rebalancing
- currency hedge performance benchmark to be used
- hedging tools permitted (types of forward and option contracts)

Currency management should be conducted within IPS-mandated parameters

4.2 The Portfolio Optimization Problem

- Optimize foreign currency asset and FX exposures
- Optimization of a multi-currency portfolio of foreign assets involves selecting portfolio weights that locate the portfolio on the efficient frontier of the trade-off between risk and expected return defined in terms of the investor's domestic currency
- Many portfolio managers handle asset allocation with currency risk as a two-step process:
 1. portfolio optimization over fully hedged returns
 2. selection of active currency exposure

4.3 Choice of Currency Exposures

Degree of currency exposure spans a spectrum from being fully hedged to actively trading currencies

- Diversification considerations
 - Investment time horizon
 - Fixed income versus equity investments
- Cost considerations
 - Trading costs: bid-ask spread, option premiums, administrative infrastructure for currency trading
 - Opportunity costs: missing advantageous currency movements
 - 50% hedge ratio: split the difference

4.4 Locating the Portfolio along the Currency Risk Spectrum

Passive Hedging:

Keep the portfolio's currency exposures close, if not equal to, those of a benchmark portfolio used to evaluate performance; rules-based approach and removes almost all discretion from the portfolio manager.

Discretionary Hedging:

Measure performance against a "neutral" benchmark portfolio. The portfolio manager has some limited discretion on how far to allow actual portfolio risk exposures to vary from the neutral position.

Active Currency Management:

Portfolio manager is allowed to express directional opinions on exchange rates, but is nonetheless kept within mandated risk limits.

Currency Overlay:

Active currency management conducted by external, FX-specialized sub-advisors to the portfolio.

Note: This term is used differently by different sources.

Example 2: Currency Overlay

Windhoek Capital Management is a South Africa-based investment manager that runs the Conservative Value Fund, which has a mandate to avoid all currency risk in the portfolio. The firm is considering engaging a currency overlay manager to help with managing the foreign exchange exposures of this investment vehicle. Windhoek does not consider itself to have the in-house expertise to manage FX risk. Brixworth & St. Ives Asset Management is a U.K.-based investment manager, and runs the Aggressive Growth Fund. This fund is heavily weighted toward emerging market equities, but also has a mandate to seek out inefficiencies in the global foreign exchange market and exploit these for profit. Although Brixworth & St. Ives manages the currency hedges for all of its investment funds in-house, it is also considering engaging a currency overlay manager.

- 1 Using a currency overlay manager for the Conservative Value Fund is *most likely* to involve:
 - A joining the alpha and hedging mandates.
 - B a more active approach to managing currency risks.
 - C using this manager to passively hedge their foreign exchange exposures.

Example 2: Currency Overlay (Cont...)

- 2 Using a currency overlay manager for the Aggressive Growth Fund is *most likely* to involve:
 - A separating the alpha and hedging mandates.
 - B a less discretionary approach to managing currency hedges.
 - C an IPS that limits active management to emerging market currencies.

- 3 Brixworth & St. Ives is *more likely* to engage multiple currency overlay managers if:
 - A their returns are correlated with asset returns in the fund.
 - B the currency managers' returns are correlated with each other.
 - C the currency managers' use different active management strategies.

Example 2: Currency Overlay (Solution)

Solution to 1:

C is correct. The Conservative Value Fund wants to avoid all currency exposures in the portfolio and Windhoek believes that it lacks the currency management expertise to do this.

Solution to 2:

A is correct. Brixworth & St. Ives already does the FX hedging in house, so a currency overlay is more likely to be a pure alpha mandate. This should not change the way that Brixworth & St. Ives manages its hedges, and the fund's mandate to seek out inefficiencies in the global FX market is unlikely to lead to a restriction to actively manage only emerging market currencies.

Solution to 3:

C is correct. Different active management strategies may lead to a more diversified source of alpha generation, and hence reduced portfolio risk. A and B are incorrect because a higher correlation with other alpha mandates or the foreign-currency assets in the portfolio is likely to lead to less diversification.

