Module 3

ASSESSING LIQUIDITY AND OPERATIONAL EFFICIENCY

Background

- It is easier to understand a firm’s liquidity
  - If its standard balance sheet is restructured
    - Emphasize the concerns of its operating and financial managers rather than those of accountants and auditors
- This Module presents a restructured balance sheet
  - Called the managerial balance sheet
  - Shows why a firm's liquidity is driven by the structure of its managerial balance sheet

Background

- After reading this Module, students should understand:
  - How to restructure a standard balance sheet into a managerial balance sheet
  - The meaning of working capital requirement, net long-term financing, net short-term financing, net working capital, current ratio, acid test ratio, and other ratios used to measure, analyze, and manage liquidity
  - How to measure a firm's investment in its operating activities using information drawn from its balance sheet
  - The meaning of interest-rate risk and funding risk
  - How a firm's operating decisions affect the firm's liquidity
  - How to improve a firm's liquidity through better management of the firm's operating cycle

The Managerial Balance Sheet

- The managerial balance sheet
  - Helps identify the links between managerial decisions and financial performance
  - Provides a snapshot of the total capital employed (the right-hand side) and the way that capital is invested in the firm’s assets (the left-hand side)

EXHIBIT 3.1a:
OS Distributors' Balance Sheets.

Figures in millions of dollars

		DEC. 31, 1998		DEC. 31, 1999		DEC. 31, 2000
ASSETS						
CURRENT ASSETS			$104.0		$119.0	$137.0
Cash			$6.0		$12.0	$8.0
Accounts receivable			44.0		48.0	56.0
Inventories			52.0		57.0	72.0
Prepaid expenses			2.0		2.0	1.0
NONCURRENT ASSETS			56.0		51.0	53.0
Financial assets & intangibles			0.0		0.0	0.0
Property, plant, & equip. (net)			56.0		51.0	53.0
Gross value	$90.0			$90.0		$93.0	
Accumulated depreciation	(34.0)			(39.0)		(40.0)	
TOTAL ASSETS			$160.0		$170.0	$190.0

EXHIBIT 3.1b:
OS Distributors' Balance Sheets.

Figures in millions of dollars

	DEC. 31, 1998		DEC. 31, 1999		DEC. 31, 2000	
LIABILITIES AND OWNERS' EQUITY						
CURRENT LIABILITIES		$54.0		$66.0		$75.0
Short-term debt	$15.0		$22.0		$23.0	
Owed to banks	$7.0		$14.0		$15.0	
Current portion of long-term debt	8.0		8.0		8.0	
Accounts payable	37.0		40.0		48.0	
Accrued expenses	2.0		4.0		4.0	
NONCURRENT LIABILITIES		42.0		34.0		38.0
Long-term debt	42.0		34.0		38.0	
Owners' equity	64.0	64.0	70.0	70.0	77.0	77.0
TOTAL LIABILITIES AND OWNERS' EQUITY		$160.0		$170.0		$190.0

EXHIBIT 3.2a:
The Managerial Balance Sheet Versus the Standard Balance Sheet.

THE MANAGERIAL BALANCE SHEET

INVESTED CAPITAL OR NET ASSETS	CAPITAL EMPLOYED
Cash	**Short-term debt**
Working capital requirement (WCR) *Operating assets less Operating liabilities*	
Net fixed assets	**Long-term financing** *Long-term debt plus Owners' equity*

Exhibit 3.2 provides a comparison of the managerial balance sheet with a standard one.

EXHIBIT 3.2b:
The Managerial Balance Sheet Versus the Standard Balance Sheet.

THE STANDARD BALANCE SHEET

TOTAL ASSETS	LIABILITIES AND OWNER'S EQUITY
Cash	**Short-term debt**
Operating assets ***Accounts receivable plus Inventories plus Prepaid expenses***	**Operating liabilities** ***Accounts payable plus Accrued expenses***
Net fixed assets	**Long-term financing** ***Long-term debt plus Owners' equity***

The Three Components Of A Firm's Invested Capital

- **Cash and cash-equivalent assets**
  - Firms hold cash to:
    - Meet their unexpected expenses
    - Acquire assets on short notice
    - Maintain some **compensating balances** required by banks, *etc*.
- **Investment in fixed assets**
  - Property, plant and equipment
- **Working capital requirement**
  - Fixed assets alone cannot produce sales and profits
  - The firm's **operating activities** require investments in inventories and receivables generated by the firm's **operating cycle** (see **Exhibit 3.3**)
    - The *net* investment the firm must make to support its operating cycle is the sum of its inventories and accounts receivable minus its accounts payable
      - Known at the firm's **working capital requirement** (**WCR**)

EXHIBIT 3.3:
The Firm's Operating Cycle and Its Impact on the Firm's Balance Sheet.

