
UNIT TWO : MANAGING CASH AND MARKETABLE SECURITIES

Introduction

Cash is the most important current asset for operations of the business. It is the basic input needed to keep the business running on a continuous basis; it is also the ultimate output expected to be realized by selling the service or product manufactured by the firm. The firm should keep sufficient cash, neither too high nor too low. As shortage will interrupt the firm's manufacturing operations while excessive cash will simply remain idle without contributing anything towards the firm's profitability. Thus, major function of the financial manager is to maintain a sound or optimal cash position.

Motives for holding cash

Cash includes all currency and demand deposit balances held by the firm. It is the lifeblood of a business firm. It is needed to acquire supplies, resources, and other assets used in generating the products and services provided by the firm. It is also needed to pay wages and salaries to employees, taxes to governments, interest and principal to creditors, and dividends to shareholders. More fundamentally, cash is the medium of exchange that allows management to carry on the various activities of the business firm from day-to-day. As long as the firm has the cash to meet these obligations, financial failure is improbable. Without sufficient cash, or at least access to it, bankruptcy becomes a grim possibility.

The basic objectives of cash management are twofold:

- to meet the cash disbursement needs (payment schedule) and;
- to minimize funds committed to cash balances.

Reasons (motives) for holding Cash

Firms hold cash for four primary reasons:

Transactional Balance: One very important reason for holding cash in the form of non-earning currency and deposits is to meet the firm's day-to-day transactions. A firm's cash inflows and outflows are rarely synchronized. Therefore, working cash balances must be maintained to provide

ready access to funds for paying suppliers, employees, and other day-to-day expenses. The amount of cash necessary to meet the transaction needs of a firm may vary according to whether the firm is a manufacture, wholesaler, retailer, or service firm and depending on the industry within which it operates.

Compensating Balance: Another reason for holding cash is to meet the compensating balance requirement of the firm's commercial banks. When banks provide loans and other services to business, they often require that a specified level of balances on deposit be maintained in the bank to help the borrower offset the costs of providing the services. Also, banks may require borrowers to hold deposits at the bank. Both types of deposits are defined as compensating balances.

Precautionary Balance: Cash Inflows and outflows can be predicted reasonably but there may still variations in these estimates due to the uncertain future. For example, a debtor who was to pay after 7 days may inform of his inability to pay; on the other hand a supplier who used to give credit for 15 days may not have the stock to supply or he may not be in a position to give credit at present. In these situations cash receipts will be less than expected and cash payments will be more, as purchases may have to be made for cash instead of credit. Such contingencies may arise in a business. Therefore, firms need to hold some cash in reserve for random, unforeseen fluctuations inflows and outflows. These "safety stocks" are called precautionary balances, and the less predictable the firm's cash flows, the larger such balances should be. However, if the firm has easy access to borrow funds that are, if it can borrow on short notice its need for precautionary balances will be reduced.

Speculative Balance: The speculative balance relates to holding of cash for investing in profitable opportunities as and when they arise. Such opportunities do not come in a regular manner. These opportunities cannot be scientifically predicted but only conjectures can be made about their occurrence. The prices of raw materials may fall temporarily and a firm may like to make purchases at these prices. Such opportunities can be availed if a firm has cash balance with it. These transactions are speculative because prices may not move in a direction in which we assume them to move. Thus, speculative cash balance is held to enable the firm to take advantage of unexpected opportunities that may arise.

The cash accounts of most firms can be thought of as consisting of transactions, compensating, precautionary, and speculative balances. However we cannot calculate the amount needed for each purpose, sum up, and produce a total desired cash balance, because the same money often serves more than one purpose. For example, precautionary and speculative balances can also be used to satisfy compensating balance requirements. Firms do, however, consider all four factors when establishing their target cash balances. The firm's cash balances are also influenced by its *operating and cash conversion cycles*.

Operating & Cash Conversion Cycles

Cash balances are significantly influenced by the firm's production and sales techniques and by its procedures for collecting sales receipts and paying for purchases. These influences can be better understood through analysis of the firm's *operating and cash conversion cycles* that follows immediately. By efficiently managing these cycles, the financial manager can maintain a low level of cash investment and thereby contribute toward maximization of share value of the firm.