4.5 Formulating a Client-Appropriate Currency Management Program

The strategic currency positioning of the portfolio, as encoded in the IPS, should be biased toward a more-fully hedged currency management program the more

- short term the investment objectives of the portfolio;
- risk averse the beneficial owners of the portfolio are (and impervious to ex post regret over missed opportunities);
- immediate the income and/or liquidity needs of the portfolio;
- fixed-income assets are held in a foreign-currency portfolio;
- cheaply a hedging program can be implemented;
- volatile (i.e., risky) financial markets are;
- skeptical the beneficial owners and/or management oversight committee are of the expected benefits of active currency management.

5. Currency Management: Tactical Decisions

Tactical FX decisions are about which FX exposures to accept and manage within the discretionary limits specified in IPS

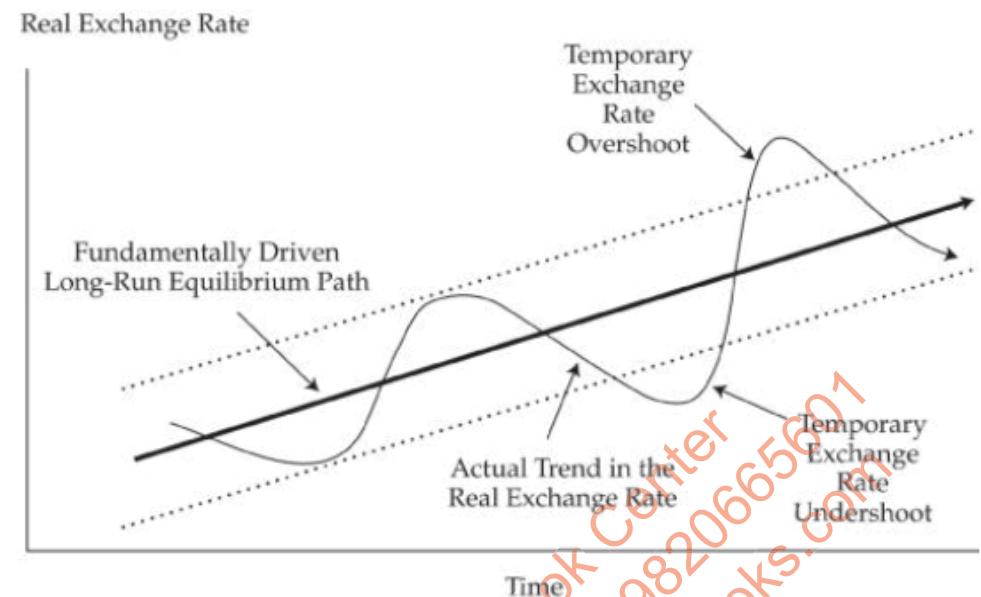
Possible techniques include:

1. Active Currency Management Based on Economic Fundamentals
2. Active Currency Management Based on Technical Analysis
3. Active Currency Management Based on the Carry Trade
4. Active Currency Management Based on Volatility Trading

5.1 Active Currency Management Based on Economic Fundamentals

All else equal, the base currency's real exchange rate should appreciate if there is an upward movement in

- its long-run equilibrium real exchange rate
- either its real or nominal interest rates, which should attract foreign capital
- expected foreign inflation, which should cause the foreign currency to depreciate; and
- the foreign risk premium, which should make foreign assets less attractive compared with the base currency nation's domestic assets.



5.2 Active Currency Management Based on Technical Analysis

- Market technicians believe that in a liquid, freely traded market the historical price data can be helpful in projecting future price movements
- Market technicians believe that historical patterns in the price data have a tendency to repeat, and that this repetition provides profitable trade opportunities
- Technical analysis does not attempt to determine where market prices should trade (fair value, as in fundamental analysis) but where they will trade.