Δ = Change in the balance sheet account

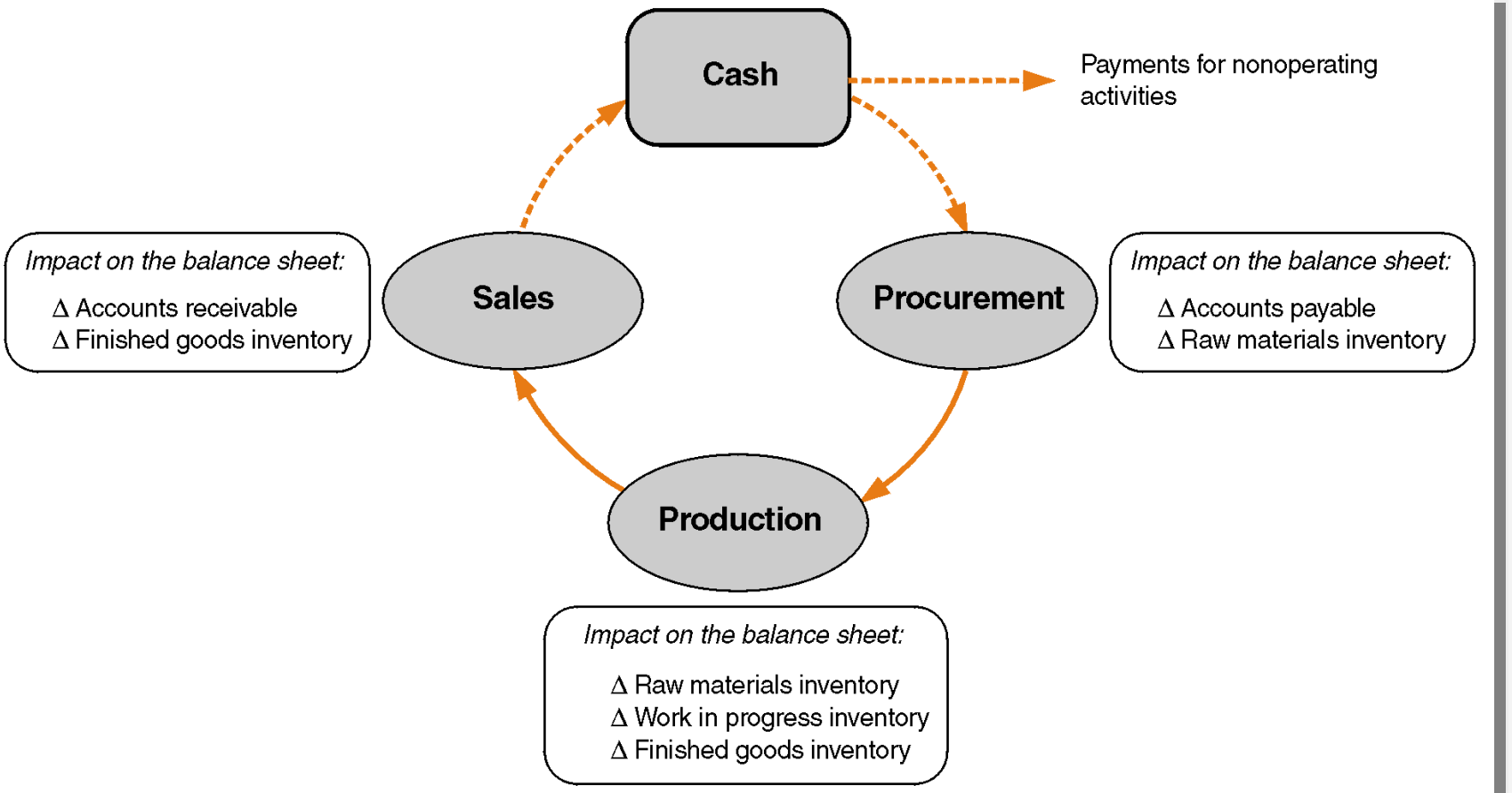
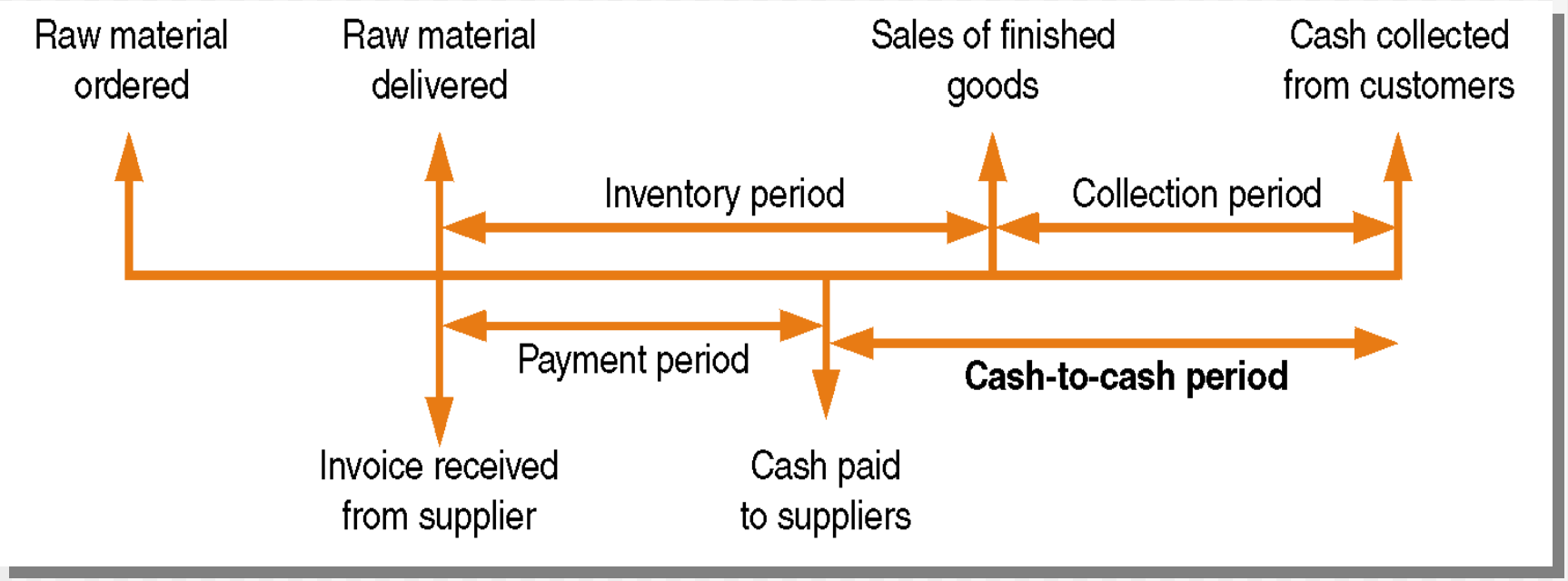