The Operating Cycles

The operating cycle (OC) of a firm is defined as the amount of time that elapses from the point when the firm inputs material and labor into the production process (i.e., begins to build inventory) to the point when cash is collected from the sale of the finished product that contains these production inputs. The OC is made up of two components:

- ♦ *The average age of inventory*
- ♦ *The average collection period of sales.*

The firm's operating cycle (OC) is simply the sum of the average age of Inventory (AAI) and the average collection period (ACP):

$$OC = AAI + ACP$$

Average age of inventory (AAI): is the average time required to convert materials into finished goods and then to sell those goods. Note that the average age of inventory is calculated by dividing inventory by sales per day. For example, if average inventories are Br. 2 million and sales are Br.10 million per year, then the AAI is 72 days:

$$\begin{aligned}
 \text{AAI} &= \frac{\text{Average inventory}}{\text{Sales per day}} \\
 &= \frac{\text{Br. 2,000,000}}{\text{Br.10, 000,000/360 days}} \\
 &= 72 \text{ days}
 \end{aligned}$$

Thus, it takes an average of 72 days to convert materials into finished goods and then to sell those goods.

Average collection period (ACP) - is the average length of time required to convert the firm's credit sales (receivables) into cash, that is, to collect cash following sales of goods. The ACP is calculated by dividing accounts receivable by the average credit sales per day. For example, if the average receivables are Br. 666, 667 and credit sales are Br. 10 million, the ACP is 24 days:

$$\begin{aligned}
 \text{ACP} &= \frac{\text{Average Receivables}}{\text{Credit sales/360 days}} \\
 &= \frac{\text{Br. 666,667}}{\text{Br. 10,000,000/360 days}} \\
 &= 24 \text{ days}
 \end{aligned}$$

Thus, it takes on average 24 days after a credit sale to convert the receivables into cash. The concept of the operating cycle can be more clarified by using the following simple example. ABC Company, a producer of shoes, sells all its shoes on credit. The credit terms require customers to pay within 60 days of a sale. The company's calculations reveal that, on average, it takes 85 days to manufacture, warehouse, and ultimately sell a pair shoe. In other words, the firm's average age of inventory (AAI) is 85 days.

Similarly, calculation of the average collection period (ACP) of the company indicates that it is taking the firm, on average, 70 days to collect its accounts receivable. Thus, substituting AAI = 85 days and ACP = 70 days into equation of operating cycle formula, you can find ABC's operating cycle to be 155 days (85 days + 70 days). It is graphically depicted above the time line **in figure 2.1.**

The Cash Conversion Cycle

The cash conversion cycle (CCC) equals the length of time between the firm's actual cash expenditures to pay for productive resources (materials and labor) and its own cash receipts from the sale of products (that is, the length of time between paying for labor and materials and collecting on receivables). The cash conversion cycle thus equals the average length of time a dollar (or a Birr) is tied up in current assets.

A company is usually able to purchase many of its production inputs (i.e., raw materials and labor) on credit. The average length of time between the purchase of raw materials and labor and the payment of cash for them is called average payment period (APP). The APP is calculated by dividing the average accounts payable by the cost of goods sold per year. For example, if a firm's accounts payable average Br. 666,667, and its cost of goods sold are Br. 8 million per year, then its APP is 30 days:

$$\begin{aligned} \text{APP} &= \frac{\text{Average Accounts payable}}{\text{Cost of goods sold}/360 \text{ days}} \\ &= \frac{\text{Br. } 666,667}{\text{Br. } 10,000,000/360 \text{ days}} \\ &= 30 \text{ days} \end{aligned}$$

Thus, the firm on average has 30 days to pay for raw materials and labor. The ability to purchase production inputs on credit allows the firm to partially (or may be even totally) offset the length of time resources are tied up in operating cycle. The total number of days in operating cycle (OC) less the average payment period (APP) for inputs to production represents the cash conversion cycle (CCC):

$$\begin{aligned} \text{CCC} &= \text{OC} - \text{APP} \\ &= \text{AAI} + \text{ACP} - \text{APP} \end{aligned}$$

A continuation of the ABC company example illustrates the cash conversion cycle concept as follows:

The credit terms extended for ABC Company for raw materials purchases currently require payment within 40 days of a purchase, and employees are paid every 15 days. The firm's calculated

weighted average payment period for raw materials and labor is 35 days, which represents the average payment period (APP). Thus, substituting ABC Company's 155-day operating cycle (OC), found in the preceding example, and its 35 - day average payment period (APP) into equation of cash conversion cycle, its cash conversion cycle (CCC) is 120 days:

$$\begin{aligned} \text{CCC} &= \text{OC} - \text{APP} \\ &= 155 \text{ days} - 35 \text{ days} = 120 \text{ days} \end{aligned}$$

ABC Company's cash conversion cycle is graphically depicted below the time line in Figure 1.4. There are 120 days between the cash outflow to pay the accounts payable (on day 35) and the cash inflow from the collection of the accounts receivable (on day 155).