5.3 Active Currency Management Based on the Carry Trade

The carry trade is a trading strategy of borrowing in low-yield currencies and investing in high-yield currencies

	Buy/Invest	Sell/Borrow
Implementing the carry trade	High-yield currency	Low-yield currency
Trading the forward rate bias	Forward discount currency	Forward premium currency

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5.4 Active Currency Management Based on Volatility Trading

- Trade based on a view about future volatility of exchange rates, not the direction of exchange rates
 - Use delta hedging to hedge away the exposure to changes in FX rates
 - Trader then has exposure to other Greeks, the most significant of which is vega (sensitivity of option price to volatility underlying FX rate)
- One simple option strategy that implements a volatility trade is a straddle, which is a combination of both an at-the-money (ATM) put and an ATM call
- A similar option structure is a strangle position for which a long position is buying out-of-the-money (OTM) puts and calls with the same expiry date and the same degree of being out of the money

Example 3: Active Strategies

Annie McYelland works as an analyst at Scotland-based Kilmarnock Advisors, an investment firm that offers several investment vehicles for its clients. McYelland has been put in charge of formulating the firm's market views for some of the foreign currencies that these vehicles have exposures to. Her market views will be used to guide the hedging and discretionary positioning for some of the actively managed portfolios.

McYelland begins by examining yield spreads between various countries and the implied volatility extracted from the option pricing for several currency pairs. She collects the following data:

One-Year Yield Levels

Switzerland	-0.103%
United States	0.162%
Poland	4.753%
Mexico	4.550%

One-Year Implied Volatility

PLN/CHF	8.4%
MXN/CHF	15.6%
PLN/USD	20.3%
MXN/USD	16.2%

McYelland is also examining various economic indicators to shape her market views. After studying the economic prospects for both Japan and New Zealand, she expects that the inflation rate for New Zealand is about to accelerate over the next few years, whereas the inflation rate for Japan should remain relatively stable. Turning her attention to the economic situation in India, McYelland believes that the Indian authorities are about to tighten monetary policy, and that this change has not been fully priced into the market. She reconsiders her short-term view for the Indian rupee (i.e., the INR/USD spot rate) after conducting this analysis.

McYelland also examines the exchange rate volatility for several currency pairs to which the investment trusts are exposed. Based on her analysis of the situation, she believes that the exchange rate between Chilean peso and the U.S. dollar (CLP/USD) is about to become much more volatile than usual, although she has no strong views about whether the CLP will appreciate or depreciate.

One of McYelland's colleagues, Catalina Ortega, is a market technician and offers to help McYelland time her various market position entry and exit points based on chart patterns. While examining the JPY/NZD price chart, Ortega notices that the 200-day moving average is at 62.0405 and the current spot rate is 62.0315.

- 1** Based on the data she collected, all else equal, McYelland's *best* option for implementing a carry trade position would be to fund in:
- A** USD and invest in PLN.
 - B** CHF and invest in MXN.
 - C** CHF and invest in PLN.
- 2** Based on McYelland's inflation forecasts, all else equal, she would be *more likely* to expect a(n):
- A** depreciation in the JPY/NZD.
 - B** increase in capital flows from Japan to New Zealand.
 - C** more accommodative monetary policy by the Reserve Bank of New Zealand.
- 3** Given her analysis for India, McYelland's short-term market view for the INR/USD spot rate is now *most likely* to be:
- A** biased toward appreciation.
 - B** biased toward depreciation.
 - C** unchanged because it is only a short-run view.

4 Using CLP/USD options, what would be the *cheapest* way for McYelland to implement her market view for the CLP?

- A** Buy a straddle
- B** Buy a 25-delta strangle
- C** Sell a 40-delta strangle

5 Based on Ortega's analysis, she would *most likely* expect:

- A** support near 62.0400.
- B** resistance near 62.0310.
- C** resistance near 62.0400.

