Most often, when news breaks about a firm’s cash position, it’s because the company is running low. That wasn’t the case for oil companies in 2001. The Royal Dutch/Shell Group, for example, was pumping out $1.5 million in profit per hour and had about $12 billion in the bank. ExxonMobil was sitting on $11 billion, and the industry as a whole had a $40 billion (and growing fast) stockpile according to analysts. These companies certainly had ample cash reserves; in fact, the word enormous might be more appropriate. Why would these firms hold such large quantities of cash? We examine cash management in this chapter to find out.

This chapter is about how firms manage cash. The basic objective in cash management is to keep the investment in cash as low as possible while still keeping the firm operating efficiently and effectively. This goal usually reduces to the dictum “Collect early and pay late.” Accordingly, we discuss ways of accelerating collections and managing disbursements.

In addition, firms must invest temporarily idle cash in short-term marketable securities. As we discuss in various places, these securities can be bought and sold in the financial markets. As a group, they have very little default risk, and most are highly marketable. There are different types of these so-called money market securities, and we discuss a few of the most important ones.

REASONS FOR HOLDING CASH

John Maynard Keynes, in his great work *The General Theory of Employment, Interest, and Money*, identified three motives for liquidity: the speculative motive, the precautionary motive, and the transaction motive. We discuss these next.

The Speculative and Precautionary Motives

The speculative motive is the need to hold cash in order to be able to take advantage of, for example, bargain purchases that might arise, attractive interest rates, and (in the case of international firms) favorable exchange rate fluctuations.
For most firms, reserve borrowing ability and marketable securities can be used to satisfy speculative motives. Thus, there might be a speculative motive for maintaining liquidity, but not necessarily for holding cash per se. Think of it this way: if you have a credit card with a very large credit limit, then you can probably take advantage of any unusual bargains that come along without carrying any cash.

This is also true, to a lesser extent, for precautionary motives. The precautionary motive is the need for a safety supply to act as a financial reserve. Once again, there probably is a precautionary motive for maintaining liquidity. However, given that the value of money market instruments is relatively certain and that instruments such as T-bills are extremely liquid, there is no real need to hold substantial amounts of cash for precautionary purposes.

The Transaction Motive
Cash is needed to satisfy the transaction motive, the need to have cash on hand to pay bills. Transaction-related needs come from the normal disbursement and collection activities of the firm. The disbursement of cash includes the payment of wages and salaries, trade debts, taxes, and dividends.

Cash is collected from product sales, the selling of assets, and new financing. The cash inflows (collections) and outflows (disbursements) are not perfectly synchronized, and some level of cash holdings is necessary to serve as a buffer.

As electronic funds transfers and other high-speed, “paperless” payment mechanisms continue to develop, even the transaction demand for cash may all but disappear. Even if it does, however, there will still be a demand for liquidity and a need to manage it efficiently.

Compensating Balances
Compensating balances are another reason to hold cash. As we discussed in the previous chapter, cash balances are kept at commercial banks to compensate for banking services the firm receives. A minimum compensating balance requirement may impose a lower limit on the level of cash a firm holds.

Costs of Holding Cash
When a firm holds cash in excess of some necessary minimum, it incurs an opportunity cost. The opportunity cost of excess cash (held in currency or bank deposits) is the interest income that could be earned in the next best use, such as investment in marketable securities.

Given the opportunity cost of holding cash, why would a firm hold cash in excess of its compensating balance requirements? The answer is that a cash balance must be maintained to provide the liquidity necessary for transaction needs—paying bills. If the firm maintains too small a cash balance, it may run out of cash. If this happens, the firm may have to raise cash on a short-term basis. This could involve, for example, selling marketable securities or borrowing.