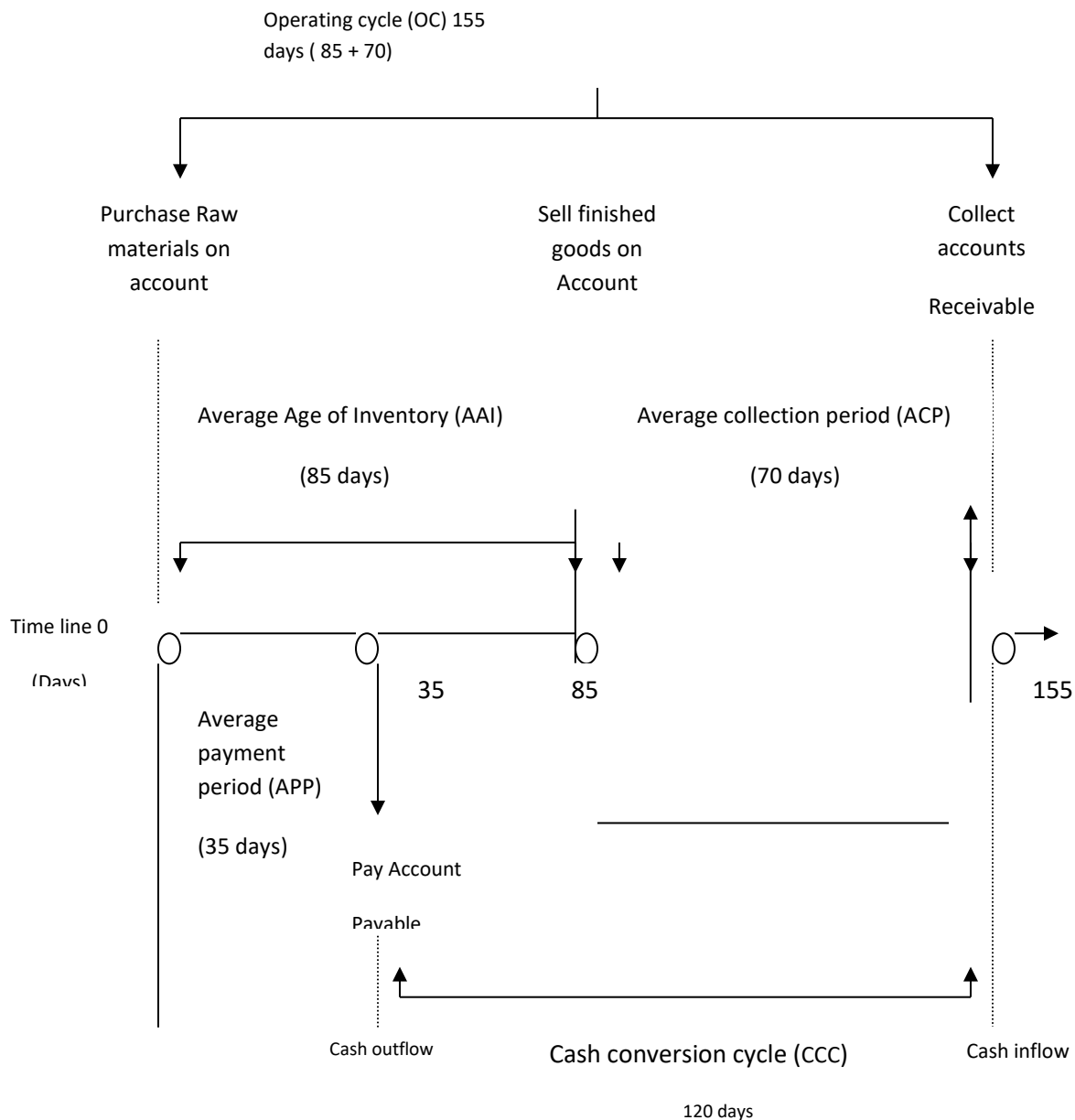


Figure 2. 1 ABC Company's Operating and Conversion cycles

A positive cash conversion cycle, as in the case of ABC Company in the preceding example, means that the firm must use non-spontaneous (i.e., negotiated) forms of financing, such as unsecured short-term loans or secured sources of financing to support the cash conversion cycle. Because during this period there is no fund available from operation, rather money is tied up.

Ideally, a firm would like to have a negative cash conversion cycle. A negative CCC means the average payment period (APP) exceeds the operating cycle (OC). Manufacturing firms usually will not have negative cash conversion cycles unless they extend their average payment periods (APP) to an unreasonable length of time.

Non-manufacturing firms are more likely to have negative cash conversion cycles because they generally carry smaller, faster-moving inventories and often sell their products for cash. As a result, these firms have shorter operating cycles. These shorter operating cycles may be exceeded in length by the firm's average payment periods, thereby, resulting in negative cash conversion cycles.

