



## 21: International Cash Management

The term **cash management** can be broadly defined to mean optimization of cash flows and investment of excess cash. From an international perspective, cash management is very complex because laws pertaining to cross-border cash transfers differ among countries. In addition, exchange rate fluctuations can affect the value of cross-border cash transfers. Financial managers need to understand the advantages and disadvantages of investing cash in foreign markets so that they can make international cash management decisions that maximize the value of the MNC.

### The specific objectives of this chapter are to:

- explain the difference in analyzing cash flows from a subsidiary perspective and from a parent perspective,
- explain the various techniques used to optimize cash flows,
- explain common complications in optimizing cash flows, and
- explain the potential benefits and risks from foreign investing.

## Multinational Management of Working Capital

MNCs tie up funds when investing in their working capital, which includes short-term assets such as inventory, accounts receivable, and cash. They attempt working capital management by maintaining sufficient short-term assets to support their operations. Yet, they do not want to invest excessively in short-term assets because these funds might be put to better use.

The management of working capital is more complex for MNCs that have foreign subsidiaries because each subsidiary must have adequate working capital to support its operations. If a subsidiary experiences a deficiency in inventory, its production may be delayed. If it is short of cash, it may be unable to purchase supplies or materials. If the parent of an MNC is aware of the working capital situation at every subsidiary, it may be able to transfer working capital from one subsidiary to another in order to solve temporary deficiencies at any subsidiary.

### Subsidiary Expenses

Begin with outflow payments by the subsidiary to purchase raw materials or supplies. The subsidiary will normally have a more difficult time forecasting future outflow payments if its purchases are international rather than domestic because of exchange rate fluctuations. In addition, there is a possibility that payments will be substantially higher due to appreciation of the invoice currency. Consequently, the firm may wish to maintain a large inventory of supplies and raw materials so that it can draw from its inventory and cut down on purchases if the invoice currency appreciates. Still another possibility is that imported goods from another country could be restricted by the

host government (through quotas, etc.). In this event, a larger inventory would give a firm more time to search for alternative sources of supplies or raw materials. A subsidiary with domestic supply sources would not experience such a problem and therefore would not need such a large inventory.

Outflow payments for supplies will be influenced by future sales. If the sales volume is substantially influenced by exchange rate fluctuations, its future level becomes more uncertain, which makes its need for supplies more uncertain. Such uncertainty may force the subsidiary to maintain larger cash balances to cover any unexpected increase in supply requirements.

## Subsidiary Revenue

If subsidiaries export their products, their sales volume may be more volatile than if the goods were only sold domestically. This volatility could be due to the fluctuating exchange rate of the invoice currency. Importers' demand for these finished goods will most likely decrease if the invoice currency appreciates. The sales volume of exports is also susceptible to business cycles of the importing countries. If the goods were sold domestically, the exchange rate fluctuations would not have a direct impact on sales, although they would still have an indirect impact since the fluctuations would influence prices paid by local customers for imports from foreign competitors.

Sales can often be increased when credit standards are relaxed. However, it is important to focus on cash inflows due to sales rather than on sales themselves. Looser credit standards may cause a slowdown in cash inflows from sales, which could offset the benefits of increased sales. Accounts receivable management is an important part of the subsidiary's working capital management because of its potential impact on cash inflows.

## Subsidiary Dividend Payments

The subsidiary may be expected to periodically send dividend payments and other fees to the parent. These fees could represent royalties or charges for overhead costs incurred by the parent that benefit the subsidiary. An example is research and development costs incurred by the parent, which improve the quality of goods produced by the subsidiary. Whatever the reason, payments by the subsidiary to the parent are often necessary. When dividend payments and fees are known in advance and denominated in the subsidiary's currency, forecasting cash flows is easier for the subsidiary. The level of dividends paid by subsidiaries to the parent is dependent on the liquidity needs of each subsidiary, potential uses of funds at various subsidiary locations, expected movements in the currencies of the subsidiaries, and regulations of the host country government.

## Subsidiary Liquidity Management

After accounting for all outflow and inflow payments, the subsidiary will find itself with either excess or deficient cash. It uses liquidity management to either invest its excess cash or borrow to cover its cash deficiencies. If it anticipates a cash deficiency, short-term financing is necessary, as described in the previous chapter. If it anticipates excess cash, it must determine how the excess cash should be used. Investing in foreign currencies can sometimes be attractive, but exchange rate risk makes the effective yield uncertain. This issue is discussed later in this chapter.

Liquidity management is a crucial component of a subsidiary's working capital management. Subsidiaries commonly have access to numerous lines of credit and overdraft facilities in various currencies. Therefore, they may maintain adequate liquidity without substantial cash balances. While liquidity is important for the overall MNC, it cannot be properly measured by liquidity ratios. Potential access to funds is more relevant than cash on hand.

## Centralized Cash Management

A key component of working capital management is cash management. MNCs have large cash inflows and outflows in various currencies, and the cash inflows and outflows will not balance in any currency in any given month. An MNC may have consistent surpluses in cash for some currencies each month and consistent shortages for some other currencies. Many of its currencies will likely have surplus cash positions in some months and shortages in other months. For MNCs with foreign subsidiaries, cash management is even more complicated because every subsidiary may be short of cash in some currencies and have excess currency in others.

Each subsidiary's management may naturally focus on managing its own cash positions. However, such a decentralized management is not optimal because it will force the MNC overall to maintain a larger investment in cash than is necessary. Thus, MNCs commonly use **centralized cash management** to monitor and manage the parent-subsidiary and intersubsidiary cash flows. This role is critical since it can often benefit individual subsidiaries in need of funds or overly exposed to exchange rate risk.

### EXAMPLE

The treasury department of Kraft Foods is centralized to manage liquidity, funding, and foreign exchange requirements of its global operations. Monsanto has a centralized system for pooling different currency balances from various subsidiaries in Asia that saves hundreds of thousands of dollars per year. ■

Exhibit 21.1 is a complement to the following discussion of cash flow management. It is a simplified cash flow diagram for an MNC with two subsidiaries in different countries. Although each MNC may handle its payments in a different manner, Exhibit 21.1 is based on simplified assumptions that will help illustrate some key concepts of international cash management. The exhibit reflects the assumption that the two subsidiaries periodically send loan repayments and dividends to the parent or send excess cash to the parent (where the centralized cash management process is assumed to take place). These cash flows represent the incoming cash to the parent from the subsidiaries. The parent's cash outflows to the subsidiaries can include loans and the return of cash previously invested by the subsidiaries. The subsidiaries also have cash flows between themselves because they purchase supplies from each other.

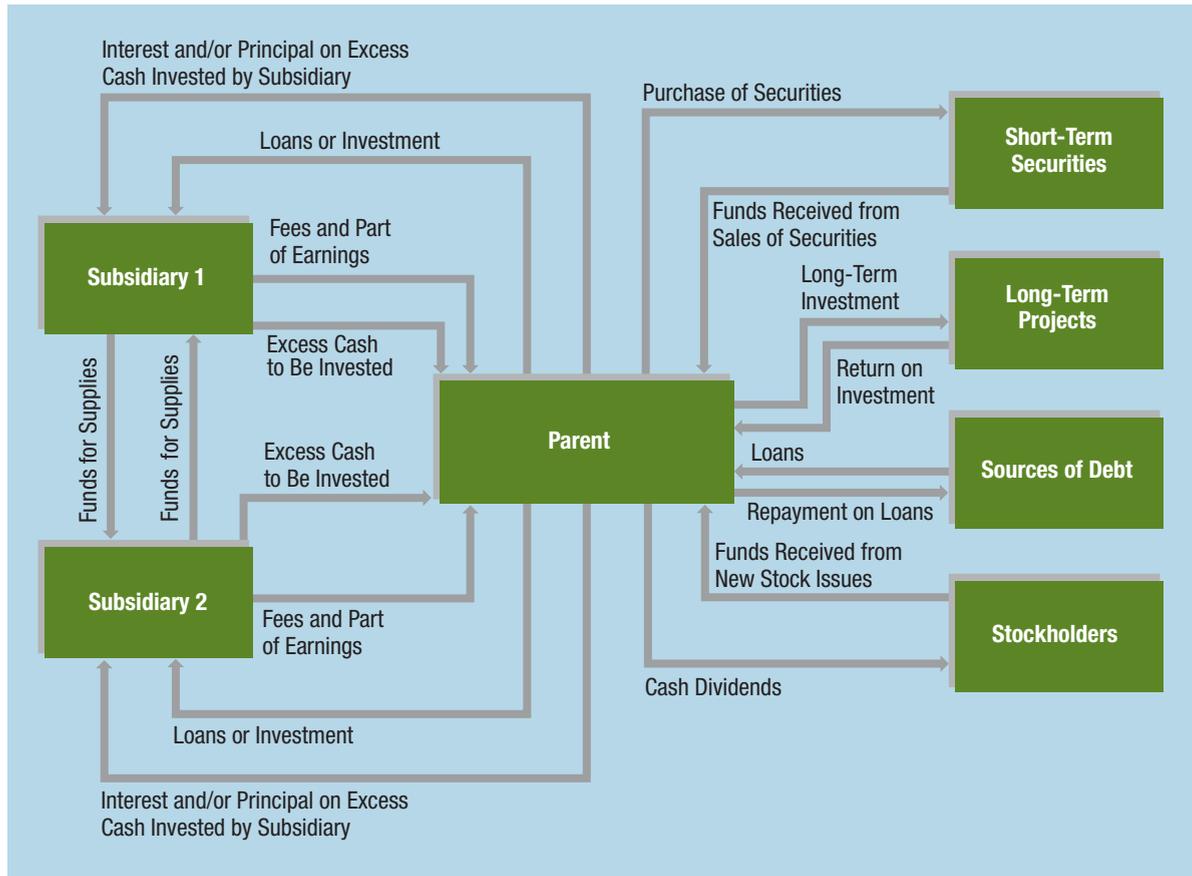
While each subsidiary is managing its working capital, there is a need to monitor and manage the cash flows between the parent and the subsidiaries, as well as between the individual subsidiaries. This task of international cash management should be delegated to a centralized cash management group. International cash management can be segmented into two functions: (1) optimizing cash flow movements and (2) investing excess cash. These two functions are discussed in turn.