6. Tools of Currency Management

1. Forward Contracts
2. Currency Options
3. Strategies to Reduce Hedging Costs and Modify a Portfolio's Risk Profile
4. Hedging Multiple Foreign Currencies
5. Basic Intuitions for Using Currency Management Tools

6.1 Forward Contracts

- Basic principle of **hedging with forward contracts**: match the current market value of the foreign-currency exposure in the portfolio with an equal and offsetting position in a forward contract

Practical challenge: the market value of the foreign-currency assets will change with market conditions. Actual hedge ratio will drift away from the desired hedge ratio as market conditions change.

A **static hedge** (i.e., unchanging hedge) will avoid transaction costs, but will accumulate unwanted currency exposures.

Portfolio managers might need to implement a **dynamic hedge** by rebalancing the portfolio periodically. This hedge rebalancing will mean adjusting some combination of the size, number, and maturities of the forward currency contracts.

Executing a Hedge

Jiao Yang works at Hong Kong-based Kwun Tong Investment Advisors; its reporting currency is the Hong Kong Dollar (HKD). She has been put in charge of managing the firm's foreign-currency hedges. Forward contracts for two of these hedges are coming due for settlement, and Yang will need to use FX swaps to roll these hedges forward three months.

- Hedge #1: Kwun Tong has a short position of JPY800,000,000 coming due on a JPY/ HKD forward contract. The market value of the underlying foreign-currency assets has not changed over the life of the contract, and Yang does not have a firm opinion on the expected future movement in the JPY/HKD spot rate.
- Hedge #2: Kwun Tong has a short position of EUR8,000,000 coming due on a HKD/EUR forward contract. The market value of the EUR-denominated assets has increased (measured in EUR). Yang expects the HKD/EUR spot rate to depreciate.

The following spot exchange rates and three-month forward points are in effect when Yang transacts the FX swaps necessary to roll the hedges forward:

	Spot Rate	Three-Month Forward Points
JPY/HKD	10.80/10.82	-20/-14
HKD/EUR	10.0200/10.0210	125/135

Note: The JPY/HKD forward points will be scaled by 100; the HKD/EUR forward points will be scaled by 10,000

For Hedge #1, the foreign-currency value of the underlying assets has not changed, and she does not have a market view that would lead her to want to either over- or under-hedge the foreign-currency exposure. Therefore, she uses a matched swap. The spot leg of the swap would be to buy JPY800,000,000 at the mid-market rate of 10.81 JPY/ HKD. The forward leg of the swap would require selling JPY800,000,000 forward three months. Selling JPY (the price currency in the JPY/HKD quote) is equivalent to buying HKD (the base currency). Therefore, she uses the offer-side forward points, and the all-in forward rate for the forward leg of the swap is as follows:

$$10.81 + \frac{-14}{100} = 10.67$$

	Spot Rate	Three-Month Forward Points
JPY/HKD	10.80/10.82	-20/-14
HKD/EUR	10.0200/10.0210	125/135

Note: The JPY/HKD forward points will be scaled by 100; the HKD/EUR forward points will be scaled by 10,000

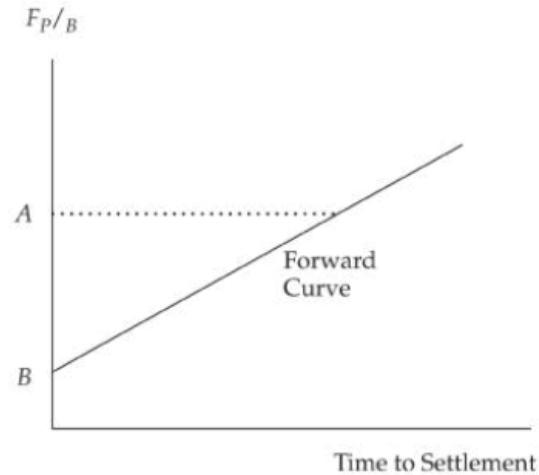
For Hedge #2, the foreign-currency value of the underlying assets has increased; Yang recognizes that this implies that she should increase the size of the hedge greater than EUR8,000,000. She also believes that the HKD/EUR spot rate will depreciate, and recognizes that this implies a hedge ratio of more than 100% (Kwun Tong Advisors has given her discretion to over- or under-hedge based on her market views). This too means that the size of the hedge should be increased more than EUR8,000,000, because Yang will want a larger short position in the EUR to take advantage of its expected depreciation. Hence, Yang uses a mismatched swap, buying EUR8,000,000 at spot rate against the HKD, and selling an amount more than EUR8,000,000 forward. Because the EUR is the base currency in the HKD/EUR quote, it means using the bid side for both the spot rate and the forward points. This means that the spot leg of the swap is transacted at 10.0200 and the forward leg at the following:

