Principles of Managerial Finance

Brief Edition

Chapter 16

Cash & Marketable Securities

Learning Objectives

- Discuss why firms hold cash and marketable securities, and how the levels they hold of each relate to those motives.
- Demonstrate the three basic strategies for the efficient management of cash using the firm's operating and cash conversion cycles.
- Explain float, including its three basic components, and the firm's major objectives with respect to collection float and disbursement float.

Learning Objectives

- Review popular techniques for speeding up collections and slowing down disbursements, the role of banking relationships, and international cash management.
- Understand the basic characteristics of marketable securities and the key key features of popular government and nongovernment issues.
- Describe the Baumol model and Miller-Orr model and how they can be used to determine the optimum quantity in which to convert marketable securities and cash.

Cash & Marketable Securities Balances

Motives for Holding Cash

- The transactions motive for holding cash or near-cash balances is driven by the need to make planned payments for such items as materials and wages.
- The safety motive is driven by the need to protect the firm against being unable to satisfy unexpected demands for cash.
- The speculative motive is driven by the desire to put unneeded funds to work or to be able to quickly take advantage of unforeseen opportunities.

Cash & Marketable Securities Balances

Estimating Desirable Cash Balances

- Like other financial decisions, the goal of the firm is to maintain the level of cash and marketable securities that maximizes shareholder and firm value.
- Balances that are too high will diminish profitability -- and balances that are too low will accentuate risk.
- Although the more sophisticated mathematical estimation models are beyond our scope, the overriding objective is to balance risk against return.