The centralized cash management division of an MNC cannot always accurately forecast events that affect parent-subsidiary or intersubsidiary cash flows. It should, however, be ready to react to any event by considering (1) any potential adverse impact on cash flows and (2) how to avoid such an adverse impact. If the cash flow situation between the parent and subsidiaries results in a cash squeeze on the parent, it should have sources of funds (credit lines) available. On the other hand, if it has excess cash after considering all outflow payments, it must consider where to invest funds. This decision is thoroughly examined shortly.

### GOVERNANCE

#### Monitoring of MNC Cash Positions

When an MNC uses centralized cash management, the parent can more easily monitor the cash positions of the subsidiaries. This type of system can prevent managers of foreign subsidiaries from wasting excess funds to serve themselves because the system will detect funding deficiencies. In essence, the centralized cash management serves as an internal

**Exhibit 21.1** Cash Flow of the Overall MNC

control that governs the weekly expenditures by the subsidiary. In some cases, the deficiency in short-term funds may be attributed to reasons that are completely beyond the control of the subsidiary managers, such as a weak local economy that caused sales to decline. However, the centralized cash management system can be designed to identify when the subsidiary cash balance declines below a specific level, and then the parent can investigate the reasons for the subsidiary's cash deficiency. ■

## Techniques to Optimize Cash Flows

Cash inflows can be optimized by the following techniques:

- Accelerating cash inflows
- Minimizing currency conversion costs
- Managing blocked funds
- Managing intersubsidiary cash transfers

Each of these techniques is discussed in turn.

### Accelerating Cash Inflows

The first goal in international cash management is to accelerate cash inflows since the more quickly the inflows are received, the more quickly they can be invested or used for other purposes. Several managerial practices are advocated for this endeavor, some of

which may be implemented by the individual subsidiaries. First, a corporation may establish **lockboxes** around the world, which are post office boxes to which customers are instructed to send payment. When set up in appropriate locations, lockboxes can help reduce mailing time (**mail float**). A bank usually processes incoming checks at a lockbox on a daily basis. Second, cash inflows can be accelerated by using **preauthorized payments**, which allow a corporation to charge a customer's bank account up to some limit. Both preauthorized payments and lockboxes are also used in a domestic setting. Because international transactions may have a relatively long mailing time, these methods of accelerating cash inflows can be quite valuable for an MNC.

## Minimizing Currency Conversion Costs

Another technique for optimizing cash flow movements, **netting**, can be implemented with the joint effort of subsidiaries or by the centralized cash management group. This technique optimizes cash flows by reducing the administrative and transaction costs that result from currency conversion.

### EXAMPLE

Montana, Inc., has subsidiaries located in France and in Hungary. Whenever the French subsidiary needs to purchase supplies from the Hungarian subsidiary, it needs to convert euros into Hungary's currency (the forint) to make payment. Hungary's subsidiary must convert its forint into euros when purchasing supplies from the French subsidiary. Montana, Inc., has instructed both subsidiaries to net their transactions on a monthly basis so that only one net payment is made at the end of each month. By using this approach, both subsidiaries avoid (or at least reduce) the transaction costs of currency conversion. ■

Over time, netting has become increasingly popular because it offers several key benefits. First, it reduces the number of cross-border transactions between subsidiaries, thereby reducing the overall administrative cost of such cash transfers. Second, it reduces the need for foreign exchange conversion since transactions occur less frequently, thereby reducing the transaction costs associated with foreign exchange conversion. Third, the netting process imposes tight control over information on transactions between subsidiaries. Thus, all subsidiaries engage in a more coordinated effort to accurately report and settle their various accounts. Finally, cash flow forecasting is easier since only net cash transfers are made at the end of each period, rather than individual cash transfers throughout the period. Improved cash flow forecasting can enhance financing and investment decisions.

A **bilateral netting system** involves transactions between two units: between the parent and a subsidiary, or between two subsidiaries. A **multilateral netting system** usually involves a more complex interchange among the parent and several subsidiaries. For most large MNCs, a multilateral netting system would be necessary to effectively reduce administrative and currency conversion costs. Such a system is normally centralized so that all necessary information is consolidated. From the consolidated cash flow information, net cash flow positions for each pair of units (subsidiaries, or whatever) are determined, and the actual reconciliation at the end of each period can be dictated. The centralized group may even maintain inventories of various currencies so that currency conversions for the end-of-period net payments can be completed without significant transaction costs.

MNCs commonly monitor the cash flows between their subsidiaries with the use of an intersubsidiary payments matrix. A U.S.-based MNC will normally translate the payments into dollars (based on the prevailing spot rate) so that the net payments can be easily determined. If the Canadian subsidiary of the MNC normally makes payments to the French subsidiary in euros, but the French subsidiary normally makes payments to the Canadian subsidiary in Canadian dollars, the payments need to be

translated into a common currency to determine the net payment owed. The amounts can be translated into dollars to determine the net payment owed between each pair of subsidiaries. This allows the parent of a U.S.-based MNC to assess the relative size of each net payment owed between subsidiaries, as illustrated below.

### EXAMPLE

Exhibit 21.2 is an example of an intersubsidiary payments matrix that totals each subsidiary's individual payments to each of the other subsidiaries. The first row indicates that the Canadian subsidiary owes the equivalent of \$40,000 to the French subsidiary, the equivalent of \$90,000 to the Japanese subsidiary, and so on. During this same period, these subsidiaries have also received goods from the Canadian subsidiary, for which payment is due. The second column (under Canada) shows that the Canadian subsidiary is owed the equivalent of \$60,000 by the French subsidiary, the equivalent of \$100,000 by the Japanese subsidiary, and so on.

Since subsidiaries owe each other, currency conversion costs can be reduced by requiring that only the net payment be extended. Using the intersubsidiary table, the schedule of net payments is determined as shown in Exhibit 21.3. Since the Canadian subsidiary owes the French subsidiary the equivalent of \$40,000 but is owed the equivalent of \$60,000 by the French subsidiary, the net payment required is the equivalent of \$20,000 from the French subsidiary to the Canadian subsidiary. Exhibits 21.2 and 21.3 convert all figures to U.S. dollar equivalents to allow for consolidating payments in both directions so the net payment can be determined.