Activities such as selling marketable securities and borrowing involve various costs. As we’ve discussed, holding cash has an opportunity cost. To determine the appropriate cash balance, the firm must weigh the benefits of holding cash against these costs. We discuss this subject in more detail in the sections that follow.
Cash Management versus Liquidity Management

Before we move on, we should note that it is important to distinguish between true cash management and a more general subject, liquidity management. The distinction is a source of confusion because the word *cash* is used in practice in two different ways. First of all, it has its literal meaning, actual cash on hand. However, financial managers frequently use the word to describe a firm’s holdings of cash along with its marketable securities, and marketable securities are sometimes called cash equivalents or near-cash. In our discussion of oil companies’ cash positions at the beginning of the chapter, for example, what was actually being described was their total cash and cash equivalents.

The distinction between liquidity management and cash management is straightforward. Liquidity management concerns the optimal quantity of liquid assets a firm should have on hand, and it is one particular aspect of the current asset management policies we discussed in our previous chapter. Cash management is much more closely related to optimizing mechanisms for collecting and disbursing cash, and it is this subject that we primarily focus on in this chapter.

**Concept Questions**

20.1a. What is the transaction motive, and how does it lead firms to hold cash?
20.1b. What is the cost to the firm of holding excess cash?

**Understanding Float**

As you no doubt know, the amount of money you have according to your checkbook can be very different from the amount of money that your bank thinks you have. The reason is that some of the checks you have written haven’t yet been presented to the bank for payment. The same thing is true for a business. The cash balance that a firm shows on its books is called the firm’s *book, or ledger, balance*. The balance shown in its bank account as available to spend is called its *available, or collected, balance*. The difference between the available balance and the ledger balance is called the *float*, and it represents the net effect of checks in the process of *clearing* (moving through the banking system).

**Disbursement Float**

Checks written by a firm generate *disbursement float*, causing a decrease in the firm’s book balance but no change in its available balance. For example, suppose General Mechanics, Inc. (GMI), currently has $100,000 on deposit with its bank. On June 8, it buys some raw materials and pays with a check for $100,000. The company’s book balance is immediately reduced by $100,000 as a result.

GMI’s bank, however, will not find out about this check until it is presented to GMI’s bank for payment on, say, June 14. Until the check is presented, the firm’s available balance is greater than its book balance by $100,000. In other words, before June 8, GMI has a zero float:

\[
\text{Float} = \text{Firm’s available balance} - \text{Firm’s book balance} \\
= 100,000 - 100,000 \\
= 0
\]
GMI’s position from June 8 to June 14 is:

\[
\text{Disbursement float} = \text{Firm’s available balance} - \text{Firm’s book balance} \\
= \$100,000 - 0 \\
= \$100,000
\]

During this period of time that the check is clearing, GMI has a balance with the bank of $100,000. It can obtain the benefit of this cash while the check is clearing. For example, the available balance could be temporarily invested in marketable securities and thus earn some interest. We will return to this subject a little later.

**Collection Float and Net Float**

Checks received by the firm create *collection float*. Collection float increases book balances but does not immediately change available balances. For example, suppose GMI receives a check from a customer for $100,000 on October 8. Assume, as before, that the company has $100,000 deposited at its bank and a zero float. It deposits the check and increases its book balance by $100,000 to $200,000. However, the additional cash is not available to GMI until its bank has presented the check to the customer’s bank and received $100,000. This will occur on, say, October 14. In the meantime, the cash position at GMI will reflect a collection float of $100,000. We can summarize these events. Before October 8, GMI’s position is:

\[
\text{Float} = \text{Firm’s available balance} - \text{Firm’s book balance} \\
= \$100,000 - 100,000 \\
= \$0
\]

GMI’s position from October 8 to October 14 is:

\[
\text{Collection float} = \text{Firm’s available balance} - \text{Firm’s book balance} \\
= \$100,000 - 200,000 \\
= -\$100,000
\]

In general, a firm’s payment (disbursement) activities generate disbursement float, and its collection activities generate collection float. The net effect, that is, the sum of the total collection and disbursement floats, is the net float. The net float at a point in time is simply the overall difference between the firm’s available balance and its book balance. If the net float is positive, then the firm’s disbursement float exceeds its collection float, and its available balance exceeds its book balance. If the available balance is less than the book balance, then the firm has a net collection float.