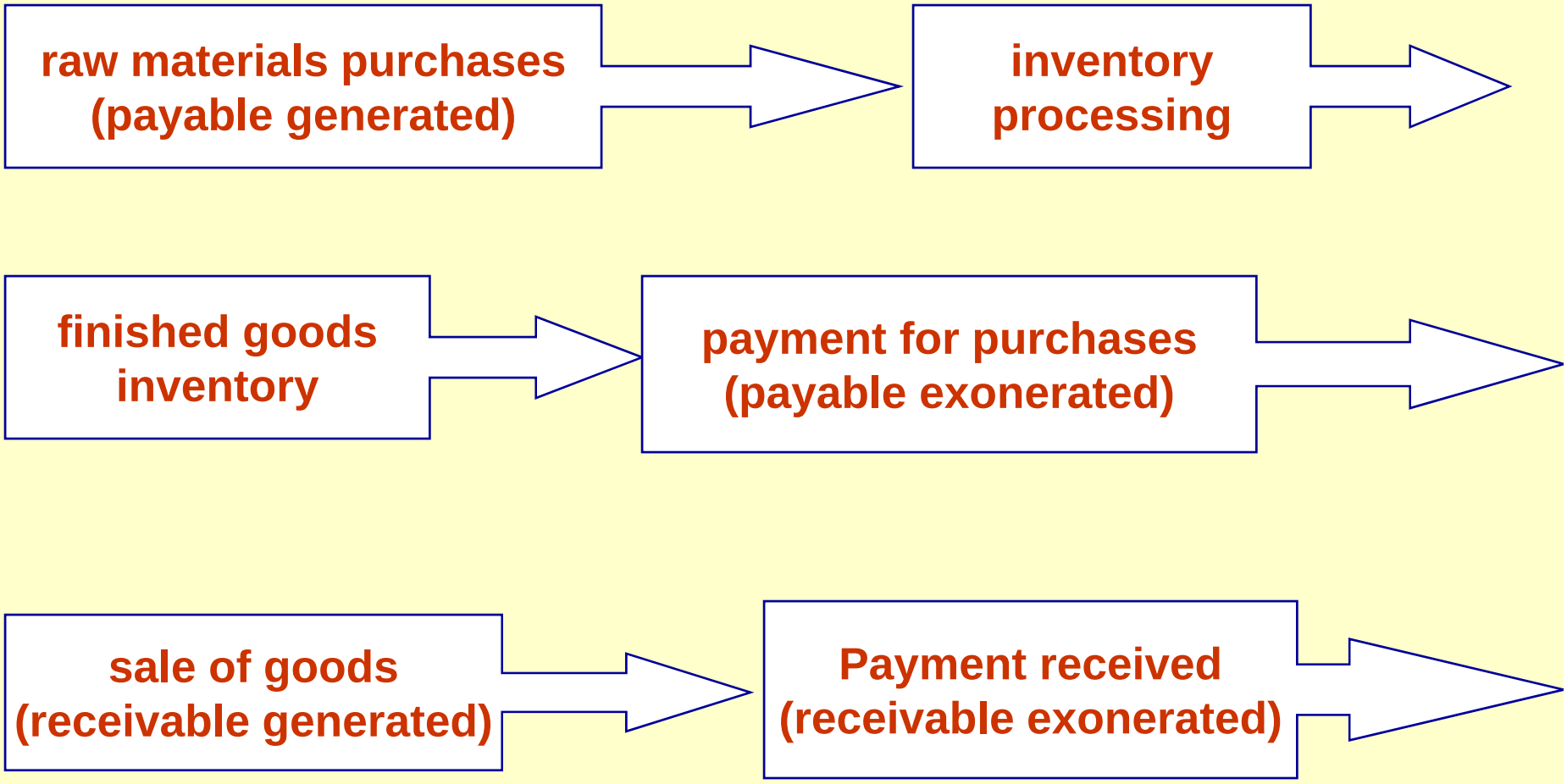
Cash & Marketable Securities Balances

The Level of Marketable Securities Investment

- In addition to earning a return on temporarily idle funds, marketable securities serve as a safety stock of cash that can be deployed to satisfy unexpected demands for funds.
- For example, if a company wishes to maintain $70,000 of liquid funds and a transactions balance of $50,000 -- $20,000 would be held as marketable securities.
- In addition, a firm could use a line of credit in lieu of marketable securities -- or a combination of both.

The Efficient Management of Cash

Recall the Operating Cycle from the Last Chapter...



The Efficient Management of Cash

The Operating Cycle (OC) is the time between ordering materials and collecting cash from receivables.

The Cash Conversion Cycle (CCC) is the time between when a firm pays it's suppliers (payables) for inventory and collecting cash from the sale of the finished product.

The Efficient Management of Cash

Both the OC and CCC may be computed mathematically as shown below.

Operating Cycle (OC) = Average Age of Inventory (AAI) + Average Collection Period (ACP)

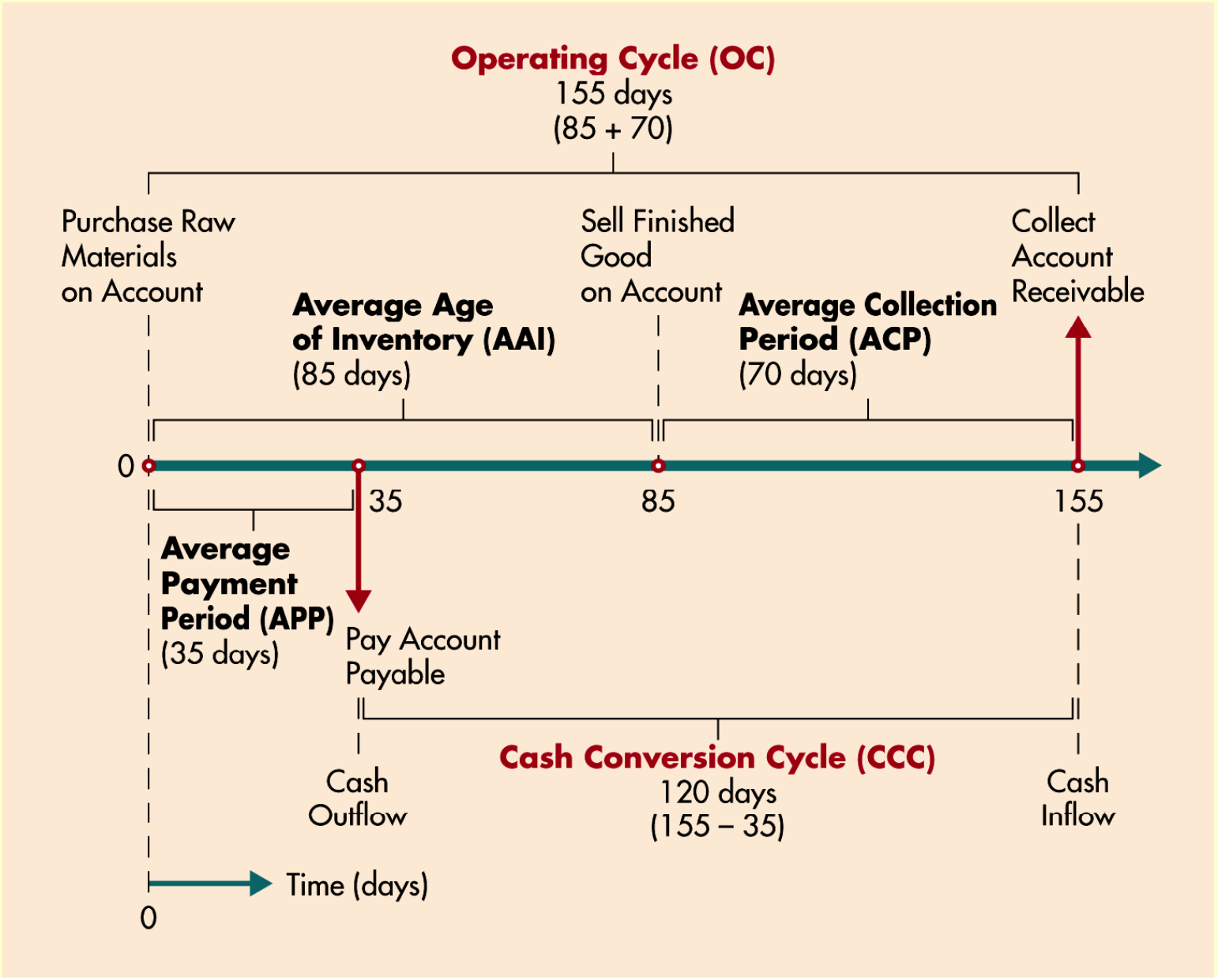
Cash Conversion Cycle (CCC) = Operating Cycle (OC) - Average Payment Period (APP)

The Efficient Management of Cash

MAX Company, a producer of dinnerware, sells all its merchandise on credit. The credit terms require customers to pay within 60 days of a sale. On average, it takes 85 days to manufacture, warehouse, and ultimately sell a finished good. In other words, the average age of Inventory (AAI) is 85 days. It also takes an average of 70 days to collect on its accounts receivable (ACP).