The net amount owed by each subsidiary to all other subsidiaries is shown in the last column in Exhibit 21.3, while the net amount to be received by each subsidiary from all other subsidiaries is shown in the bottom row. The Canadian subsidiary owes net payments totaling \$40,000, while it will receive net payments totaling \$30,000. Therefore, its overall balance

**Exhibit 21.2** Intersubsidiary Payments Matrix

Payments Owed by Subsidiary Located in:	U.S. Dollar Value (in Thousands) Owed to Subsidiary Located in:				
	Canada	France	Japan	Switzerland	U.S.
Canada	—	40	90	20	40
France	60	—	30	60	50
Japan	100	30	—	20	30
Switzerland	10	50	10	—	50
U.S.	10	60	20	20	—

**Exhibit 21.3** Netting Schedule

Net Payments to Be Made by Subsidiary Located in:	Net U.S. Dollar Value (in Thousands) Owed to Subsidiary Located in:					Total
	Canada	France	Japan	Switzerland	U.S.	
Canada	—	0	0	10	30	40
France	20	—	0	10	0	30
Japan	10	0	—	10	10	30
Switzerland	0	0	0	—	30	30
U.S.	<u>0</u>	<u>10</u>	<u>0</u>	<u>0</u>	<u>—</u>	10
Total	30	10	0	30	70	

of net cash flows based on payments to and from subsidiaries is a net outflow of \$10,000 for this period. The Canadian subsidiary may use this information along with its expectations of other cash flows not related to other subsidiaries to determine whether it will have sufficient cash during this period. ■

There can be some limitations to multilateral netting due to foreign exchange controls. Although the major industrialized countries typically do not impose such controls, some other countries do, and some countries prohibit netting altogether. Thus, an MNC with subsidiaries around the world may not be able to include all of its subsidiaries in its multilateral netting system. Obviously, this will limit the degree to which the netting system can reduce administration and transaction costs.

## Managing Blocked Funds

Cash flows can also be affected by a host government's blockage of funds, which might occur if the government requires all funds to remain within the country in order to create jobs and reduce unemployment. To deal with funds blockage, the MNC may implement the same strategies used when a host country government imposes high taxes. To make efficient use of these funds, the MNC may instruct the subsidiary to set up a research and development division, which incurs costs and possibly generates revenues for other subsidiaries.

Another strategy is to use transfer pricing in a manner that will increase the expenses incurred by the subsidiary. A host country government is likely to be more lenient on funds sent to cover expenses than on earnings remitted to the parent.

When subsidiaries are restricted from transferring funds to the parent, the parent may instruct the subsidiary to obtain financing from a local bank rather than from the parent. By borrowing through a local intermediary, the subsidiary is assured that its earnings can be distributed to pay off previous financing. Overall, most methods of managing blocked funds are intended to make efficient use of the funds by using them to cover expenses that are transferred to that country.

### EXAMPLE

Wittenberg, Inc., a U.S.-based MNC, has a subsidiary in the Philippines. During a turbulent period, the subsidiary was prevented from exchanging its Philippine pesos into U.S. dollars to be sent home. Wittenberg held its corporate meeting in Manila so that it could use the pesos to pay the expenses of the meeting (hotel, food, etc.) in pesos. In this way, it was able to use local funds to cover an expense that it would have incurred anyway. Ordinarily, the corporate meeting would have been held in the parent's country, and the parent would have paid the expenses. ■

## Managing Intersubsidiary Cash Transfers

Proper management of cash flows can also be beneficial to a subsidiary in need of funds.

### EXAMPLE

Texas, Inc., has two foreign subsidiaries called Short Sub and Long Sub. Short Sub needs funds, while Long Sub has excess funds. If Long Sub purchases supplies from Short Sub, it can provide financing by paying for its supplies earlier than necessary. This technique is often called **leading**. Alternatively, if Long Sub sells supplies to Short Sub, it can provide financing by allowing Short Sub to lag its payments. This technique is called **lagging**. ■

The leading or lagging strategy can make efficient use of cash and thereby reduce debt. Some host governments prohibit the practice by requiring that a payment between subsidiaries occur at the time the goods are transferred. Thus, an MNC needs to be aware of any laws that restrict the use of this strategy.

## Complications in Optimizing Cash Flow

Most complications encountered in optimizing cash flow can be classified into three categories:

- Company-related characteristics
- Government restrictions
- Characteristics of banking systems

Each complication is discussed in turn.

### Company-Related Characteristics

In some cases, optimizing cash flow can become complicated due to characteristics of the MNC. If one of the subsidiaries delays payments to other subsidiaries for supplies received, the other subsidiaries may be forced to borrow until the payments arrive. A centralized approach that monitors all intersubsidiary payments should be able to minimize such problems.

### Government Restrictions

The existence of government restrictions can disrupt a cash flow optimization policy. Some governments prohibit the use of a netting system, as noted earlier. In addition, some countries periodically prevent cash from leaving the country, thereby preventing net payments from being made. These problems can arise even for MNCs that do not experience any company-related problems. Countries in Latin America commonly impose restrictions that affect an MNC's cash flows.

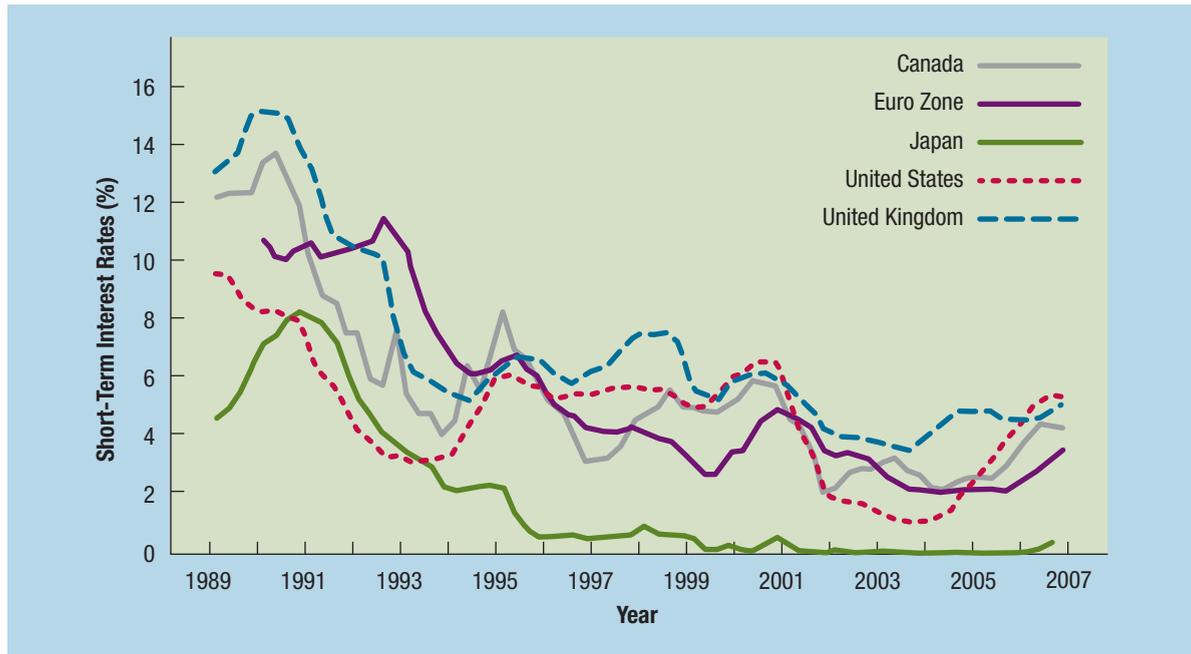
### Characteristics of Banking Systems

The abilities of banks to facilitate cash transfers for MNCs vary among countries. Banks in the United States are advanced in this field, but banks in some other countries do not offer services. MNCs prefer some form of zero-balance account, where excess funds can be used to make payments but earn interest until they are used. In addition, some MNCs benefit from the use of lockboxes. Such services are not available in some countries.

In addition, a bank may not update the MNC's bank account information sufficiently or provide a detailed breakdown of fees for banking services. Without full use of banking resources and information, the effectiveness of international cash management is limited. In addition, an MNC with subsidiaries in, say, eight different countries will typically be dealing with eight different banking systems. Much progress has been made in foreign banking systems in recent years. As time passes and a more uniform global banking system emerges, such problems may be alleviated.

## Investing Excess Cash

Many MNCs have at least \$100 million in cash balances across banks in various countries. If they can find a way to earn an extra 1 percent on those funds, they will generate an extra \$1 million each year on cash balances of \$100 million. Thus, their short-term investment decision affects the amount of their cash inflows. Their excess funds can be invested in domestic or foreign short-term securities. In some periods, foreign short-term securities will have higher interest rates than domestic interest rates. The differential can be substantial, as illustrated in Exhibit 21.4. However, firms must account for the possible exchange rate movements when assessing the potential yield on foreign investments.

**Exhibit 21.4** Short-Term Annualized Interest Rates among Countries

Source: Federal Reserve.

## How to Invest Excess Cash

International money markets have grown to accommodate corporate investments of excess cash. MNCs may use international money markets in an attempt to earn higher returns than they can achieve domestically.

Eurocurrency deposits are one of the most commonly used international money market instruments. Many MNCs establish large deposits in various currencies in the Eurocurrency market, with Eurodollar deposits being the most popular. The dollar volume of Eurodollar deposits has more than doubled since 1980. Eurodollar deposits commonly offer MNCs a slightly higher yield than bank deposits in the United States. Though Eurodollar deposits still dominate the market, the relative importance of nondollar currencies has increased over time.