Strategies in cash management

Cash management has taken an increased importance in recent years for two reasons. First, there was an upward trend in interest rates that increased the opportunity cost of holding cash. Second, technological developments, particularly computerized electronic funds transfer mechanisms changed the way cash is managed. Financial managers, therefore, have developed and refined techniques of cash collection and disbursement to try to optimize the availability of cash and to reduce the interest costs of borrowing from creditors. The firm and its banks perform most cash management activities jointly. Effective cash management encompasses proper management of cash inflows and outflows. There are commonly used cash management techniques. These include:

- ♦ *Cash Flow Synchronization*
- ♦ *Using float*
- ♦ *Speeding up collections*
- ♦ *Slowing down disbursements*
- ♦ *Speed up the check clearing process, etc*

Cash Flow Synchronization

A synchronization of cash flows is a situation in which inflows coincide with outflows, thereby permitting a firm to hold low transactions balances. By improving their forecasts and by arranging things so that cash receipts coincide with cash requirements, firms can reduce their transactions balances to a minimum. This synchronization of cash flows provides cash when it is needed and thus enables firms to reduce cash balance, decrease bank loans, lower interest expenses and increases profits.

The first step in synchronization of cash flows is the preparation of a cash budget that shows projected receipts and disbursements as well as a forecast of any cumulative cash shortages or surpluses expected during a specified period. It is an extremely important cash management tool because it enables a firm to plan ahead for its day-to-day cash needs. Without a cash budget, a firm could suddenly find itself being strapped for cash and scrambling to pay its bills. Lack of cash can lead to loss of purchase discounts, poor credit ratings and many lost opportunities. Many firms prepare a series of cash budgets with the shortest period being budgeted on a daily basis and long-term being on a weekly or monthly basis.

Using Float

A key concepts underlying cash management is float. Float is defined as the difference between the cash balance shown in a firm's checking account (or its book balance) and the balance on the bank's books (or records). There are three types of float:

- ♦ *Collection float*
- ♦ *Processing float*
- ♦ *Disbursement float*

Collection Float- The term collection float refers to the total time lag between the mailing of the payment by the payer and the availability of cash in the bank. As shown in Figure 2.2 the collection float has three components: mail float, processing float and availability float. Mail float (mail delays) results from the time that elapses from the mailing of the check until the firm receives the check. It is the time taken by the post office for transferring check from the customer to the firm.

Processing float (processing delay): is the time taken in processing the check within the firm and sending it to bank for collection. The last component of collection float is availability float (availability delays), which is a result of the firm not being granted immediate availability for use on all deposits. It is the time taken by the bank in collecting the payment from the customer's bank. These last two elements of collection float are referred as deposit float.

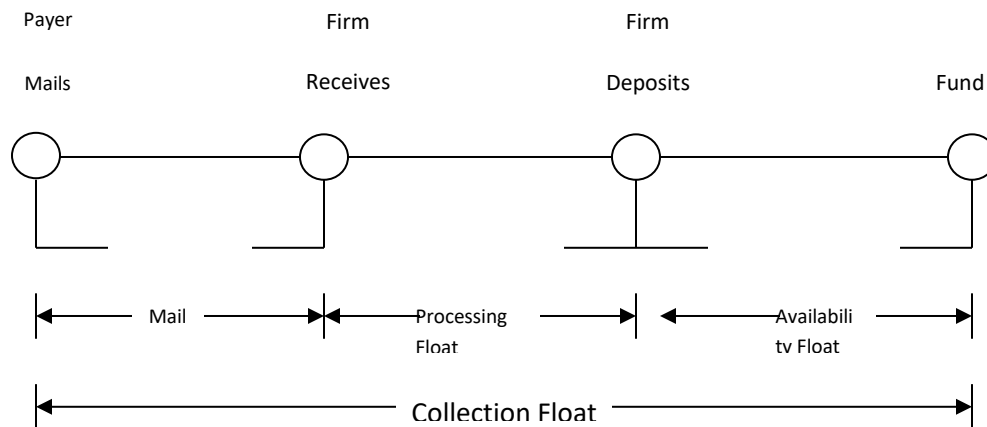


Figure 2.2 Collection Float and Its Components

Float is a function of both of the time lag and of the amount involved. Float is calculated by multiplying the time lag in days by the amount of cash being delayed. For example, XYZ Co. located in Addis Ababa receives checks from its customers in Bahir Dar; a certain amount of time will elapse between receiving and depositing the check and collecting the funds from the customers' banks.