A firm should be concerned with its net float and available balance more than with its book balance. If a financial manager knows that a check written by the company will not clear for several days, that manager will be able to keep a lower cash balance at the bank than might be possible otherwise. This can generate a great deal of money.

For example, take the case of ExxonMobil. The average daily sales of ExxonMobil are about $650 million. If ExxonMobil’s collections could be speeded up by a single day, then ExxonMobil could free up $650 million for investing. At a relatively modest .015 percent daily rate, the interest earned would be on the order of $97,500 per day.

**Staying Afloat**

Suppose you have $5,000 on deposit. One day, you write a check for $1,000 to pay for books, and you deposit $2,000. What are your disbursement, collection, and net floats?
Float Management

Float management involves controlling the collection and disbursement of cash. The objective in cash collection is to speed up collections and reduce the lag between the time customers pay their bills and the time the cash becomes available. The objective in cash disbursement is to control payments and minimize the firm’s costs associated with making payments.

Total collection or disbursement times can be broken down into three parts: mailing time, processing delay, and availability delay:

1. **Mailing time** is the part of the collection and disbursement process during which checks are trapped in the postal system.
2. **Processing delay** is the time it takes the receiver of a check to process the payment and deposit it in a bank for collection.
3. **Availability delay** refers to the time required to clear a check through the banking system.

Speeding up collections involves reducing one or more of these components. Slowing up disbursements involves increasing one of them. We will describe some procedures for managing collection and disbursement times later. First, we need to discuss how float is measured.

### Measuring Float

The size of the float depends on both the dollars and the time delay involved. For example, suppose you mail a check for $500 to another state each month. It takes five days in the mail for the check to reach its destination (the mailing time) and one day for the recipient to get over to the bank (the processing delay). The recipient’s bank holds out-of-state checks for three days (availability delay). The total delay is $5 + 1 + 3 = 9$ days.

In this case, what is your average daily disbursement float? There are two equivalent ways of calculating the answer. First, you have a $500 float for nine days, so we say that the total float is $9 \times $500 = $4,500. Assuming 30 days in the month, the average daily float is $4,500/30 = $150.

Alternatively, your disbursement float is $500 for 9 days out of the month and zero the other 21 days (again assuming 30 days in a month). Your average daily float is thus:

\[
\text{Average daily float} = \frac{(9 \times $500 + 21 \times 0)}{30} = \frac{9}{30} \times $500 + \frac{21}{30} \times 0
\]
This means that, on an average day, your book balance is $150 less than your available balance, representing a $150 average disbursement float.

Things are only a little more complicated when there are multiple disbursements or receipts. To illustrate, suppose Concepts, Inc., receives two items each month as follows:

<table>
<thead>
<tr>
<th>Processing and availability delay</th>
<th>Total float</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1: $5,000,000 × 9</td>
<td>$45,000,000</td>
</tr>
<tr>
<td>Item 2: $3,000,000 × 5</td>
<td>$15,000,000</td>
</tr>
<tr>
<td>Total $8,000,000</td>
<td>$60,000,000</td>
</tr>
</tbody>
</table>

The average daily float is equal to:

\[
\text{Average daily float} = \frac{\text{Total float}}{\text{Total days}}
\]

\[= \frac{\$60 \text{ million}}{30} = \$2 \text{ million}
\]

So, on an average day, there is $2 million that is uncollected and not available.

Another way to see this is to calculate the average daily receipts and multiply by the weighted average delay. Average daily receipts are:

\[
\text{Average daily receipts} = \frac{\text{Total receipts}}{\text{Total days}}
\]

\[= \frac{\$8 \text{ million}}{30} = \$266,666.67
\]

Of the $8 million total receipts, $5 million, or \(\frac{5}{8}\) of the total, is delayed for nine days. The other \(\frac{3}{8}\) is delayed for five days. The weighted average delay is thus:

\[
\text{Weighted average delay} = (\frac{5}{8}) \times 9 \text{ days} + (\frac{3}{8}) \times 5 \text{ days}
\]

\[= 5.625 + 1.875 = 7.50 \text{ days}
\]

The average daily float is thus:

\[
\text{Average daily float} = \text{Average daily receipts} \times \text{Weighted average delay}
\]

\[= \$266,666.67 \times 7.50 \text{ days} = \$2 \text{ million}
\]

**Some Details** In measuring float, there is an important difference to note between collection and disbursement float. We defined float as the difference between the firm’s available cash balance and its book balance. With a disbursement, the firm’s book balance goes down when the check is mailed, so the mailing time is an important component in disbursement float. However, with a collection, the firm’s book balance isn’t increased until the check is received, so mailing time is not a component of collection float.