Substituting AAI = 85 days and ACP = 70 days into the into the OC equation (OC = AAI + ACP), we get OC = 85 + 70 = 155 days. This is highlighted in the exhibit on the following slide.

The Efficient Management of Cash

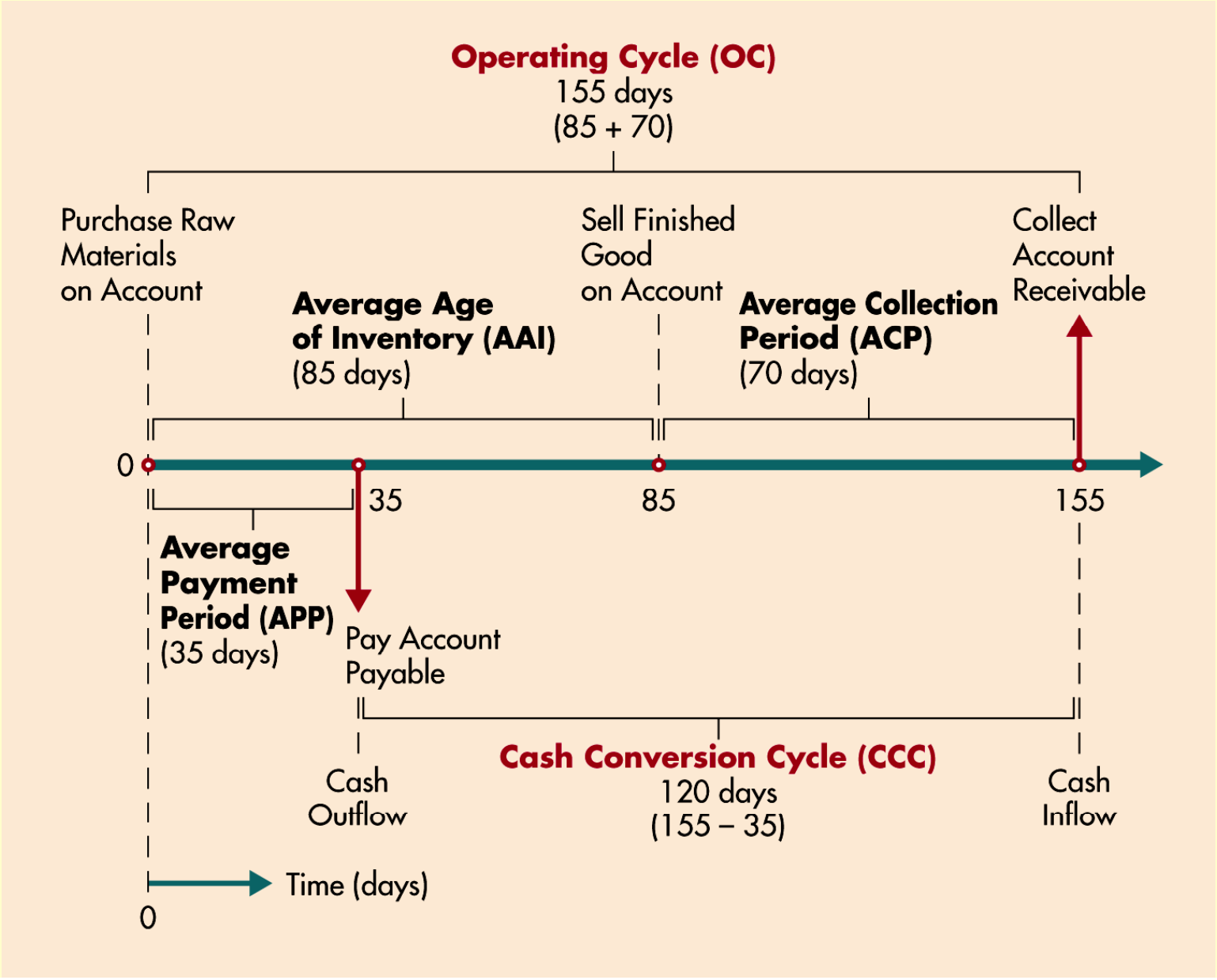


The Efficient Management of Cash

Continuing with the example, assume that the credit terms for MAX's raw material purchases currently require payment within 40 days and employees are paid every 15 days. The firm's weighted average payment period (APP) for raw materials and labor is 35 days.

Substituting APP days into the CCC equation (CCC = OC - APP), we get CCC = 155 - 35 = 120 days. This is highlighted in the exhibit on the following slide.