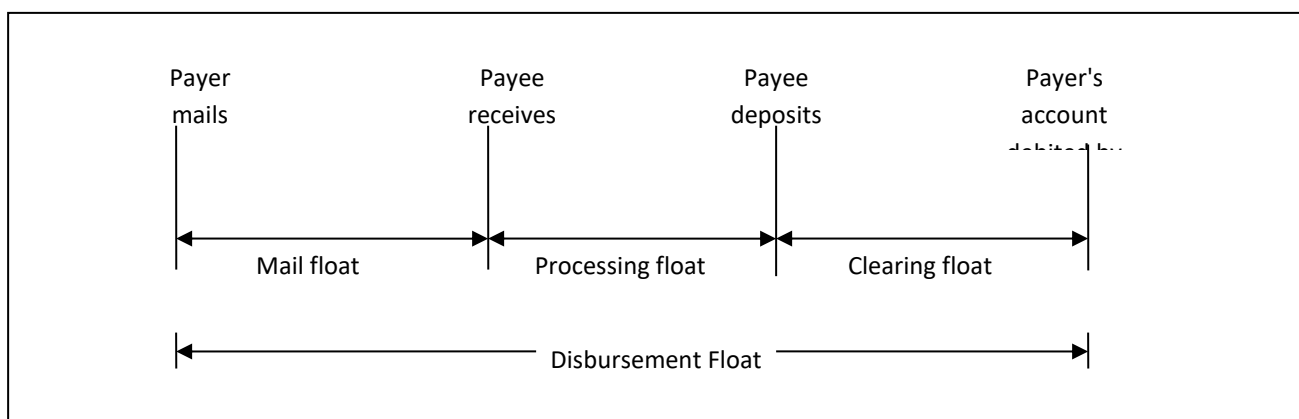
During this period of time, XYZ's book balance will be higher than its actual bank balance according to the bank's records. Only when the funds are actually collected and credited to the firm's checking account they are available for other purposes. For example, if XYZ Company receives checks in the amount of Br. 5,000 daily, but it loses four days while checks are being deposited and cleared. Therefore, the collection float is calculated as follows:

$$\begin{aligned}
 \text{Collection float} &= \text{Average daily check receipts} \times \text{time lag in days} \\
 &= \text{Br. } 5,000 \times 4 \text{ days} \\
 &= \text{Br. } 20,000
 \end{aligned}$$

Collection float is a negative float in a sense that it has an adverse impact on cash management. The larger the collection float, the larger the opportunity cost because the cash is unavailable for use during this time. As much as possible, to offset this effect, the firm has to minimize the collection float thus putting the funds to work faster and the opportunity cost will be minimal. Thus, in order to minimize collection float, the firm should reduce mail delays or processing delays or both in the collection process.

Disbursement Float: Disbursement float refers to the value of the checks that a firm has written but which are still being processed and thus have not been deducted from firm's bank account balance by the bank. It occurs when the balance on the firm's bank account exceeds that on the firm's books. This occurs because of the delays caused by mailing, processing and clearing process of disbursement checks.

Disbursement float is experienced by the payer and is a delay in the actual withdrawal of funds. Disbursement float consists of (1) mail float measured as the time between the payer is mailing of the check and the payee's receipt of it: (2) processing float, the time required by the payee to deposit the checks after it has been received: and (3) clearing float, the time required by the banking system to return the check and present it against the payer disbursement account (see figure 2.3).



For example, suppose XYZ Company (mentioned earlier) writes a check to PTA Company, one of its suppliers in Bahirdar. A certain amount of time will elapse between the time the check is written and mailed, cleared and presented to the XYZ's bank for deduction from its checking

account. In this case, XYZ's book balance will be lower than its actual balance in the bank until the check is actually presented to the bank and deducted from the checking account. Assume XYZ Company writes on average, checks to PTA Company in the amount of Br. 5,000 each day, which takes 2 days mail float, 2 days processing float, and 2 days clearing float.

This will cause the XYZ's own book balance to show a balance of Br. 30,000 (Br. 5,000 X 6 days delay) smaller than the balance on its bank account. This difference is called disbursement float. To the payer company (XYZ company), Br. 30, 000 is disbursement float; to the payee (PTA company), Br. 30,000 is collection float.

Disbursement float is a positive float in a sense that, all other things remaining constant, a firm would rather prefer to delay its own payments as long as possible.

Because there is an importance in delayed payments as the firm can either invest cash for a longer time or minimize the cost of obtaining cash from lenders or investors. Therefore a firm would like to increase the disbursement float as long as possible in order to get these benefits.

The difference between a firm's checkbook balance and the balance shown on the bank's books is called net float. In other words, net float is the sum of a firm's collection float (negative float) and disbursement float (positive float).