This doesn’t mean that mailing time is not important. The point is that when collection float is calculated, mailing time should not be considered. As we will discuss, when total collection time is considered, the mailing time is a crucial component.

Also, when we talk about availability delay, how long it actually takes a check to clear isn’t really crucial. What matters is how long we must wait before the bank grants availability, that is, use of the funds. Banks actually have availability schedules that are used to determine how long a check is held based on time of deposit and other factors.
Beyond this, availability delay can be a matter of negotiation between the bank and a customer. In a similar vein, for outgoing checks, what matters is the date our account is debited, not when the recipient is granted availability.

**Cost of the Float**  
The basic cost of collection float to the firm is simply the opportunity cost of not being able to use the cash. At a minimum, the firm could earn interest on the cash if it were available for investing.

Suppose the Lambo Corporation has average daily receipts of $1,000 and a weighted average delay of three days. The average daily float is thus $3,000 = $3,000. This means that, on a typical day, there is $3,000 that is not earning interest. Suppose Lambo could eliminate the float entirely. What would be the benefit? If it costs $2,000 to eliminate the float, what is the NPV of doing so?

Figure 20.1 illustrates the situation for Lambo. Suppose Lambo starts with a zero float. On a given day, Day 1, Lambo receives and deposits a check for $1,000. The cash will become available three days later on Day 4. At the end of the day on Day 1, the book balance is $1,000 more than the available balance, so the float is $1,000. On Day 2, the firm receives and deposits another check. It will collect three days later on Day 5. Now, at the end of Day 2, there are two uncollected checks, and the books show a $2,000 balance. The bank, however, still shows a zero available balance; so the float is $2,000. The same sequence occurs on Day 3, and the float rises to a total of $3,000.

On Day 4, Lambo again receives and deposits a check for $1,000. However, it also collects $1,000 from the Day 1 check. The change in book balance and the change in available balance are identical, +$1,000; so the float stays at $3,000. The same thing happens every day after Day 4; the float therefore stays at $3,000 forever.\(^1\)

Figure 20.2 illustrates what happens if the float is eliminated entirely on some day \(t\) in the future. After the float is eliminated, daily receipts are still $1,000. The firm collects the same day because the float is eliminated, so daily collections are also still $1,000. As Figure 20.2 illustrates, the only change occurs the first day. On that day, as usual, Lambo collects $1,000 from the sale made three days before. Because the float is gone, it also collects on the sales made two days before, one day before, and that same day, for an additional $3,000. Total collections on Day \(t\) are thus $4,000 instead of $1,000.

What we see is that Lambo generates an extra $3,000 on Day \(t\) by eliminating the float. On every subsequent day, Lambo receives $1,000 in cash just as it did before the float was eliminated. Thus, the only change in the firm’s cash flows from eliminating \(^1\)This permanent float that exists forever is sometimes called the *steady-state float.*
the float is this extra $3,000 that comes in immediately. No other cash flows are affected, so Lambo is $3,000 richer.

In other words, the PV of eliminating the float is simply equal to the total float. Lambo could pay this amount out as a dividend, invest it in interest-bearing assets, or do anything else with it. If it costs $2,000 to eliminate the float, then the NPV is $3,000 – $2,000 = $1,000; so Lambo should do it.

**Reducing the Float: Part I**

Instead of eliminating the float, suppose Lambo can reduce it to one day. What is the maximum Lambo should be willing to pay for this?

If Lambo can reduce the float from three days to one day, then the amount of the float will fall from $3,000 to $1,000. From our discussion immediately preceding, we see right away that the PV of doing this is just equal to the $2,000 float reduction. Lambo should thus be willing to pay up to $2,000.