The Efficient Management of Cash



The Efficient Management of Cash

Managing the Cash Conversion Cycle

- In this example, MAX (like most companies) has a positive CCC.
- As a result, the company will have to finance this period using some combination of short-term financing such as a line of credit or revolving credit agreement.
- By looking at the model, we can also see that the firm could improve its financial condition by (1) shortening the AAI, (2) Shortening the ACP, (3) lengthening the APP, or (4) some combination of the above.
- The next example is intended to illustrate how this might be effectuated.

The Efficient Management of Cash

Let’s consider a second example using financial statement data for ABC Company

The Efficient Management of Cash

ABC Manufacturing		
Income Statement		
Year Ended December 31, 1997		
Sales Revenue		$ 700,000
Cost of Goods Sold	450,000	
Gross Profit		$ 250,000
Operating Expenses:		
General & Administrative	$ 95,000	
Selling & Marketing	56,000	
Depreciation Expense	25,000	176,000
Net Operating Income		$ 74,000
Interest Expense		14,000
Earnings Before Tax		$ 60,000
Income Tax Expense		24,000
Net Income		$ 36,000

The Efficient Management of Cash

ABC Manyfacturing					
Balance Sheet					
31-Dec-95					
Current Assets:			**Current Liabilities:**		
Cash	$ 25,000		Accounts Payable	$ 78,000	
Accounts Receivable	100,000		Notes Payable	34,000	
Inventory	125,000		Accrued Liabilities	30,000	
Total Current Assets		$ 250,000	Total Current Liabilities		$ 142,000
			Long-Term Debt:		$ 140,000
Fixed Assets:			Total Liabilities		$ 282,000
Gross Plant & Equipment	$ 300,000		**Shareholders Eequity:**		
Accumulated Depreciation	(100,000)		Common Stock	$ 50,000	
Net Plant & Equipment		200,000	Paid-in-Capital	100,000	
Land		$ 50,000	Retained Earnings	68,000	
Total Fixed Assets		250,000	Total Stockholder's Equity		$ 218,000
Total Assets		$ 500,000	Total Liabilties & Equity		$ 500,000

The Efficient Management of Cash

Average Age of Inventory (AAI) = Inventory / CGS/365

Average Age of Inventory (AAI) = $125,000 / $450,000/365 = 101 days

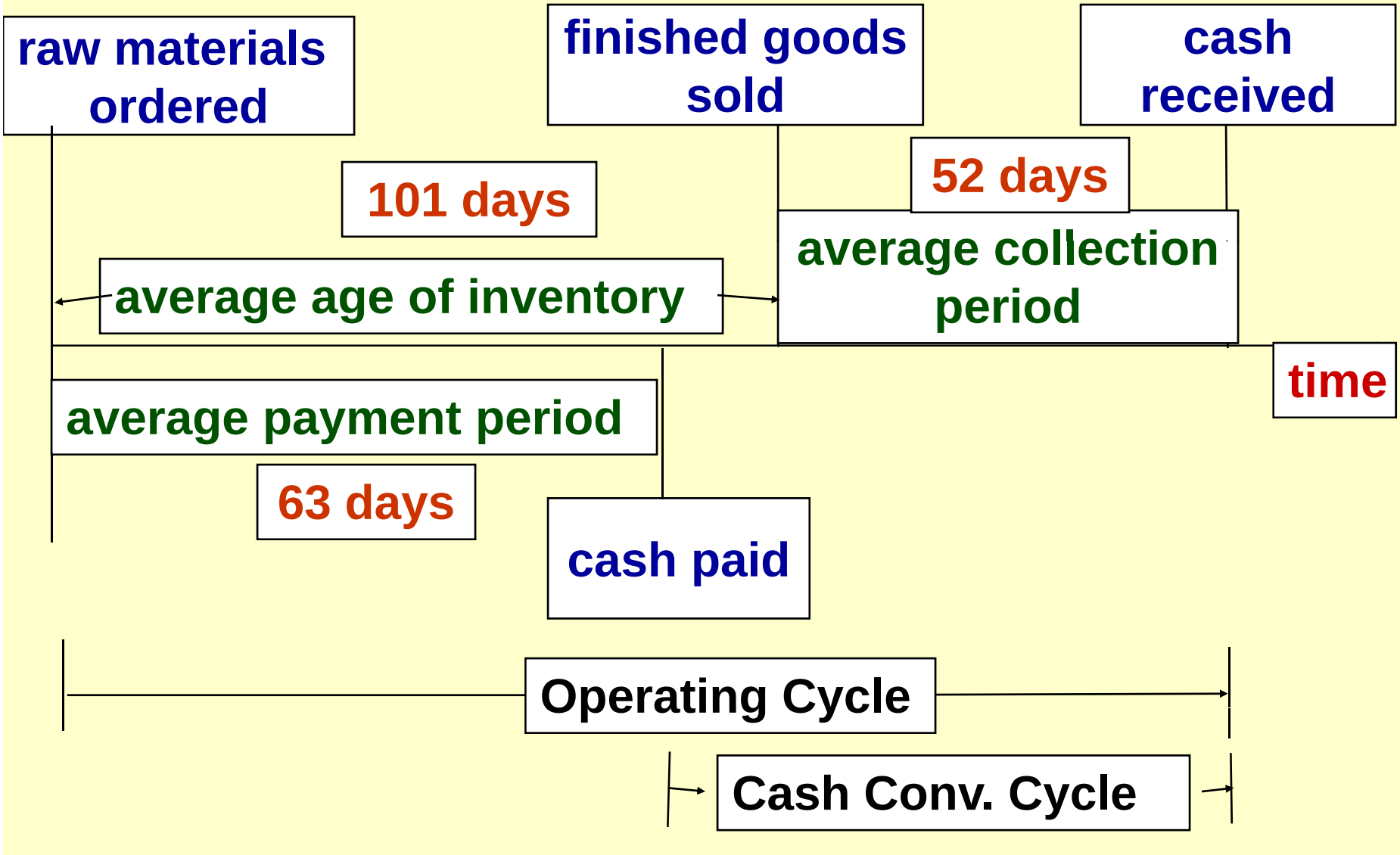
Average Collection Period (ACP) = A/R / Net Sales/365