In addition to using the Eurocurrency market, MNCs can also purchase foreign Treasury bills and commercial paper. Improved telecommunications systems have increased access to these securities in foreign markets and allow for a greater degree of integration among money markets in various countries.

## Centralized Cash Management

An MNC's short-term investing policy can either maintain separate investments for all subsidiaries or employ a centralized approach. Recall that the function of optimizing cash flows can be improved by a centralized approach since all subsidiary cash positions can be monitored simultaneously. With regard to the investing function, centralization allows for more efficient usage of funds and possibly higher returns. Here the term *centralized* means that excess cash from each subsidiary is pooled until it is needed by a particular subsidiary.

### Centralization When Subsidiaries Use the Same Currency.

To understand the advantages of a centralized system, consider that the rates paid on short-term investments such as bank deposits are often higher for larger amounts.

Thus, if two subsidiaries have excess cash of \$50,000 each for one month, the rates on their individual bank deposits may be lower than the rate they could obtain if they pooled their funds into a single \$100,000 bank deposit. In this manner, the centralized (pooling) approach generates a higher rate of return on excess cash.

The centralized approach can also facilitate the transfer of funds from subsidiaries with excess funds to those that need funds.

### EXAMPLE

Subsidiary A of Moorhead, Inc., has excess cash of \$50,000 during the next month, while Subsidiary B of Moorhead, Inc., needs to borrow \$50,000 for one month. If cash management is not centralized, Subsidiary A may use the \$50,000 to purchase a one-month bank certificate earning, say, 10 percent (on an annualized basis). At the same time, Subsidiary B may borrow from a bank for one month at a rate of, say, 12 percent. The bank must charge a higher rate on loans than it offers on deposits. With a centralized approach, Subsidiary B can borrow Subsidiary A's excess funds, thereby reducing its financing costs. ■

### Centralized Cash Management of Multiple Currencies.

Centralized cash management is more complicated when the MNC uses multiple currencies. All excess funds could be pooled and converted to a single currency for investment purposes. However, the advantage of pooling may be offset by the transaction costs incurred when converting to a single currency.

Centralized cash management can still be valuable, though. The short-term cash available among subsidiaries can be pooled together so that there is a separate pool for each currency. Then excess cash in a particular currency can still be used to satisfy other subsidiary deficiencies in that currency. In this way, funds can be transferred from one subsidiary to another without incurring transaction costs that banks charge for exchanging currencies. This strategy is especially feasible when all subsidiary funds are deposited in branches of a single bank so that the funds can easily be transferred among subsidiaries.

Another possible function of centralized cash management is to invest funds in securities denominated in the foreign currencies that will be needed by the subsidiaries in the future. MNCs can use excess cash to invest cash in international money market instruments so that they can cover any payables positions in specific foreign currencies. If they have payables in foreign currencies that are expected to appreciate, they can cover such positions by creating short-term deposits in those currencies. The maturity of a deposit would ideally coincide with the date at which the funds are needed.

### Impact of Technology on Centralized Cash Management.

International cash management requires timely information across subsidiaries regarding each subsidiary's cash positions in each currency, along with interest rate information about each currency. A centralized cash management system needs a continual flow of information about currency positions so that it can determine whether one subsidiary's shortage of cash can be covered by another subsidiary's excess cash in that currency. Given the major improvements in online technology in recent years, all MNCs can easily and efficiently create a multinational communications network among their subsidiaries to ensure that information about cash positions is continually updated.

### EXAMPLE

To understand how such a communications network works, consider Jax Co., which creates a cash balances website that specifies the cash balance of every currency for each subsidiary. Near the end of each day, each subsidiary revises the website to provide the latest update of its cash balance for each currency. Each subsidiary also specifies the period of time in which the excess or deficiency will persist. The parent's treasury department moni-

tors the updated data and determines whether any cash needs identified by a subsidiary in a particular currency can be accommodated by another subsidiary that has excess cash in that same currency. The treasury department then e-mails instructions to the subsidiaries about fund transfers. If it notices that the Canadian subsidiary has an excess of Canadian dollars for the next 26 days, and the Belgian subsidiary needs Canadian dollars tomorrow (but will have inflows of Canadian dollars in 17 days), it provides the following instructions: “The Canadian subsidiary should transfer C\$60,000 to the Belgian subsidiary and will be repaid by the Belgian subsidiary in 17 days.” The fund transfers are essentially short-term loans, so a subsidiary that borrows funds will repay them with interest. The interest charged on a loan creates an incentive for subsidiaries to make their excess cash available and an incentive for subsidiaries with cash deficiencies to return the funds as soon as possible. ■

The electronic communications network may be more sophisticated than the one described here, but this description illustrates how easy it is for an MNC’s parent to continuously monitor the cash balances of each subsidiary and communicate instructions among subsidiaries. The process of transferring funds among subsidiaries may be especially easy when all the MNC’s subsidiaries use branches of the same bank. A communications network allows the MNC to make the best use of each subsidiary’s cash, which can reduce the amount of external financing needed and reduce the MNC’s exchange rate risk.

## Determining the Effective Yield

Firms commonly consider investing in a deposit denominated in a currency with a high interest rate and then converting the funds back to dollars when the deposit matures. This strategy will not necessarily be feasible since the currency denominating the deposit may depreciate over the life of the deposit. If it does, the advantage of a higher interest rate may be more than offset by the depreciation in the currency representing the deposit.

Consequently, it is the deposit’s **effective yield**, not its interest rate, that is most important to the cash manager. The effective yield of a bank deposit considers both the interest rate and the rate of appreciation (or depreciation) of the currency denominating the deposit and can therefore be very different from the quoted interest rate on a deposit denominated in a foreign currency. An example follows to illustrate this point.

### EXAMPLE

Quant Co., a large U.S. corporation with \$1 million in excess cash, could invest in a one-year deposit at 6 percent but is attracted to higher interest rates in Australia. It creates a one-year deposit denominated in Australian dollars (A\$) at 9 percent. The exchange rate of the Australian dollar at the time of the deposit is \$.68. The U.S. dollars are first converted to A\$1,470,588 (since  $\$1,000,000 / \$.68 = \$1,470,588$ ) and then deposited in a bank.

One year later, Quant Co. receives A\$1,602,941, which is equal to the initial deposit plus 9 percent interest on the deposit. At this time, Quant Co. has no use for Australian dollars and converts them into U.S. dollars. Assume that the exchange rate at this time is \$.72. The funds will convert to \$1,154,118 (computed as  $A\$1,602,941 \times \$.72$  per A\$). Thus, the yield on this investment to the U.S. corporation is

$$\frac{\$1,154,118 - \$1,000,000}{\$1,000,000} = .1541, \text{ or } 15.41\%$$

The high yield is attributed to the relatively high interest rate earned on the deposit, plus the appreciation in the currency denominating the deposit over the investment period.

If the currency had depreciated over the investment period, however, the effective yield to Quant Co. would have been less than the interest rate on the deposit and could even have been lower than the interest rate available on U.S. investments. For example, if the Australian dollar had depreciated from \$.68 at the beginning of the investment period to \$.65 by

the end of the investment period, Quant Co. would have received \$1,041,912 (computed as A\$1,602,941  $\times$  \$.65 per A\$). In this case, the yield on the investment to the U.S. corporation would have been

$$\frac{\$1,041,912 - \$1,000,000}{\$1,000,000} = .0419, \text{ or } 4.19\% \quad \blacksquare$$

The preceding example illustrates how appreciation of the currency denominating a foreign deposit over the deposit period will force the effective yield to be above the quoted interest rate. Conversely, depreciation will create the opposite effect.

The previous computation of the effective yield on foreign deposits was conducted in a logical manner. A quicker method is shown here:

$$r = (1 + i_f)(1 + e_f) - 1$$

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The effective yield on the foreign deposit is represented by  $r$ ,  $i_f$  is the quoted interest rate, and  $e_f$  is the percentage change (from the day of deposit to the day of withdrawal) in the value of the currency representing the foreign deposit. The term  $i_f$  was used in Chapter 20 to represent the interest rate when borrowing a foreign currency. In this chapter, the interest rate of concern is the deposit rate on the foreign currency.