Remember the previous example that XYZ Company had a negative collection float of Br. 20,000 and a positive disbursement float of Br. 30,000. In total the XYZ's net float is:

$$= \text{Br. } 30,000 - \text{Br. } 20,000$$

$$= \text{Br. } 10,000$$

Basically, the size of a firm's net float is a function of its ability to speed up collections on checks received and to slow down payments on checks written. Efficient firms go to great lengths to speed up the processing of incoming checks, thus putting the funds to work faster, and they try to stretch their own payments out as long as possible.

Speeding Up Cash Collections

Financial managers have searched for ways of collecting receivables faster since credit transactions began. Although cash collection is the financial manager's responsibility, the speed with which checks are cleared also depends on the banks system. Several techniques are now used both to speed up collections and thereby reducing collection float and availing funds where they are needed. It includes:

- *Prompt billing*
- *Allowing discounts for earlier payments*
- *Lock box system*
- *Concentration banking*
- *Decentralized collections*

Prompt Billing. An obvious but easily overlooked way to speed up the collections of receivables is to prepare invoices and send to customers promptly & accurately.

In any event, accelerated preparation and mailing of invoices will result in faster payment because of the earlier invoice receipt and resulting earlier due dates.

Allowing Discounts for Earlier payments: Another technique for prompting customers to pay earlier is to allow a cash discount. The availability of discount is a good motivation to make quicker payments.

Lockbox System. The most important tool for accelerating the collection of remittances is the lockbox. A company rents a local post office box and authorizes its bank to pick up remittances in the box. Customers are billed with instructions to mail their remittances to the lockbox. The bank picks up the mail several times a day and deposits the checks directly into the company's account. The checks are recorded and cleared for collection. The company receives a deposit slip and a list of payments, together with any material in the envelopes. The benefit of this system is that checks are deposited before, rather than after, any processing and accounting work is done. In short, the lockbox system eliminates processing float (the time between the receipt of checks or remittances by the company and their deposit in the bank).

With a lockbox network, locating lockboxes close to customers' mailing points reduces mail float and availability float. This type of lockbox arrangement is usually on a regional basis, with the company choosing regional banks according to its billing patterns. Before determining the regions to be used and the number of collection points, a feasibility study is made of the availability of checks that would be deposited under alternative plans. Generally, the best collection points are cities that have good transportation facilities.

The main advantage of a lockbox arrangement, once again, is that checks are deposited at a bank and become collected balances sooner than if they were processed by the company prior to deposit. The principal disadvantage of a lockbox arrangement is the cost. Since the bank is providing a number of services in addition to the usual clearing of checks, it requires compensation for them. Because the cost is almost directly proportional to the number of checks deposited, lockbox arrangements are usually not profitable for the firm if the average remittance is small.

Decentralizing collections: A big firm operating over wide geographical area can accelerate collections by using the system of decentralized collections. A number of collecting centers are opened in different areas instead of collecting receipts at one place. The idea of opening different collection centers is to reduce the mailing time from customer's dispatch of check and its receipts in the firm and then reducing the time in collecting these checks because on the receipt of the check it is immediately sent for collection. Since the party may have issued the check on a local bank, it will not take much time in collecting it. The amount so collected will be sent in the central office at the earliest time. Decentralized collection system saves mailing and processing time and, thus, reduces the firm's collection float and thereby funds will be available sooner for its own purposes.

Slowing Down Disbursements

Whereas one of the objectives of cash management is to accelerate collections, still another objective is to slow-down cash disbursements as much as possible. To this effect, the firm's objective relative to its accounts payable is not only to pay its accounts as late as possible but also to slow down the availability of funds to suppliers and employees once the payment has been dispatched. The combination of fast collections and slow disbursements will result in increased availability of cash for the firm.

A variety of techniques aimed at slowing down disbursements, and thereby increasing disbursement float, are available. It includes:

- ♦ *Controlled disbursing*
- ♦ *Playing the float*
- ♦ *Zero balance account*

Controlled Disbursing: Essential to good cash management is a firm's control of disbursements that will slow down cash outflows and minimize the time that cash deposits are idle. The first procedure for tightly controlling disbursements is to centralize payables into a single account (or a small number of accounts), most probably at the firm's head quarter. In this way, disbursements can be made at the precise time they are needed. Operating procedures for disbursements should be established. If the cash discounts are taken on accounts payable, the firm should send at the end of the cash discount period. But, if a discount is not taken, the firm shouldn't pay until the final due date in order to have maximum use of cash.

The second procedure in controlled disbursing involves the strategic use of mailing points and bank accounts to lengthen mail float and clearing float, respectively.