Average Collection Period (ACP) = $100,000 / $700,000/365 = 52 days

Average Payment Period (APP) = A/P / CGS/365

Average Payment Period (APP) = $78,000 / $450,000/365 = 63 days

The Efficient Management of Cash



The Efficient Management of Cash

Both the OC and CCC may be computed mathematically as shown below.

Operating Cycle (OC) = 101 days + 52 days = 153 days

Cash Conv. Cycle (CCC) = 153 days - 63 days = 90 days

The Efficient Management of Cash

- From the above, we can calculate ABC's working capital requirements.

Receivables investment	**= Net Sales/day x Average Collection** **= (700,000/365) x 52** **= $100,000**
Inventories investment	**= CGS/day x Average Age of Inventory** **= (450,000/365) x 101** **= $125,000**
Accounts Payable	**= CGS/day x Average Payment Period** **= (450,000/365) x 63** **= $78,000**

The Efficient Management of Cash

- Summing them up we get:

Receivables investment	**= $100,000**
+ Inventories investment	**= 125,000**
- Accounts Payable	**= 78,000**
= Net Investment	**= $147,000**

This net investment represents the amount of money committed to the productions process. It also represents the amount of financing the firm needs to secure to support operations.

Cash Management Techniques

Float

- Collection float is the delay between the time when a payer deducts a payment from its checking account ledger and the time when the payee actually receives the funds in spendable form.
- Disbursement float is the delay between the time when a payer deducts a payment from its checking account ledger and the time when the funds are actually withdrawn from the account.
- Both the collection and disbursement float have three separate components.