### EXAMPLE

Given the information for Quant Co., the effective yield on the Australian deposit can be estimated. The term  $e_f$  represents the percentage change in the Australian dollar (against the U.S. dollar) from the date Australian dollars are purchased (and deposited) until the day they are withdrawn (and converted back to U.S. dollars). The Australian dollar appreciated from \$.68 to \$.72, or by 5.88 percent over the life of the deposit. Using this information as well as the quoted deposit rate of 9 percent, the effective yield to the U.S. firm on this deposit denominated in Australian dollars is

$$\begin{aligned} r &= (1 + i_f)(1 + e_f) - 1 \\ &= (1 + .09)[1 + (.0588)] - 1 \\ &= .1541, \text{ or } 15.41\% \end{aligned}$$

This estimate of the effective yield corresponds with the return on investment determined earlier for Quant Co.  $\blacksquare$

If the currency had depreciated, Quant Co. would have earned an effective yield that was less than the interest rate.

### EXAMPLE

In the revised example for Quant Co., the Australian dollar depreciated from \$.68 to \$.65, or by 4.41 percent. Based on the quoted interest rate of 9 percent and the depreciation of 4.41 percent, the effective yield is

$$\begin{aligned} r &= (1 + i_f)(1 + e_f) - 1 \\ &= (1 + .09)[1 + (-.0441)] - 1 \\ &= .0419, \text{ or } 4.19\% \end{aligned}$$

which is the same rate computed earlier for this revised example.  $\blacksquare$

The effective yield can be negative if the currency denominating the deposit depreciates to an extent that more than offsets the interest accrued from the deposit.

### EXAMPLE

Nebraska, Inc., invests in a bank deposit denominated in euros that provides a yield of 9 percent. The euro depreciates against the dollar by 12 percent over the one-year period. The effective yield is

$$\begin{aligned}
 r &= (1 + .09)[1 + (-.12)] - 1 \\
 &= -.0408, \text{ or } -4.08\%
 \end{aligned}$$

This result indicates that Nebraska, Inc., will end up with 4.08 percent less in funds than it initially deposited. ■

As with bank deposits, the effective yield on all other securities denominated in a foreign currency is influenced by the fluctuation of that currency's exchange rate. Our discussion will continue to focus on bank deposits for short-term foreign investment, but the implications of the discussion can be applied to other short-term securities as well.

## Implications of Interest Rate Parity

Recall that covered interest arbitrage is described as a short-term foreign investment with a simultaneous forward sale of the foreign currency denominating the foreign investment. One might think that a foreign currency with a high interest rate would be an ideal candidate for covered interest arbitrage. However, such a currency will normally exhibit a forward discount that reflects the differential between its interest rate and the investor's home interest rate. This relationship is based on the theory of interest rate parity. Investors cannot lock in a higher return when attempting covered interest arbitrage if interest rate parity exists.

Even if interest rate parity does exist, short-term foreign investing may still be feasible but would have to be conducted on an uncovered basis (without use of the forward market). That is, short-term foreign investing may result in a higher effective yield than domestic investing, but it cannot be guaranteed.

## Use of the Forward Rate as a Forecast

If interest rate parity exists, the forward rate serves as a break-even point to assess the short-term investment decision. When investing in the foreign currency (and not covering the foreign currency position), the effective yield will be more than the domestic yield if the spot rate of the foreign currency after one year is more than the forward rate at the time the investment is undertaken. Conversely, the yield of a foreign investment will be lower than the domestic yield if the spot rate of the foreign currency after one year turns out to be less than the forward rate at the time the investment is undertaken.

### HTTP://

<http://ciber.msu.edu>  
Links to numerous sites  
related to international  
business.

**Relationship with the International Fisher Effect.** When interest rate parity exists, MNCs that use the forward rate as a predictor of the future spot rate expect the yield on foreign deposits to equal that on U.S. deposits. Though the forward rate is not necessarily an accurate predictor, it may provide unbiased forecasts of the future spot rate. If the forward rate is unbiased, it does not consistently underestimate or overestimate the future spot rate with equal frequency. Thus, the effective yield on foreign deposits is equal to the domestic yield, on average. MNCs that consistently invest in foreign short-term securities would earn a yield similar on average to what they could earn on domestic securities.

Our discussion here is closely related to the international Fisher effect (IFE). Recall that the IFE suggests that the exchange rate of a foreign currency is expected to change by an amount reflecting the differential between its interest rate and the U.S. interest rate. The rationale behind this theory is that a high nominal interest rate reflects an expectation of high inflation, which could weaken the currency (according to purchasing power parity).

If interest rate parity exists, the forward premium or discount reflects that interest rate differential and represents the expected percentage change in the currency's

value when the forward rate is used as a predictor of the future spot rate. The IFE suggests that firms cannot consistently earn short-term yields on foreign securities that are higher than those on domestic securities because the exchange rate is expected to adjust to the interest rate differential on average. If interest rate parity holds and the forward rate is an unbiased predictor of the future spot rate, we can expect the IFE to hold.

A look back in time reveals that the IFE is supported for some currencies in some periods. Moreover, it may be difficult for an MNC to anticipate when the IFE will hold and when it will not. For virtually any currency, it is possible to identify previous periods when the forward rate substantially underestimated the future spot rate, and an MNC would have earned very high returns from investing short-term funds in a foreign money market security. However, it is also possible to identify other periods when the forward rate substantially overestimated the future spot rate, and the MNC would have earned low or even negative returns from investing in that same foreign money market security.

**Conclusions about the Forward Rate.** The key implications of interest rate parity and the forward rate as a predictor of future spot rates for foreign investing are summarized in Exhibit 21.5. This exhibit explains the conditions in which investment in foreign short-term securities is feasible.

### Use of Exchange Rate Forecasts

Although MNCs do not know how a currency's value will change over the investment horizon, they can use the formula for the effective yield provided earlier in this chapter and plug in their forecast for the percentage change in the foreign currency's exchange rate ( $e_f$ ). Since the interest rate of the foreign currency deposit ( $i_f$ ) is known, the effective yield can be forecasted given a forecast of  $e_f$ . This projected effective yield on a foreign deposit can then be compared with the yield when investing in the firm's local currency.

**Exhibit 21.5** Considerations When Investing Excess Cash

Scenario	Implications for Investing in Foreign Money Markets
1. Interest rate parity exists.	Covered interest arbitrage is not worthwhile.
2. Interest rate parity exists, and the forward rate is an accurate forecast of the future spot rate.	An uncovered investment in a foreign security is not worthwhile.
3. Interest rate parity exists, and the forward rate is an unbiased forecast of the future spot rate.	An uncovered investment in a foreign security will on average earn an effective yield similar to an investment in a domestic security.
4. Interest rate parity exists, and the forward rate is expected to overestimate the future spot rate.	An uncovered investment in a foreign security is expected to earn a lower effective yield than an investment in a domestic security.
5. Interest rate parity exists, and the forward rate is expected to underestimate the future spot rate.	An uncovered investment in a foreign security is expected to earn a higher effective yield than an investment in a domestic security.
6. Interest rate parity does not exist; the forward premium (discount) exceeds (is less than) the interest rate differential.	Covered interest arbitrage is feasible for investors residing in the home country.
7. Interest rate parity does not exist; the forward premium (discount) is less than (exceeds) the interest rate differential.	Covered interest arbitrage is feasible for foreign investors but not for investors residing in the home country.

**EXAMPLE**

Latrobe, Inc., is a U.S. firm with funds available to invest for one year. It is aware that the one-year interest rate on a U.S. dollar deposit is 11 percent and the interest rate on an Australian deposit is 14 percent. Assume that the U.S. firm forecasts that the Australian dollar will depreciate from its current rate of \$.1600 to \$.1584, or a 1 percent decrease. The expected value for  $e_f$  [ $E(e_f)$ ] will therefore be  $-1$  percent. Thus, the expected effective yield [ $E(r)$ ] on an Australian dollar-denominated deposit is

$$\begin{aligned} E(r) &= (1 + i_f)[1 + E(e_f)] - 1 \\ &= (1 + 14\%)[1 + (-1\%)] - 1 \\ &= 12.86\% \end{aligned}$$

Thus, in this example, investing in an Australian dollar deposit is expected to be more rewarding than investing in a U.S. dollar deposit. ■

Keep in mind that the value for  $e_f$  is forecasted and therefore is not known with certainty. Thus, there is no guarantee that foreign investing will truly be more lucrative.