**Reducing the Float: Part II**

Look back at Example 20.2. A large bank is willing to provide the float reduction service for $175 per year, payable at the end of each year. The relevant discount rate is 8 percent. Should Lambo hire the bank? What is the NPV of the investment? How do you interpret this discount rate? What is the most per year that Lambo should be willing to pay?

The PV to Lambo is still $2,000. The $175 would have to be paid out every year forever to maintain the float reduction; so the cost is perpetual, and its PV is $175/.08 = $2,187.50. The NPV is $2,000 – $2,187.50 = −$187.50; therefore, the service is not a good deal.

Ignoring the possibility of bounced checks, the discount rate here corresponds most closely to the cost of short-term borrowing. The reason is that Lambo could borrow $1,000 from the bank every time a check was deposited and pay it back three days later. The cost would be the interest that Lambo would have to pay.

The most Lambo would be willing to pay is whatever charge results in an NPV of zero. This zero NPV occurs when the $2,000 benefit exactly equals the PV of the costs, that is, when $2,000 = C/.08, where C is the annual cost. Solving for C, we find that C = .08 × $2,000 = $160 per year.

**Ethical and Legal Questions**

The cash manager must work with collected bank cash balances and not the firm’s book balance (which reflects checks that have been deposited but not collected). If this is not done, a cash manager could be drawing on un-
collected cash as a source of funds for short-term investing. Most banks charge a penalty rate for the use of uncollected funds. However, banks may not have good enough accounting and control procedures to be fully aware of the use of uncollected funds. This raises some ethical and legal questions for the firm.

For example, in May 1985, Robert Fomon, chairman of E. F. Hutton (a large investment bank), pleaded guilty to 2,000 charges of mail and wire fraud in connection with a scheme the firm had operated from 1980 to 1982. E. F. Hutton employees had written checks totaling hundreds of millions of dollars against uncollected cash. The proceeds had then been invested in short-term money market assets. This type of systematic overdrafting of accounts (or check kiting, as it is sometimes called) is neither legal nor ethical and is apparently not a widespread practice among corporations. Also, the particular inefficiencies in the banking system that Hutton was exploiting have been largely eliminated.

For its part, E. F. Hutton paid a $2 million fine, reimbursed the government (the U.S. Department of Justice) $750,000, and reserved an additional $8 million for restitution to defrauded banks. We should note that the key issue in the case against Hutton was not its float management per se, but, rather, its practice of writing checks for no economic reason other than to exploit float.

Despite the stiff penalties for check kiting, the practice apparently continues to go on. For example, in April 2001, a contractor near Chicago was sentenced to more than three years in prison and ordered to pay restitution of $1.1 million for engaging in a 15-month check-kiting scheme that cost two Chicago-area banks more than $2.4 million.

**Electronic Data Interchange: The End of Float?**

*Electronic data interchange* (EDI) is a general term that refers to the growing practice of direct, electronic information exchange between all types of businesses. One important use of EDI, often called financial EDI, or FEDI, is to electronically transfer financial information and funds between parties, thereby eliminating paper invoices, paper checks, mailing, and handling. For example, it is now possible to arrange to have your checking account directly debited each month to pay many types of bills, and corporations now routinely directly deposit paychecks into employee accounts. More generally, EDI allows a seller to send a bill electronically to a buyer, thereby avoiding the mail. The seller can then authorize payment, which also occurs electronically. Its bank then transfers the funds to the seller’s account at a different bank. The net effect is that the length of time required to initiate and complete a business transaction is shortened considerably, and much of what we normally think of as float is sharply reduced or eliminated. As the use of FEDI increases (which it will), float management will evolve to focus much more on issues surrounding computerized information exchange and funds transfers.