$$10.0200 + \frac{125}{10,000} = 10.0325$$

	Spot Rate	Three-Month Forward Points
JPY/HKD	10.80/10.82	-20/-14
HKD/EUR	10.0200/10.0210	125/135

Note: The JPY/HKD forward points will be scaled by 100; the HKD/EUR forward points will be scaled by 10,000

The Forward Curve and Roll Yield



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Example 4: The Hedging Decision

The reporting currency of Hong Kong-based Kwun Tong Investment Advisors is the Hong Kong dollar (HKD). The investment committee is examining whether it should implement a currency hedge for the firm's exposures to the GBP and the ZAR (the firm has long exposures to both of these foreign currencies). The hedge would use forward contracts. The following data relevant to assessing the expected cost of the hedge and the expected move in the spot exchange rate has been developed by the firm's market strategist.

	Current Spot Rate	Six-Month Forward Rate	Six-Month Forecast Spot Rate
HKD/GBP	12.4610	12.6550	12.3000
HKD/ZAR	0.9510	0.9275	0.9300

- 1 Recommend whether to hedge the firm's long GBP exposure. Justify your recommendation.
- 2 Discuss the trade-offs in hedging the firm's long ZAR exposure.

Kwun Tong is long the GBP against the HKD, and HKD/GBP is selling at a forward premium of +1.6% compared with the current spot rate. All else equal, this is the expected roll yield—which is in the firm's favor, in this case, because to implement the hedge Kwun Tong would be *selling* GBP, the base currency in the quote, at a price *higher* than the current spot rate. Moreover, the firm's market strategist expects the GBP to *depreciate* by 1.3% against the HKD. Both of these considerations argue for hedging this exposure.

Kwun Tong is long the ZAR against the HKD, and HKD/ZAR is selling at a forward discount of -2.5% compared with the current spot rate. Implementing the hedge would require the firm to *sell* the base currency in the quote, the ZAR, at a price *lower* than the current spot rate. This would imply that, all else equal, the roll yield would go against the firm; that is, the expected cost of the hedge would be 2.5%. But the firm's strategist also forecasts that the ZAR will depreciate against the HKD by 2.2%. This makes the decision to hedge less certain. A risk-neutral investor would not hedge because the expected cost of the hedge is more than the expected depreciation of the ZAR. But this is only a point forecast and comes with a degree of uncertainty—there is a risk that the HKD/ZAR spot rate might depreciate by more than the 2.5% cost of the hedge. In this case, the decision to hedge the currency risk would depend on the trade-offs between (1) the level of risk aversion of the firm; and (2) the conviction the firm held in the currency forecast—that is, the level of certainty that the ZAR would not depreciate by more than 2.5%.



6.2 Currency Options

- Protection against downside risk without compromising upside potential
- Protective put
- Insurance comes at a cost: intrinsic value + time value

Example 5: Hedging Problems

Brixworth & St. Ives Asset Management is a U.K.-based firm managing a dynamic hedging program for the currency exposures in its Aggressive Growth Fund. One of the fund's foreign-currency asset holdings is denominated in the Mexican peso (MXN), and one month ago Brixworth & St. Ives fully hedged this exposure using a two-month MXN/GBP forward contract. The following table provides the relevant information.