**Deriving the Value of  $e_f$  That Equates Foreign and Domestic Yields.** From the preceding example, Latrobe may attempt to at least determine what value of  $e_f$  would make the effective yield from foreign investing the same as that from investing in a U.S. dollar deposit. To determine this value, begin with the effective yield formula and solve for  $e_f$  as follows:

$$\begin{aligned} r &= (1 + i_f)(1 + e_f) - 1 \\ 1 + r &= (1 + i_f)(1 + e_f) \\ \frac{1 + r}{1 + i_f} &= 1 + e_f \\ \frac{1 + r}{1 + i_f} - 1 &= e_f \end{aligned}$$

Since the U.S. deposit rate was 11 percent in our previous example, that is the rate to be plugged in for  $r$ . We can also plug in 14 percent for  $i_f$ , so the break-even value of  $e_f$  would be

$$\begin{aligned} e_f &= \frac{1 + r}{1 + i_f} - 1 \\ &= \frac{1 + 11\%}{1 + 14\%} - 1 \\ &= -2.63\% \end{aligned}$$

This suggests that the Australian dollar must depreciate by about 2.63 percent to make the Australian dollar deposit generate the same effective yield as a deposit in U.S. dollars. With any smaller degree of depreciation, the Australian dollar deposit would be more rewarding. Latrobe, Inc., can use this information when determining whether to invest in a U.S. dollar or Australian dollar deposit. If it expects the Australian dollar to depreciate by more than 2.63 percent over the deposit period, it will prefer investing in U.S. dollars. If it expects the Australian dollar to depreciate by less than 2.63 percent, or to appreciate, its decision is more complex. If the potential reward from investing in the foreign currency outweighs the risk involved, then the firm should choose that route. The final decision here will be influenced by the firm's degree of risk aversion.

**Use of Probability Distributions.** Since even expert forecasts are not always accurate, it is sometimes useful to develop a probability distribution instead of

relying on a single prediction. An example of how a probability distribution is applied follows.

### EXAMPLE

Ohio, Inc., is deciding whether to invest in Australian dollars for one year. It finds that the quoted interest rate for the Australian dollar is 14 percent, and the quoted interest rate for a U.S. dollar deposit is 11 percent. It then develops a probability distribution for the Australian dollar's possible percentage change in value over the life of the deposit.

The probability distribution is displayed in Exhibit 21.6. From the first row in the exhibit, we see that there is a 5 percent probability of a 10 percent depreciation in the Australian dollar over the deposit's life. If the Australian dollar does depreciate by 10 percent, the effective yield will be 2.60 percent. This indicates that there is a 5 percent probability that Ohio, Inc., will earn a 2.60 percent effective yield on its funds. From the second row in the exhibit, there is a 10 percent probability of an 8 percent depreciation in the Australian dollar over the deposit period. If the Australian dollar does depreciate by 8 percent, the effective yield will be 4.88 percent, which means there is a 10 percent probability that Ohio will generate a 4.88 percent effective yield on this deposit.

For each possible percentage change in the Australian dollar's value, there is a corresponding effective yield. Each possible effective yield (third column) is associated with a probability of that yield occurring (second column). An *expected value* of the effective yield of the Australian dollar is derived by multiplying each possible effective yield by its corresponding probability. Based on the information in Exhibit 21.6, the expected value of the effective yield, referred to as  $E(r)$ , is computed this way:

$$\begin{aligned}
 E(r_f) &= 5\%(2.60\%) + 10\%(4.88\%) + 15\%(9.44\%) + 20\%(11.72\%) \\
 &\quad + 20\%(15.14\%) + 15\%(16.28\%) + 10\%(17.42\%) \\
 &\quad + 5\%(18.56\%) \\
 &= .13\% + .488\% + 1.416\% + 2.344\% + 3.028\% + 2.442\% \\
 &\quad + 1.742\% + .928\% \\
 &= 12.518\%
 \end{aligned}$$

Thus, the expected value of the effective yield when investing in Australian dollars is approximately 12.5 percent.

**Exhibit 21.6** Analysis of Investing in a Foreign Currency

Possible Rate of Change in the Australian Dollar over the Life of the Investment ( $e_t$ )	Probability of Occurrence	Effective Yield If This Rate of Change in the Australian Dollar Does Occur
-10%	5%	$(1.14) [1 + (-.10)] - 1 = .0260$ , or 2.60%
-8	10	$(1.14) [1 + (-.08)] - 1 = .0488$ , or 4.88%
-4	15	$(1.14) [1 + (-.04)] - 1 = .0944$ , or 9.44%
-2	20	$(1.14) [1 + (-.02)] - 1 = .1172$ , or 11.72%
+1	20	$(1.14) [1 + (.01)] - 1 = .1514$ , or 15.14%
+2	15	$(1.14) [1 + (.02)] - 1 = .1628$ , or 16.28%
+3	10	$(1.14) [1 + (.03)] - 1 = .1742$ , or 17.42%
+4	5	$(1.14) [1 + (.04)] - 1 = .1856$ , or 18.56%
	<u>100%</u>	

To further assess the question of which currency to invest in, the information in the second and third columns from Exhibit 21.6 is used to develop a probability distribution in Exhibit 21.7, which illustrates the probability of each possible effective yield that may occur if Ohio, Inc., invests in Australian dollars. Notice that the U.S. interest rate (11 percent) is known with certainty and is included in Exhibit 21.7 for comparison purposes. A comparison of the Australian dollar's probability distribution against the U.S. interest rate suggests that there is a 30 percent probability that the U.S. rate will be more than the effective yield from investing in Australian dollars and a 70 percent chance that it will be less.

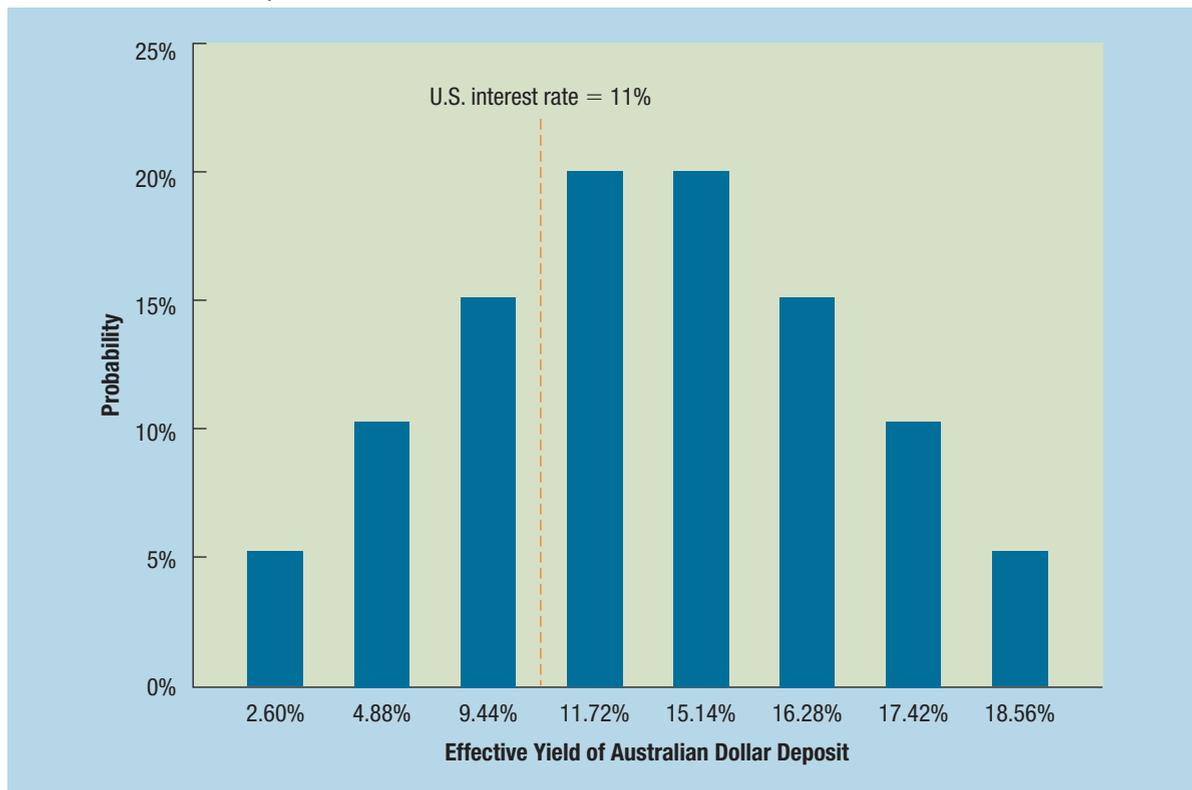
If Ohio, Inc., invests in a U.S. dollar deposit, it knows with certainty the yield it will earn from its investment. If it invests in Australian dollars, its risk is the 5 percent chance (probability) that the effective yield on the Australian dollar deposit will be 2.60 percent, or the 10 percent chance that the effective yield on the Australian dollar deposit will be 4.88 percent, or the 15 percent chance that the effective yield on Australian dollars will be 9.44 percent. Each of these possibilities represents a lower return to Ohio, Inc., than what it would have earned had it invested in a U.S. dollar deposit. Ohio, Inc., concludes that the potential return on the Australian deposit is not high enough to compensate for the risk and decides to invest in the U.S. deposit. ■

### Diversifying Cash across Currencies

Because an MNC is not sure how exchange rates will change over time, it may prefer to diversify cash among securities denominated in different currencies. Limiting the percentage of excess cash invested in each currency will reduce the MNC's exposure to exchange rate risk.