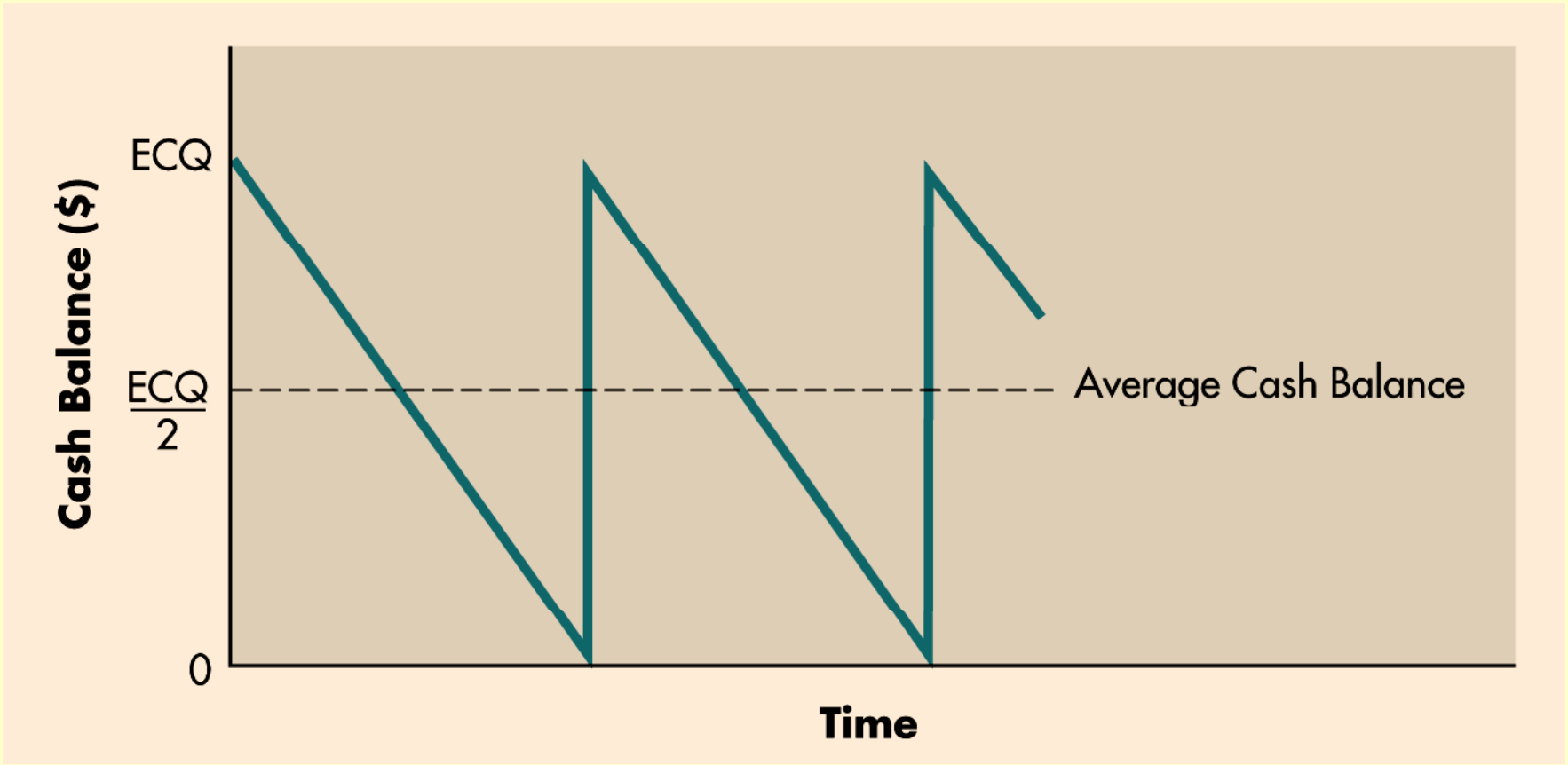
Cash Management Techniques

Float

- Mail float is the delay between the time when a payer places payment in the mail and the time when it is received by the payee.
- Processing float is the delay between the receipt of a check by the payee and the deposit of it in the firm's account.
- Clearing float is the delay between the deposit of a check by the payee and the actual availability of the funds which results from the time required for a check to clear the banking system.

Cash Management Techniques

Float



Cash Management Techniques

Speeding Collections

Concentration Banking

- Concentration banking is a collection procedure in which payments are made to regionally dispersed collection centers.
- Checks are collected at these centers several times a day and deposited in local banks for quick clearing.
- It reduces the collection float by shortening both the mail and clearing float components.

Cash Management Techniques

Speeding Collections

Lockboxes

- A lockbox system is a collection procedure in which payers send their payments to a nearby post office box that is emptied by the firm's bank several times a day.
- It is different from and superior to concentration banking in that the firm's bank actually services the lockbox which reduces the processing float.
- A lockbox system reduces the collection float by shortening the processing float as well as the mail and clearing float.

Cash Management Techniques

Speeding Collections

Direct Sends and Other Techniques

- A direct send is a collection procedure in which the payee presents checks for payment directly to the banks on which they are drawn, thus reducing the clearing float.
- Pre-authorized checks (PAC) is a check written against a customer's account for a previously agreed upon amount avoiding the need for the customer's signature.
- Depository transfer checks (DTC) are unsigned checks drawn on one of the firm's accounts and deposited at a concentration bank to speed up transfers.

Cash Management Techniques

Speeding Collections

Direct Sends and Other Techniques

- Wire transfers is a telecommunications bookkeeping device that removes funds from the payer's bank and deposits them into the payees bank -- thereby reducing collections float.
- Automated clearinghouse (ACH) debits are pre-authorized electronic withdrawals from the payer's account that are transferred to the payee's account via a settlement among banks by the automated clearinghouse.
- ACHs clear in one day, thereby reducing mail, processing, and clearing float.

Cash Management Techniques

Slowing Disbursements

- Controlled disbursing involves the strategic use of mailing points and bank accounts to lengthen mail float an clearing float.
- Playing the float is a method of consciously anticipating the resulting float or delay associated with the payment process and using it to keep funds in an account as long as possible.
- Staggered funding is a method of playing the float by depositing a certain portion of a payroll into an account on several successive days following the issuance of checks.

Cash Management Techniques

Slowing Disbursements

- With an overdraft system, if the firm's checking account balance is insufficient to cover all checks presented, the bank will automatically lend money to cover the account.
- A zero-balance account is an account in which a zero balance is maintained and the firm is required to deposit funds to cover checks drawn on the account only as they are presented for payment.

The Role of Banking Relationships

- Maintaining strong banking relationships is one of the most important elements of an effective cash management system.
- In recent years, banks have become a source for a wide variety of cash management services which are designed to help financial managers maximize day-to-day cash availability and facilitate short-term investing.

International Cash Management

- Although the motivations for holding and managing cash are universal worldwide, significant differences exist in practical management techniques for international versus strictly domestic transactions.
- First, foreign banks are generally far less restricted wither geographically or in terms of the services they offer.
- Second, checks are used less frequently than in the U.S.
- Third, most foreign banks are permitted to pay interest on corporate checking accounts which is offset by higher bank fees and value dating.

International Cash Management

- In addition, cash management is further complicated by the need both to maintain local currency deposit balances in every country in which the firm operates and to retain centralized control over often large cash balances.
- This can be facilitated by using intracompany netting and the Clearinghouse Interbank Payments System.
- Intracompany netting is a technique used by subsidiaries of MNCs to minimize cash requirements by transferring across national boundaries only the amount of payments owed between them.