	One Month Ago	Today
Value of assets (in MXN)	10,000,000	9,500,000
MXN/GBP spot rate (bid–offer)	20.0500/20.0580	19.5985/20.0065
One-month forward points (bid–offer)	625/640	650/665
Two-month forward points (bid–offer)	875/900	900/950

The Aggressive Growth Fund also has an unhedged foreign-currency asset exposure denominated in the South African rand (ZAR). The current mid-market spot rate in the ZAR/GBP currency pair is 5.1050.

- 1 One month ago, Brixworth & St. Ives *most likely* sold:

 - A MXN9,500,000 forward at an all-in forward rate of MXN/GBP 19.6635.
 - B MXN10,000,000 forward at an all-in forward rate of MXN/GBP 20.1375.
 - C MXN10,000,000 forward at an all-in forward rate of MXN/GBP 20.1480.

- 2 To rebalance the hedge today, the firm would *most likely* need to:

 - A buy MXN500,000 spot.
 - B buy MXN500,000 forward.
 - C sell MXN500,000 forward.

- 3** Given the data in the table, the roll yield on this hedge at the forward contracts' maturity date is *most likely* to be:
- A zero.
 - B negative.
 - C positive.
- 4** Assuming that all ZAR/GBP options considered have the same notional amount and maturity, the *most* expensive hedge that Brixworth & St. Ives could use to hedge its ZAR exposure is a long position in a(n):
- A ATM call.
 - B 25-delta call.
 - C put with a strike of 5.1050.

6.3 Strategies to Reduce Hedging Costs and Modify a Portfolio's Risk Profile

Exhibit 9

Select Currency Management Strategies

Forward Contracts	Over-/under-hedging	Profit from market view
Option Contracts	OTM options	Cheaper than ATM
	Risk reversals	Write options to earn premiums
	Put/call spreads	Write options to earn premiums
	Seagull spreads	Write options to earn premiums
Exotic Options	Knock-in/out features	Reduced downside/upside exposure
	Digital options	Extreme payoff strategies

Example 6: Alternating Hedging Strategies

Brixworth & St. Ives Asset Management, the U.K.-based investment firm, has hedged the exposure of its Aggressive Growth Fund to the MXN with a long position in a MXN/GBP forward contract. The fund's foreign-currency asset exposure to the ZAR is hedged by buying an ATM call option on the ZAR/GBP currency pair. The portfolio managers at Brixworth & St. Ives are looking at ways to modify the risk-reward trade-offs and net costs of their currency hedges.

Jasmine Khan, one of the analysts at Brixworth & St. Ives, proposes an option-based hedge structure for the long-ZAR exposure that would replace the hedge based on the ATM call option with either long or short positions in the following three options on ZAR/GBP:

- a ATM put option
- b 25-delta put option
- c 25-delta call option

Khan argues that these three options can be combined into a hedge structure that will have some limited downside risk, but provide complete hedge protection starting at the relevant 25-delta strike level. The structure will also have unlimited upside potential, although this will not start until the ZAR/GBP exchange rate moves to the relevant 25-delta strike level. Finally, this structure can be created at a relatively low cost because it involves option writing.

- 1 The *best* method for Brixworth & St. Ives to gain some upside potential for the hedge on the Aggressive Growth Fund's MXN exposure using MXN/GBP options is to replace the forward contract with a:
- A long position in an OTM put.
 - B short position in an ATM call.
 - C long position in a 25-delta risk reversal.
- 2 While keeping the ATM call option in the ZAR/GBP, the method that would lead to *greatest* cost reduction on the hedge would be to:
- A buy a 25-delta put.
 - B write a 10-delta call.
 - C write a 25-delta call.
- 3 Setting up Khan's proposed hedge structure would *most likely* involve being:
- A long the 25-delta options and short the ATM option.
 - B long the 25-delta call, and short both the ATM and 25-delta put options.
 - C short the 25-delta call, and long both the ATM and 25-delta put options.