The degree to which a portfolio of investments denominated in various currencies will reduce risk depends on the currency correlations. Ideally, the currencies represented within the portfolio will exhibit low or negative correlations with each

**Exhibit 21.7** Probability Distribution of Effective Yields



other. When currencies are likely to be affected by the same underlying event, their movements tend to be more highly correlated, and diversification among these types of currencies does not substantially reduce exposure to exchange rate risk.

### EXAMPLE

In 1997, the interest rates in most Asian countries were higher than the interest rate in the United States. However, Asian currencies, such as the Indonesian rupiah, the Malaysian ringgit, the South Korean won, and the Thailand baht, depreciated by more than 50 percent against the U.S. dollar in less than one year. Consequently, subsidiaries based outside Asia that attempted to benefit from the high Asian interest rates earned negative effective yields on their investments, so they received less than what they initially invested. Diversification of cash among these currencies was not beneficial in this case because all of the currencies weakened in response to the Asian crisis. The potential benefits from investing in a portfolio of currencies are more thoroughly discussed in Appendix 21. ■

### Dynamic Hedging

Some MNCs continually adjust their short-term positions in currencies in response to revised expectations of each currency's future movement. They may engage in **dynamic hedging**, which is a strategy of applying a hedge when the currencies held are expected to depreciate and removing the hedge when the currencies held are expected to appreciate. In essence, the objective is to protect against downside risk while benefiting from the favorable movement of exchange rates.

For example, consider a treasurer of a U.S. firm who plans to invest in British money market securities. If the British pound begins to decline and is expected to depreciate further, the treasurer may sell pounds forward in the foreign exchange market for a future date at which the pound's value is expected to turn upward. If the treasurer is very confident that the pound will depreciate in the short run, most or all of the position will be hedged.

Now assume that the pound begins to appreciate before the forward contract date. Since the contract will preclude the potential benefits from the pound's appreciation, the treasurer may buy pounds forward to offset the existing forward sale contracts. In this way, the treasurer has removed the existing hedge. Of course, if the forward rate at the time of the forward purchase exceeds the forward rate that existed at the time of the forward sale, a cost is incurred to offset the hedge.

The treasurer may decide to remove only part of the hedge, offsetting only some of the existing forward sales with forward purchases. With this approach, the position is still partially protected if the pound depreciates further. Overall, the performance from using dynamic hedging is dependent on the treasurer's ability to forecast the direction of exchange rate movements.

## SUMMARY

- Each subsidiary of an MNC can assess its cash flows by estimating expected cash inflows and outflows to forecast its balance in each currency. This will indicate whether it will have excess cash to invest or a cash deficiency. The MNC's parent may prefer to use a centralized perspective, which consolidates the cash flow positions of all subsidiaries. In this way, funds can be transferred among subsidiaries to accommodate cash deficiencies at particular subsidiaries.
- The common techniques to optimize cash flows are (1) accelerating cash inflows, (2) minimizing currency conversion costs, (3) managing blocked funds, and (4) implementing intersubsidiary cash transfers.
- The efforts by MNCs to optimize cash flows are complicated by (1) company-related characteristics, (2) government restrictions, and (3) characteristics of banking systems.

■ MNCs can possibly achieve higher returns when investing excess cash in foreign currencies that either have relatively high interest rates or may appreciate over the investment period. If the foreign currency

depreciates over the investment period, however, this may offset any interest rate advantage of that currency.

## POINT COUNTER-POINT

### Should Interest Rate Parity Prevent MNCs from Investing in Foreign Currencies?

**Point** Yes. Currencies with high interest rates have large forward discounts according to interest rate parity. To the extent that the forward rate is a reasonable forecast of the future spot rate, investing in a foreign country is not feasible.

**Counter-Point** No. Even if interest rate parity holds, MNCs should still consider investing in a for-

ign currency. The key is their expectations of the future spot rate. If their expectations of the future spot rate are higher than the forward rate, the MNCs would benefit from investing in a foreign currency.

**Who Is Correct?** Use the Internet to learn more about this issue. Which argument do you support? Offer your own opinion on this issue.

## SELF TEST

Answers are provided in Appendix A at the back of the text.

- Country X typically has a high interest rate, and its currency is expected to strengthen against the dollar over time. Country Y typically has a low interest rate, and its currency is expected to weaken against the dollar over time. Both countries have imposed a “blocked funds” restriction over the next 4 years on the two subsidiaries owned by a U.S. firm. Which subsidiary will be more adversely affected by the blocked funds, assuming that there are limited opportunities for corporate expansion in both countries?
- Assume that the Australian one-year interest rate is 14 percent. Also assume that the Australian dollar is expected to appreciate by 8 percent over the next year against the U.S. dollar. What is the expected effective yield on a one-year deposit in Australia by a U.S. firm?
- Assume that the one-year forward rate is used as the forecast of the future spot rate. The Malaysian ringgit’s spot rate is \$.20, while its one-year forward rate is \$.19. The Malaysian one-year interest rate is 11 percent. What is the expected effective yield on a one-year deposit in Malaysia by a U.S. firm?
- Assume that the Venezuelan one-year interest rate is 90 percent, while the U.S. one-year interest rate is 6 percent. Determine the break-even value for the percentage change in Venezuela’s currency (the bolivar) that would cause the effective yield to be the same for a one-year deposit in Venezuela as for a one-year deposit in the United States.
- Assume interest rate parity exists. Would U.S. firms possibly consider placing deposits in countries with high interest rates? Explain.

## QUESTIONS AND APPLICATIONS

- International Cash Management.** Discuss the general functions involved in international cash management. Explain how the MNC’s optimization of cash flow can distort the profits of each subsidiary.
- Netting.** Explain the benefits of netting. How can a centralized cash management system be beneficial to the MNC?

3. **Leading and Lagging.** How can an MNC implement leading and lagging techniques to help subsidiaries in need of funds?
4. **International Fisher Effect.** If a U.S. firm believes that the international Fisher effect holds, what are the implications regarding a strategy of continually attempting to generate high returns from investing in currencies with high interest rates?
5. **Investing Strategy.** Tallahassee Co. has \$2 million in excess cash that it has invested in Mexico at an annual interest rate of 60 percent. The U.S. interest rate is 9 percent. By how much would the Mexican peso have to depreciate to cause such a strategy to backfire?
6. **Investing Strategy.** Why would a U.S. firm consider investing short-term funds in euros even when it does not have any future cash outflows in euros?
7. **Covered Interest Arbitrage.** Evansville, Inc., has \$2 million in cash available for 90 days. It is considering the use of covered interest arbitrage since the euro's 90-day interest rate is higher than the U.S. interest rate. What will determine whether this strategy is feasible?
8. **Effective Yield.** Fort Collins, Inc., has \$1 million in cash available for 30 days. It can earn 1 percent on a 30-day investment in the United States. Alternatively, if it converts the dollars to Mexican pesos, it can earn 1½ percent on a Mexican deposit. The spot rate of the Mexican peso is \$.12. The spot rate 30 days from now is expected to be \$.10. Should Fort Collins invest its cash in the United States or in Mexico? Substantiate your answer.
9. **Effective Yield.** Rollins, Inc., has \$3 million in cash available for 180 days. It can earn 7 percent on a U.S. Treasury bill or 9 percent on a British Treasury bill. The British investment does require conversion of dollars to British pounds. Assume that interest rate parity holds and that Rollins believes the 180-day forward rate is a reliable predictor of the spot rate to be realized 180 days from now. Would the British investment provide an effective yield that is below, above, or equal to the yield on the U.S. investment? Explain your answer.
10. **Effective Yield.** Repeat question 9, but this time assume that Rollins, Inc., expects the 180-day forward rate of the pound to substantially overestimate the spot rate to be realized in 180 days.
11. **Effective Yield.** Repeat question 9, but this time assume that Rollins, Inc., expects the 180-day forward rate of the pound to substantially underestimate the spot rate to be realized in 180 days.
12. **Effective Yield.** Assume that the one-year U.S. interest rate is 10 percent and the one-year Canadian interest rate is 13 percent. If a U.S. firm invests its funds in Canada, by what percentage will the Canadian dollar have to depreciate to make its effective yield the same as the U.S. interest rate from the U.S. firm's perspective?
13. **Investing in a Currency Portfolio.** Why would a firm consider investing in a portfolio of foreign currencies instead of just a single foreign currency?
14. **Interest Rate Parity.** Dallas Co. has determined that the interest rate on euros is 16 percent while the U.S. interest rate is 11 percent for one-year Treasury bills. The one-year forward rate of the euro has a discount of 7 percent. Does interest rate parity exist? Can Dallas achieve a higher effective yield by using covered interest arbitrage than by investing in U.S. Treasury bills? Explain.
15. **Diversified Investments.** Hofstra, Inc., has no European business and has cash invested in six European countries, each of which uses the euro as its local currency. Are Hofstra's short-term investments well diversified and subject to a low degree of exchange rate risk? Explain.
16. **Investing Strategy.** Should McNeese Co. consider investing funds in Latin American countries where it may expand facilities? The interest rates are high, and the proceeds from the investments could be used to help support the expansion. When would this strategy backfire?
17. **Impact of September 11.** Palos Co. commonly invests some of its excess dollars in foreign government short-term securities in order to earn a higher short-term interest rate on its cash. Describe how the potential return and risk of this strategy may have changed after the September 11, 2001, terrorist attack on the United States.