International Cash Management

- CHIPS is the most important wire transfer service.
- It is operated by an international banking consortia.
- Hundreds of billions of dollars of payments per day are settled using wire transfers.
- Finally, MNCs with excess cash can invest these funds in either foreign government securities or in the Eurocurrency market

Marketable Securities

- Marketable securities are short-term, interest bearing money market instruments that can easily be converted into cash
- Securities that are most commonly-held as part of a marketable securities portfolio can be segmented into two groups -- government issues and non-government issues.
- Features and recent yields on popular marketable securities are presented in Table 16.1.

TABLE 16.1 **Features and Recent Yields on Popular Marketable Securitiesa**

Government Issues

Security	Issuer	Description	Initial maturity	Risk and return	Yield on April 7, 1999[b]
Treasury bills	U.S. Treasury	Issued weekly at auction; sold at a discount; strong secondary market	91 and 182 days, occasionally 1 year	Lowest, virtually risk-free	4.38%
Treasury notes	U.S. Treasury	Stated interest rate; interest paid semiannually; strong secondary market	1 to 10 years	Low, but slightly higher than U.S. Treasury bills	4.49%
Federal agency issues	Agencies of federal government	Not an obligation of U.S. Treasury; strong secondary market	9 months to 30 years	Slightly higher than U.S. Treasury issues	4.64%[c]

Nongovernment Issues					
Negotiable certificates of deposit (CDs)	Commercial banks	Represent specific cash deposits in commercial banks; amounts and maturities tailored to investor needs; large denominations; good secondary market	1 month to 3 years	Higher than U.S. Treasury issues and comparable to commercial paper	4.90%
Commercial paper	Corporation with a high credit standing	Unsecured note of issuer; large denominations	3 to 270 days	Higher than U.S. Treasury issues and comparable to negotiable CDs	4.83%
Banker's acceptances	Banks	Results from a bank guarantee of a business transaction; sold at discount from maturity value	30 to 180 days	Slightly lower than negotiable CDs and commercial paper but higher than U.S. Treasury issues	4.76%
Eurodollar deposits	Foreign banks	Deposits of currency not native to the country in which the bank is located; large denominations; active secondary market	1 day to 3 years	Highest, due to less regulation of depository banks and some foreign exchange risk	4.93%
Money market mutual funds	Professional portfolio management companies	Professionally managed portfolios of marketable securities; provide instant liquidity	None—depends on wishes of investor	Vary, but generally higher than U.S. Treasury issues and comparable to negotiable CDs and commercial paper	4.27%[d]
Repurchase agreements	Bank or security dealer	Bank or security dealer sells specific securities to firm and agrees to repurchase them at a specific price and time	Customized to purchaser's needs	Generally slightly below that associated with the outright purchase of the security	—

[a]The prime rate of interest at this time was 7.75%.

[b]Yields obtained for 3-month maturities of each security.

[c]A Federal National Mortgage Association (FNMA) issue maturing in July 1999 is used here in the absence of any average-yield data.

[d]The Schwab Money Market Fund with an average maturity of 71 days is used here in the absence of any average-yield data.

Source: Wall Street Journal, April 8, 1999, pp. C13, C18, C20.

Marketable Securities

Characteristics

- To qualify as a marketable securities investment, the instruments must have a ready market -- which means it must be both “broad” and “deep.”
- The breadth of a market is determined by the number of participants (buyers).
- The depth of a market is determined by its ability to absorb the purchase or sale of a large dollar amount of a particular security.
- A ready market must have both of these characteristics.

Cash Conversion Models

- Cash conversion models are used to help determine the optimal quantity of marketable securities to convert into cash when needed (and vice versa).
- The cash conversion quantity depends on a number of factors, including the fixed cost of transferring funds between cash and marketable securities, the rate of interest, and the firms demand for cash.
- The objective of these models is to balance the costs and benefits of holding cash versus investing in marketable securities.

Cash Conversion Models

Baumol Model

- The Baumol model is a simple approach that provides for cost-efficient cash balances by determining the optimal cash conversion quantity.
- The firm manages its cash inventory by calculating two costs:
  - the cost of converting marketable securities into cash and vice versa, and
  - the cost of holding cash rather than marketable securities.