6.4 Hedging Multiple Foreign Currencies

- Currency hedge must consider the correlation between the various foreign-currency risk exposures
- A **cross hedge** occurs when a position in one asset (or a derivative based on the asset) is used to hedge the risk exposures of a different asset (Example 8).
 - Difference between a cross hedge & proxy hedge - A *cross hedge* moves the currency risk from one foreign currency to another foreign currency, whereas a *proxy hedge* removes foreign currency risk by hedging it back to the investor's domestic currency
 - Cross hedges are referred to as **macro hedges** when the hedge is focused on the entire portfolio
- Minimum-variance hedge ratio

Example 7: Cross Hedges

Mai Nguyen works at Cape Henlopen Advisors, which runs a U.S.-domiciled fund that invests in foreign-currency assets of Australia and New Zealand. The fund currently has equally weighted exposure to one-year Australian and New Zealand treasury bills (i.e., both of the portfolio weights, $\omega_i = 0.5$). Because the foreign-currency return on these treasury bill assets is risk-free and known in advance, their expected $\sigma(R_{FC})$ is equal to zero.

Nguyen wants to calculate the USD-denominated returns on this portfolio as well as the cross-hedging effects of these investments. She collects the following information:

Expected Values	Australia	New Zealand
Foreign-currency asset return R_{FC}	4.0%	6.0%
Foreign-currency return R_{FX}	5.0%	5.0%
Asset risk $\sigma(R_{FC})$	0%	0%
Currency risk $\sigma(R_{FX})$	8.0%	10.0%
Correlation (USD/AUD; USD/NZD)	+0.85	

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6.5 Basic Intuition for Using Currency Management Tools

A portfolio manager who is long the base currency in the P/B quote and wants to hedge that price risk needs to understand the following:

1. Because the portfolio has a long exposure to base currency, to neutralize this risk the hedge will attempt to build a short exposure out of that currency's derivatives using some combination of forward and/or option contracts.
2. A currency hedge is not a free good, particularly a complete hedge. The hedge cost, real or implied, will consist of some combination of lost upside potential, potentially negative roll yield (forward points at a discount or time decay on long option positions), and upfront payments of option premiums.
3. The cost of any given hedge structure will vary depending on market conditions (i.e., forward points and implied volatility).

4. The cost of the hedge is focused on its “core.” For a manager with a long exposure to a currency, the cost of this “core” hedge will be the implicit costs of a short position in a forward contract (no upside potential, possible negative roll yield) or the upfront premium on a long position in a put option. Either of these two forms of insurance can be expensive. However, there are various cost mitigation methods that can be used alone or in combination to reduce these core hedging costs:
 - Writing options to gain upfront premiums.
 - Varying the strike prices of the options written or bought.
 - Varying the notional amounts of the derivative contracts.
 - Using various “exotic” features, such as knock-ins or knock-outs.
5. There is nothing inherently wrong with any of these cost mitigation approaches—but the manager must understand that these invariably involve some combination of reduced upside potential and/or reduced downside protection. A reduced cost (or even a zero-cost) hedge structure is perfectly acceptable, but only as long as the portfolio manager fully understands all of the residual risks in the hedge structure and is prepared to accept and manage them.

6. There are often “natural” hedges within the portfolio, in which some residual risk exposures are uncorrelated with each other and offer portfolio diversification effects. Cross hedges and macro hedges bring basis risk into the portfolio, which will have to be monitored and managed.
7. There is no single or “best” way to hedge currency risk. The portfolio manager will have to perform a due diligence examination of potential hedge structures and make a rational decision on a cost/benefit basis.

Example 8: Hedging Strategies

Ireland-based Old Galway Capital runs several investment trusts for its clients. Fiona Doyle has just finished rebalancing the dynamic currency hedge for Overseas Investment Trust III, which has an IPS mandate to be fully hedged using forward contracts. Shortly after the rebalancing, Old Galway receives notice that one of its largest investors in the Overseas Investment Trust III has served notice of a large withdrawal from the fund.

Padma Bhattathiri works at Malabar Coast Capital, an India-based investment company. Her mandate is to seek out any alpha opportunities in global FX markets and aggressively manage these for speculative profit. The Reserve Bank of New Zealand (RBNZ) is New Zealand's central bank, and is scheduled to announce its policy rate decision within the week. The consensus forecast among economists is that the RBNZ will leave rates unchanged, but Bhattathiri believes that the RBNZ will surprise the markets with a rate hike.