One of the drawbacks of EDI (and FEDI) is that it is expensive and complex to set up. However, with the growth of the Internet, a new form of EDI has emerged, Internet e-commerce. For example, networking giant Cisco Systems books about $11 million in orders each day on its web site from resellers around the world. The CEO of Cisco estimates that the firm saved $1.4 billion in technical support, marketing, distribution, and working capital management costs in 2001 by exploiting the Web. Firms are also linking to critical suppliers and customers via “extranets,” which are business networks that extend a company’s internal network. Because of security concerns and lack of standardization, don’t look for e-commerce and extranets to eliminate the need for EDI anytime soon. In fact, these are complementary systems that will most likely be used in tandem as the future unfolds.
CASH COLLECTION AND CONCENTRATION

From our previous discussion, we know that collection delays work against the firm. All other things being the same, then, a firm will adopt procedures to speed up collections and thereby decrease collection times. In addition, even after cash is collected, firms need procedures to funnel, or concentrate, that cash where it can be best used. We discuss some common collection and concentration procedures next.

Components of Collection Time

Based on our previous discussion, we can depict the basic parts of the cash collection process as follows: the total time in this process is made up of mailing time, check-processing delay, and the bank’s availability delay.

The amount of time that cash spends in each part of the cash collection process depends on where the firm’s customers and banks are located and how efficient the firm is in collecting cash.

Cash Collection

How a firm collects from its customers depends in large part on the nature of the business. The simplest case would be a business such as a restaurant chain. Most of its customers will pay with cash, check, or credit card at the point of sale (this is called over-the-counter collection), so there is no problem with mailing delay. Normally, the funds will be deposited in a local bank, and the firm will have some means (discussed later) of gaining access to the funds.

When some or all of the payments a company receives are checks that arrive through the mail, all three components of collection time become relevant. The firm may choose to have all the checks mailed to one location, or, more commonly, the firm might have a number of different mail collection points to reduce mailing times. Also, the firm may run its collection operation itself or might hire an outside firm that specializes in cash collection. We discuss these issues in more detail in the following pages.

Other approaches to cash collection exist. One that is becoming more common is the preauthorized payment arrangement. With this arrangement, the payment amounts and
payment dates are fixed in advance. When the agreed-upon date arrives, the amount is automatically transferred from the customer’s bank account to the firm’s bank account, which sharply reduces or even eliminates collection delays. The same approach is used by firms that have on-line terminals, meaning that when a sale is rung up, the money is immediately transferred to the firm’s accounts.

**Lockboxes**

When a firm receives its payments by mail, it must decide where the checks will be mailed and how the checks will be picked up and deposited. Careful selection of the number and locations of collection points can greatly reduce collection times. Many firms use special post office boxes called **lockboxes** to intercept payments and speed cash collection.

Figure 20.3 illustrates a lockbox system. The collection process is started by customers’ mailing their checks to a post office box instead of sending them to the firm. The lockbox is maintained by a local bank. A large corporation may actually maintain more than 20 lockboxes around the country.
In the typical lockbox system, the local bank collects the lockbox checks several times a day. The bank deposits the checks directly to the firm’s account. Details of the operation are recorded (in some computer-usable form) and sent to the firm.

A lockbox system reduces mailing time because checks are received at a nearby post office instead of at corporate headquarters. Lockboxes also reduce the processing time because the corporation doesn’t have to open the envelopes and deposit checks for collection. In all, a bank lockbox system should enable a firm to get its receipts processed, deposited, and cleared faster than if it were to receive checks at its headquarters and deliver them itself to the bank for deposit and clearing.

Recently, some firms, such as Tulsa National Bank, are turning to what are called “electronic lockboxes” as an alternative to traditional lockboxes. In one version of an electronic lockbox, customers use the telephone or the Internet to access their account, say, their credit card account at a bank, review their bill, and authorize payment without paper ever having changed hands on either end of the transaction. Clearly, an electronic lockbox system is far superior to traditional bill payment methods, at least from the biller’s perspective. Look for systems like this to grow in popularity as the Internet evolves.

**Cash Concentration**

As we discussed earlier, a firm will typically have a number of cash collection points, and, as a result, cash collections may end up in many different banks and bank accounts. From here, the firm needs procedures to move the cash into its main accounts. This is called **cash concentration**. By routinely pooling its cash, the firm greatly simplifies its cash management by reducing the number of accounts that must be tracked. Also, by having a larger pool of funds available, a firm may be able to negotiate or otherwise obtain a better rate on any short-term investments.