Cash Conversion Models

Baumol Model

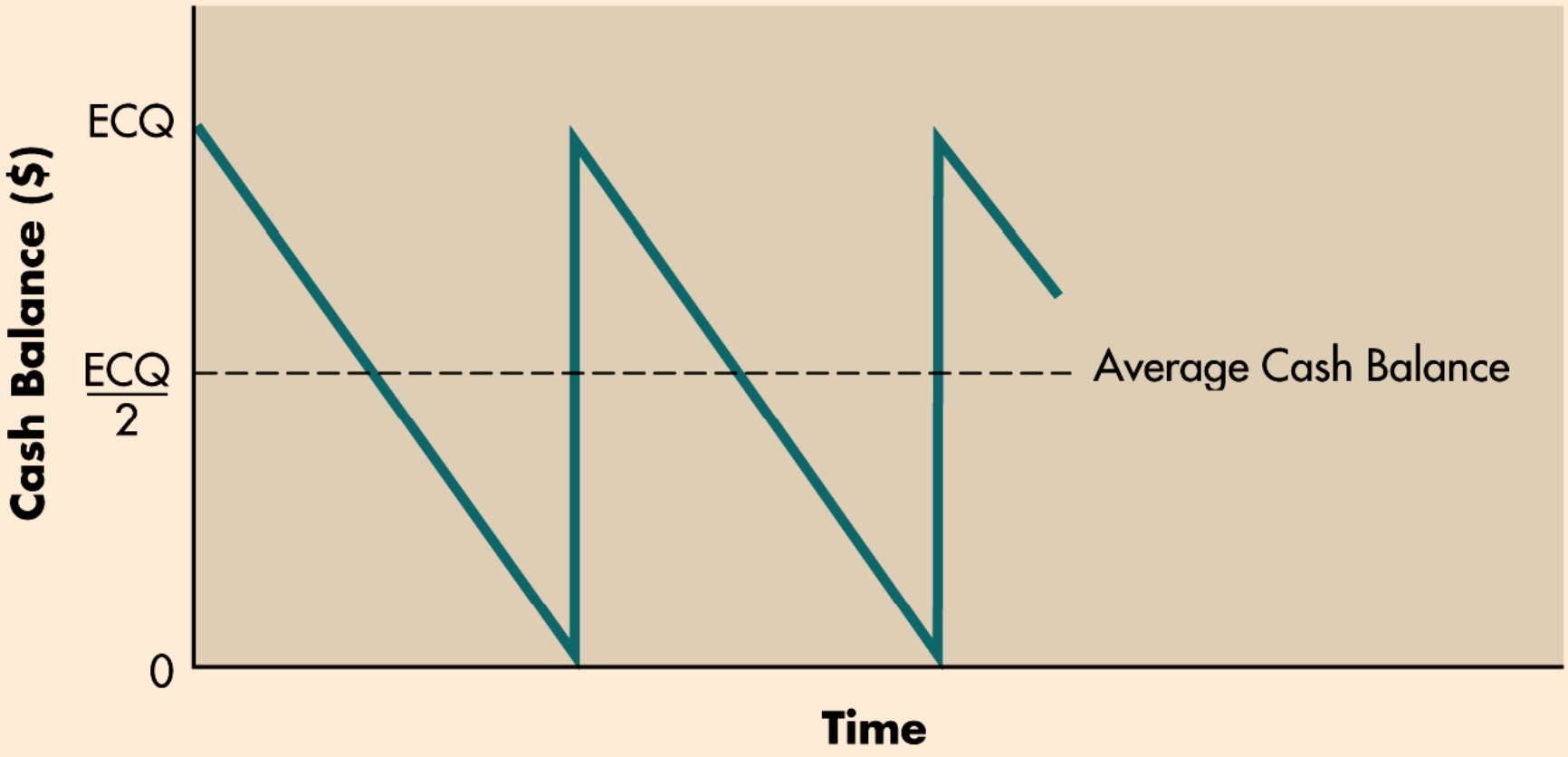
- The Baumol model may be written as shown in Equation 16.3 below:

$$\text{ECQ} = \sqrt{\frac{2 \times \text{conversion cost} \times \text{demand for cash}}{\text{opportunity cost (in decimal form)}}} \qquad (16.3)$$

Cash Conversion Models

Baumol Model

- The Baumol model may be described graphically as shown in Figure 16.3 below.



Cash Conversion Models

Baumol Model

Example

The management of JanCo, a small distributor of sporting goods, anticipates $1,500,000 in cans outlays (demand) during the coming year. The firm has determined that it costs $30 to convert marketable securities into cash and vice versa. The marketable securities portfolio currently earns an 8% rate of return.

$$\text{ECQ} = \sqrt{\frac{2 \times \text{conversion cost} \times \text{demand for cash}}{\text{opportunity cost (in decimal form)}}} \qquad (16.3)$$

Cash Conversion Models

Miller-Orr Model

- The Miller-Orr model is generally more realistic than the Baumol model.
- It provides for cost-efficient cash balances by determining an upper limit (maximum amount) and a return point (target cash balance).

$$\text{Return point} = \sqrt[3]{\frac{3 \times \text{conversion cost} \times \text{variance of daily net cash flows}}{4 \times \text{daily opportunity cost (in decimal form)}}} \qquad (16.5)$$

Cash Conversion Models

Miller-Orr Model

Example

Continuing with the prior example, it costs JanCo $30 to convert marketable securities to cash and vice versa; the firm's marketable securities portfolio earns an 8% annual return, which is 0.0222 daily (8%/360 days). The variance of JanCo's daily net cash flow is estimated to be $27,000. Substituting into Equation 16.5 yields the return point:

$$\text{Return point} = \sqrt[3]{\frac{3 \times \$30 \times \$27{,}000}{4 \times 0.000222}} = \$1{,}399$$

The upper limit is 3 × return point:

$$\text{Upper limit} = 3 \times \$1{,}399 = \$4{,}197$$