When the date of postmark is considered the effective date of payment by the supplier, the firm may be able to lengthen the mail time associated with disbursements. It can place payments in the mail at locations from which it is known that they will take a longer time to reach to supplier. Typically small towns that are not close to major high ways and other communication and transportation infrastructures provide excellent opportunities to increase mail float. Of course, the benefits of using selected mailing points should justify the costs of this strategy.

The widespread availability of computers and data on check clearing times of banks allows firms to develop disbursement schemes that maximize clearing float on their payments. These methods involve assigning payments going to vendors in certain geographic areas to be drawn on specific banks from which maximum clearing float will result.

Playing the Float: Playing the float is a technique of consciously anticipating the resulting float, or delay, associated with the payment process. Firms often play the float by writing checks against funds that are not currently in their checking accounts.

They can do this because they know that funds are not currently in their checking accounts. They can do this because they know that a delay will occur between the receipt and the deposit of checks by suppliers and the actual withdrawal of funds from their checking accounts. It is likely that the firm's bank account will not be drawn down by the amount of the payments for a few additional days.

Firms play the float in various ways - all of which are aimed at keeping funds in an interest earning form for as long as possible. For example, one way of playing the float is to deposit a certain proportion of a payroll fund or payment into the firm's checking account on several successive days following the actual issuance of a group of checks.

This technique is commonly referred to as staggered funding. If the firm can determine from historic data that only 25 percent of its payroll checks are cashed on the day immediately following the issuance of checks, then only 25 percent of the value of the payroll needs to be in its checking account 1-day earlier. The amount of checks cashed on each of several succeeding days can also be estimated until the entire payroll is accounted for. Normally, however, to protect itself against any irregularities, a firm will place slightly more money in its account than is needed to cover the expected withdrawals.

Another way of playing the float is to use payable through drafts, rather than checks, to pay large sums of money like the payroll. A payable through draft (PTD) is similar to a check in that it is drawn on the payer's checking account and is payable to a given payee. Unlike a check, however, it is not payable on demand; approval of the draft by the payer is required before the bank pays the draft. The advantage of these drafts to the payer is that money does not have to be placed on deposit until the draft clears the bank; instead, the firm can invest it in short-term investment opportunities.

Zero Balance Account (ZBA): The use of a zero balance account (ZBA) system, which is offered by banks, eliminates the need to accurately estimate and fund each individual disbursement account. Zero balance accounts are checking accounts in which zero balances are maintained.

Under this arrangement, each day the bank, which provided the zero balance account, will notify the firm of the total amount of checks presented against the account. The firm then transfers only that amount typically, from a master account into that individual disbursement account. Once the

corresponding checks have been paid, the individual disbursement account balance reverts to zero. Thus a zero ending balance is maintained each day in all accounts except the master account. The bank, of course, must be compensated for this service.

Besides improving control over disbursements, a zero balance account system eliminates idle cash balances.

Determining optimal cash balance

How is optimum cash balance maintained?

One of the important objectives of cash management is to maintain an optimum level of cash balance and the tools available with the company to ensure the maintenance of optimum level of cash balance is to prepare cash budget. Cash balance either in excess or shortage of it has its own consequences. Thus by preparing the cash budget, the company can have an idea in advance the requirement and the amount of cash which will be required by the company at any given point of time. On the basis of which company can further take its decision of investing excess cash or to meet the shortfall

Optimal Cash Models

A number of mathematical models have been developed to assist the financial manager in distributing a company's funds so that they provide a maximum return to the company.

1. William Baumol Model

The model developed by William Baumol can determine the optimum amount of cash for a company to hold under conditions of certainty. The objective is to minimize the sum of the fixed costs of transactions and the opportunity cost of holding cash balances that do not yield a return. This is similar to the EOQ model used in inventory management. The costs can be expressed as follows, according to his model:

$$F (T/C) + I (C/2)$$

Where: F = Fixed costs of a transaction

T = Total cash required for the specified time period

I = Interest rate on marketable securities

C = Cash balance

The optimal level of cash is determined using the following formula:

$$\text{Optimal level of cash} = \sqrt{(2FT / I)}$$

Example:

A Company estimates a cash requirement of \$2,000,000 for a 1 month period. The opportunity interest rate is 6% per annum, which works out to 0.5 percent per month. The transaction cost for borrowing or withdrawing funds is \$150. Optimal level of cash = $\sqrt{(2 \times \$150 \times \$2,000,000) / 0.005} \Rightarrow \$346,410.16$ With the above optimal transaction size, we can now find the number of transactions-required. Number of transactions required = $\$2,000,000 / \$346,410.16 \Rightarrow 5.77$ or 6 transactions during the month.