Jasmine Khan, analyst at U.K.-based Brixworth & St. Ives Asset Management, has been instructed by the management team to reduce hedging costs for the firm's Aggressive Growth Fund, and that more currency exposure—both downside risk and upside potential—will have to be accepted and managed. Currently, the fund's ZAR-denominated foreign-currency asset exposures are being hedged with a 25-delta risk reversal (on the ZAR/GBP cross rate). The current ZAR/GBP spot rate is 13.1350.



Bao Zhang is a market analyst at South Korea-based Kwangju Capital, an investment firm that offers several actively managed investment trusts for its clients. She notices that the exchange rate for the Philippines Peso (PHP/USD) is appreciating toward its 200-day moving average located in the 42.2500 area (the current spot rate is 42.2475). She mentions this to Akiko Takahashi, a portfolio manager for one of the firm's investment vehicles. Takahashi's view, based on studying economic fundamentals, is that the PHP/USD rate should continue to appreciate, but after speaking with Zhang she is less sure. After further conversation, Zhang and Takahashi come to the view that the PHP/USD spot rate will either break through the 42.2500 level and gain upward momentum through the 42.2600 level, or stall at the 42.2500 level and then drop down through the 42.2400 level as frustrated long positions exit the market. They decide that either scenario has equal probability over the next month.

Annie McYlland is an analyst at Scotland-based Kilmarnock Capital. The firm is considering a USD10,000,000 investment in an S&P 500 Index fund. McYlland is asked to calculate the minimum-variance hedge ratio. She collects the following statistics based on 10 years of monthly data:

$$\sigma(\% \Delta S_{GBP/USD}) \quad \sigma(R_{DC}) \quad \rho(R_{DC}; \% \Delta S_{GBP/USD})$$

2.7%

4.4%

0.2

Source: Data are from Bloomberg.



- 1 Given the sudden liquidity need announced, Doyle's *best* course of action with regard to the currency hedge is to:

 - A do nothing.
 - B reduce the hedge ratio.
 - C over-hedge by using currency options.

- 2 Given her market view, Bhattathiri would *most likely* choose which of the following long positions?

 - A 5-delta put option on NZD/AUD
 - B 10-delta put option on USD/NZD
 - C Put spread on JPY/NZD using 10-delta and 25-delta options

- 3 Among the following, replacing the current risk reversal hedge with a long position in which of the following would *best* meet Khan's instructions?
(All use the ZAR/GBP.)

 - A 10-delta risk reversal
 - B Put option with a 13.1300 strike
 - C Call option with a 13.1350 strike

- 4** Which of the following positions would *best* implement Zhang's and Takahashi's market view?
- A** Long a 42.2450 put and long a 42.2550 call
 - B** Long a 42.2450 put and short a 42.2400 put
 - C** Long a 42.2450 put and short a 42.2550 call
- 5** Which of the following positions would *best* implement Kilmarnock Capital's minimum-variance hedge?
- A** Long a USD/GBP forward contract with a notional size of USD1.2 million
 - B** Long a USD/GBP forward contract with a notional size of USD3.3 million
 - C** Short a USD/GBP forward contract with a notional size of USD2.0 million

7. Currency Management for Emerging Market Currencies

- Special Considerations in Managing Emerging Market Currency Exposures
 - higher trading costs than the major currencies under “normal” market conditions
 - increased likelihood of extreme market events and severe illiquidity under stressed market conditions
- Non-Deliverable Forwards

Summary

- Impact of currency movements on portfolio risk and return
- Currency management program should be driven by market facts and client situation
- Strategic choices
- Tactical decisions
- Tools of currency management
- Managing the risk of multiple currencies
- Special considerations for emerging market currencies

Conclusion

- Learning objectives
- Summary
- Examples
- Practice problems