### Advanced Questions

18. **Investing in a Portfolio.** Pittsburgh Co. plans to invest its excess cash in Mexican pesos for one year. The one-year Mexican interest rate is 19 percent. The probability of the peso's percentage change in value during the next year is shown below:

Possible Rate of Change in the Mexican Peso over the Life of the Investment	Probability of Occurrence
-15%	20%
-4	50
0	30

What is the expected value of the effective yield based on this information? Given that the U.S. interest rate for one year is 7 percent, what is the probability that a one-year investment in pesos

will generate a lower effective yield than could be generated if Pittsburgh Co. simply invested domestically?

19. **Effective Yield of Portfolio.** Ithaca Co. considers placing 30 percent of its excess funds in a one-year Singapore dollar deposit and the remaining 70 percent of its funds in a one-year Canadian dollar deposit. The Singapore one-year interest rate is 15 percent, while the Canadian one-year interest rate is 13 percent. The possible percentage changes in the two currencies for the next year are forecasted as follows:

Currency	Possible Percentage Change in the Spot Rate over the Investment Horizon	Probability of That Change in the Spot Rate Occurring
Singapore dollar	-2%	20%
Singapore dollar	1	60
Singapore dollar	3	20
Canadian dollar	1	50
Canadian dollar	4	40
Canadian dollar	6	10

Given this information, determine the possible effective yields of the portfolio and the probability associated with each possible portfolio yield. Given a one-year U.S. interest rate of 8 percent, what is the probability that the portfolio's effective yield will be lower than the yield achieved from investing in the United States? (See Appendix 21.)

### Discussion in the Boardroom

This exercise can be found in Appendix E at the back of this textbook.

### Running Your Own MNC

This exercise can be found on the Xtra! website at <http://maduraxtra.swlearning.com>.

## BLADES, INC. CASE

### International Cash Management

Recall from Chapter 20 that the new Thailand subsidiary of Blades, Inc., received a one-time order from a customer for 120,000 pairs of "Speedos," Blades' primary product. There is a 6-month lag between the time when Blades needs funds to purchase material for the production of the Speedos and the time when it will be paid by the customer. Ben Holt, Blades' chief financial officer (CFO), has decided to finance the cost by borrowing Thai baht at an interest rate of 6 percent over a 6-month period. Since the average cost per pair of Speedos is approximately 3,500 baht, Blades will borrow 420 million baht. The payment for the order will be used to repay the loan's principal and interest.

Ben Holt is currently planning to instruct the Thai subsidiary to remit any remaining baht-denominated cash flows back to the United States. Just before Blades receives payment for the large order, however, Holt notices that interest rates in Thailand have increased substantially. Blades would be able to invest funds in Thailand at a relatively high interest rate compared to the U.S. rate. Specifically, Blades could invest the remain-

ing baht-denominated funds for one year in Thailand at an interest rate of 15 percent.

If the funds are remitted back to the U.S. parent, the excess dollar volume resulting from the conversion of baht will either be used to support the U.S. production of Speedos, if needed, or be invested in the United States. Specifically, the funds will be used to cover cost of goods sold in the U.S. manufacturing plant, located in Omaha, Nebraska. Since Blades used a significant amount of cash to finance the initial investment to build the plant in Thailand and purchase the necessary equipment, its U.S. operations are strapped for cash. Consequently, if the subsidiary's earnings are not remitted back to the United States, Blades will have to borrow funds at an interest rate of 10 percent to support its U.S. operations. Any funds remitted by the subsidiary that are not used to support U.S. operations will be invested in the United States at an interest rate of 8 percent. Holt estimates that approximately 60 percent of the remitted funds will be needed to support U.S. operations and that the remaining 40 percent will be invested in the United States.

Consequently, Holt must choose between two alternative plans. First, he could instruct the Thai subsidiary to repay the baht loan (with interest) and invest any remaining funds in Thailand at an interest rate of 15 percent. Second, he could instruct the Thai subsidiary to repay the baht loan and remit any remaining funds back to the United States, where 60 percent of the funds would be used to support U.S. operations and 40 percent would be invested at an interest rate of 8 percent. Assume no income or withholding taxes on the earnings generated in Thailand.

Ben Holt has contacted you, a financial analyst at Blades, Inc., to help him analyze these two options. Holt has informed you that the current spot rate of the Thai baht is .0225 and that the baht is expected to depreciate by 5 percent over the coming year. He has provided you with the following list of questions he would like you to answer.

1. There is a tradeoff between the higher interest rates in Thailand and the delayed conversion of baht into dollars. What does this mean?
2. If the net baht received from the Thailand subsidiary are invested in Thailand, how will U.S. operations be affected?
3. Construct a spreadsheet that compares the cash flows resulting from the two plans. Under the first plan, net baht-denominated cash flows (received today) will be invested in Thailand at 15 percent for a one-year period, after which the baht will be converted to dollars. Under the second plan, net baht-denominated cash flows are converted to dollars immediately and 60 percent of the funds will be used to support U.S. operations, while 40 percent are invested in the United States for one year at 8 percent. Which plan is superior given the expectation of the baht's value in one year?

## SMALL BUSINESS DILEMMA

### Cash Management at the Sports Exports Company

Ever since Jim Logan began his Sports Exports Company, he has been concerned about his exposure to exchange rate risk. The firm produces footballs and exports them to a distributor in the United Kingdom, with the exports being denominated in British pounds. Jim has just entered into a joint venture in the United Kingdom in which a British firm produces sporting goods for Jim's firm and sells the goods to the British distributor. The distributor pays pounds to Jim's firm for these products. Jim recently borrowed pounds to finance this venture, which created some cash outflows (interest payments) that partially offset his cash inflows in pounds. The interest paid on this loan is equal to the British Treasury bill rate plus 3 percentage points. His original business of exporting has been very successful recently, which has caused him to have revenue (in

pounds) that will be retained as excess cash. Jim must decide whether to pay off part of the existing British loan, invest the cash in the U.S. Treasury bills, or invest the cash in British Treasury bills.

1. If Jim invests the excess cash in U.S. Treasury bills, would this reduce the firm's exposure to exchange rate risk?
2. Jim decided to use the excess cash to pay off the British loan. However, a friend advised him to invest the cash in British Treasury bills, stating that "the loan provides an offset to the pound receivables, so you would be better off investing in British Treasury bills than paying off the loan." Is Jim's friend correct? What should Jim do?

## INTERNET/EXCEL EXERCISES

The Bloomberg website provides interest rate data for many different foreign currencies over various maturities. Its address is <http://www.bloomberg.com>.

1. Go to the Markets section and then to Rates and Bonds, and you can click on a country to review its interest rates. Review the one-year yields of currencies. Assume that you could invest at the quoted yield for each currency. Which currency would offer you the highest quoted yield?
2. As a cash manager of an MNC based in the United States that has extra dollars that can be invested for one year, where would you invest funds for the next year? Explain.

3. If you were working for a foreign subsidiary based in Japan and could invest Japanese yen for one year until the yen are needed to support local operations, where would you invest the yen? Explain.
4. Assume that at the beginning of each of the last 7 years, you had the choice of a one-year investment in U.S. dollars or Australian dollars. Your business is in the United States, but you considered investing in Australian dollars because the Australian dollar annual interest rate was 9 percent versus a dollar annual interest rate of 6 percent. Go to <http://www.oanda.com/convert/fxhistory>. Obtain the annual percentage change in the Australian dollar's exchange rate for each of the last 7 years. Determine the effective yield from investing in Australian dollars in each of the last 7 years. Based on your results, was the annual effective yield higher for the Australian dollar or U.S. dollar on average over the 7 years? In how many of the years would you have been better off investing in Australian dollars rather than U.S. dollars? Explain.