2. Miller-Orr model

When the cash payments are uncertain, Miller-Orr model can be used. This model places upper and lower limits on cash balances. When the upper limit is reached, a transfer of cash to marketable securities is made; when the lower limit is reached, a transfer from securities to cash is made. As long as the cash balance stays within the limits, no transaction occurs. The various factors in this model are fixed costs of a securities transaction (F) which is assumed to be the same for buying and selling, the daily interest rate on marketable securities (I) and variance of the daily net cash flows, represented by σ^2 . This model assumes that the cash flows are random. The control limits in this model are d dollars as an upper limit and zero dollars at the lower limit. When the cash balance reaches the upper level, d less z dollars of securities are bought, and the new balance

becomes z dollars. When the cash balance equals zero, z dollars of securities are sold and the new balance again reaches z.

According to this model, the optimal cash balance z is computed as follows:

$$Z = \sqrt[3]{(3F \sigma^2) / 4I}$$

The optimal value for d is computed as 3z.

$$\text{Average cash balance (approx.)} = (z + d)/3$$

Example:

Given are the following:

Fixed cost of a securities transaction = \$5

Variance of daily net cash flows = \$25

Daily interest rate on securities = 0.0003 (10% per annum, so 10%/360 days = 0.0003 daily)

$$\text{Optimal cash balance} = \sqrt[3]{(3 \times \$5 \times \$25) / (4 \times 0.0003)} \Rightarrow \$67.86$$

(or) \$68 rounded off.

$$\text{Upper limit, } d = 3z = 3 \times \$68 = \$204$$

$$\text{Average cash balance} = (\$68 + \$204)/3 \Rightarrow \$90.67$$

So, when the upper limit of \$204 is reached, \$136 (\$204 - \$68) will be purchased. When the lower limit of zero dollars is reached, \$68 of securities will be sold to again bring it to the optimal balance of cash calculated as \$68 approximately.

3. Orgler's Model

According to this model, the optimal cash management strategy can be determined through the use of a multiple linear programming model. It is a model that provides for integration of cash management with production and other aspects of the firm. The construction of this model comprises three sections namely:

- a. Selection of the appropriate planning horizon
- b. Selection of the appropriate decision variables and
- c. Formulation of the cash management strategy.

This model uses one year planning horizon with twelve monthly periods because of its simplicity. It has four basic sets of decision variables which influence cash management of a firm and which must be incorporated into the linear programming model of the firm.

These are:

- a. Payment schedule
- b. Short-term financing and
- c. Purchase and sale of marketable securities and
- d. Cash balance.

The familiarity of all the above models provides the financial managers an insight into the normative framework as to how cash management should be conducted.

Marketable Securities

A firm can invest its excess cash in many types of securities or short-term investment opportunities. As a firm invests its temporary cash balance, its primary criterion in selecting a security or investment opportunity will be its quickest convertibility in to cash, when the need for cash arises. Besides this, the firm would also be interested in the fact that when it sell the security or liquidates investment , it at least gets the amount of cash equal to the investment outlay. Thus, in choosing among alternative investments, the firm should examine three basic features of security : safety , maturity and marketability.

Safety:

Usually, a firm would be interested in receiving as high a return on its investment as is possible. But, the higher returns – yielding securities or investment alternatives are relatively riskier. The firm would invest in very safe securities as the cash balance invested in them is needed in near future. Thus, the firm would tend to invest in the highest yielding marketable securities subject to the constraint that the securities have acceptable level of risk. The risk referred here is the default

risk. The default risk means the possibility of default in the payment of interest or principal on time and in the amount of promised.

Maturity:

Maturity refers to the time period over which interest and principal are to be made. The price of long -term security fluctuates more widely with the interest rate changes than the price of short -term security. Over time, interest rates have a tendency to change. Because of these two factors, the long-term securities are relatively riskier. For safety reasons, therefore, the firms for the purpose of investing excess cash prefer short – term securities.

Marketability:

Marketability refers to convenience and speed with which a security or an investment can be converted into cash. The two important aspects of marketability are price and time. If the security can be sold quickly without loss of price, it is highly liquid or marketable. The government treasury bills fall under this category. If the security needs time to sell without loss, it is considered illiquid. As the funds invested in marketable securities will be needed by the firm in near future, it would invest in the securities that are really marketable. The securities that have low marketability usually have higher yields in order to attract investment. Thus, differences in a marketability also cause differences in the securities yields. The following short – term investment opportunities are available to invest their temporary cash surplus:

1. Treasury bills
2. Commercial papers
3. Certificate of deposits
4. Bank deposits
5. Bank deposits
6. Inter- corporate deposits
7. Money market mutual funds