In setting up a concentration system, firms will typically use one or more concentration banks. A concentration bank pools the funds obtained from local banks within some geographic region. Concentration systems are often used in conjunction with lockbox systems. Figure 20.4 illustrates how an integrated cash collection and cash concentration system might look. As Figure 20.4 illustrates, a key part of the cash collection and concentration process is the transfer of funds to the concentration bank. There are several options available for accomplishing this transfer. The cheapest is a depositary transfer check (DTC), which is a preprinted check that usually needs no signature and is valid only for transferring funds between specific accounts within the same firm. The money becomes available one to two days later. **Automated clearinghouse** (ACH) transfers are basically electronic versions of paper checks. These may be more expensive, depending on the circumstances, but the funds are available the next day. The most expensive means of transfer are **wire transfers**, which provide same-day availability. Which approach a firm will choose depends on the number and size of payments. For example, a typical ACH transfer might be $200, whereas a typical wire transfer would be several million dollars. Firms with a large number of collection points and relatively small payments will choose the cheaper route, whereas firms that receive smaller numbers of relatively large payments may choose more expensive procedures.

**Accelerating Collections: An Example**

The decision of whether or not to use a bank cash management service incorporating lockboxes and concentration banks depends on where a firm’s customers are located and the speed of the U.S. postal system. Suppose Atlantic Corporation, located in Philadelphia, is considering a lockbox system. Its collection delay is currently eight days.
Atlantic does business in the southwestern part of the country (New Mexico, Arizona, and California). The proposed lockbox system would be located in Los Angeles and operated by Pacific Bank. Pacific Bank has analyzed Atlantic’s cash-gathering system and has concluded that it can decrease collection time by two days. Specifically, the bank has come up with the following information on the proposed lockbox system:

- Reduction in mailing time = 1.0 day
- Reduction in clearing time = .5 day
- Reduction in firm processing time = .5 day
- Total = 2.0 days

The following is also known:

- Daily interest on Treasury bills = 0.025%
- Average number of daily payments to lockboxes = 2,000
- Average size of payment = $600
The cash flows for the current collection operation are shown in the following cash flow time chart:

![Cash Flow Time Chart 1](image1)

The cash flows for the lockbox collection operation will be as follows:

![Cash Flow Time Chart 2](image2)

The Pacific Bank has agreed to operate this lockbox system for a fee of 25 cents per check processed. Should Atlantic give the go-ahead?

We first need to determine the benefit of the system. The average daily collections from the southwestern region are $1.2 million \((2,000 \times 600)\). The collection time will be decreased by two days, so the lockbox system will increase the collected bank balance by $1.2 million \(\times 2 = 2.4\) million. In other words, the lockbox system releases $2.4 million to the firm by reducing processing, mailing, and clearing time by two days. From our earlier discussion, we know that this $2.4 million is the PV of the proposal.

To calculate the NPV, we need to determine the PV of the costs. There are several different ways to proceed. First, at 2,000 checks per day and $.25 per check, the daily cost is $500. This cost will be incurred every day forever. At an interest rate of .025 percent per day, the PV is therefore $500/.00025 = $2 million. The NPV is thus $2.4 million − 2 million = $400,000, and the system appears to be desirable.

Alternatively, Atlantic could invest the $2.4 million at .025 percent per day. The interest earned would be $2.4 million \(\times .00025 = 600\) per day. The cost of the system is $500 per day; so, running it obviously generates a profit in the amount of $100 per day. The PV of $100 per day forever is $100/.00025 = $400,000, just as we had before.

Finally, and most simply, each check is for $600 and is available two days sooner if the system is used. The interest on $600 for two days is \(2 \times 600 \times .00025 = .30\). The cost is 25 cents per check, so Atlantic makes a nickel (.30 − .25) on every check. With 2,000 checks per day, the profit is \(.05 \times 2,000 \text{ checks} = 100\) per day, as we calculated.