EXHIBIT 3.4:
The Firm's Operating Cycle, Showing Cash-to-Cash Period.



An alternative way to describe the operating cycle in terms of the **cash-to-cash period** is presented in **Exhibit 3.4**.

The Components Of Capital Employed

- A firm's total capital employed can be classified as
  - Equity and debt or
  - **Long-term financing** (equity plus long-term debt) and **short-term financing** (short-term debt)
- The combination of equity and debt capital affects the firm's profitability and financial risk (see Modules 5 and 11)
- The proportions of long-term debt and short-term debt affect primarily the firm's liquidity (the subject of this Module)

EXHIBIT 3.6:
OS Distributor's Managerial Balance Sheets.

All data from the balance sheets in Exhibit 3.1; figures in millions of dollars

	DEC. 31, 1998		DEC. 31, 1999		DEC. 31, 2000	
INVESTED CAPITAL OR NET ASSETS						
• Cash	$ 6.0	5%	$12.0	10%	$ 8.0	6%
• Working capital requirement (WCR)[1]	59.0	49%	63.0	50%	77.0	56%
• Net fixed assets	56.0	46%	51.0	40%	53.0	38%
TOTAL INVESTED CAPITAL OR NET ASSETS	$121.0	100%	$126.0	100%	$138.0	100%
CAPITAL EMPLOYED						
• Short-term debt	$ 15.0	12%	$ 22.0	17%	$ 23.0	17%
• Long-term financing	106.0	88%	104.0	83%	115.0	83%
Long-term debt	$42.0		$34.0		$38.0	
Owners' equity	64.0		70.0		77.0	
TOTAL CAPITAL EMPLOYED	$121.0	100%	$126.0	100%	$138.0	100%

[1] WCR = (Accounts receivable + Inventories + Prepaid expenses) – (Accounts payable + Accrued expenses).

The Matching Strategy

- The matching strategy suggests that by matching the life of an asset with the duration of its financing source
  - Firm can minimize its interest-rate risk and funding risk
- Although WCR is made up of current assets and liabilities
  - It is essentially a long-term investment since it will remain in the managerial balance sheet as the operating cycle repeats

EXHIBIT 3.7:
The Behavior of Working Capital Requirement over Time for a Firm with Seasonal Sales.

WCR is assumed to be set at 25 percent of sales

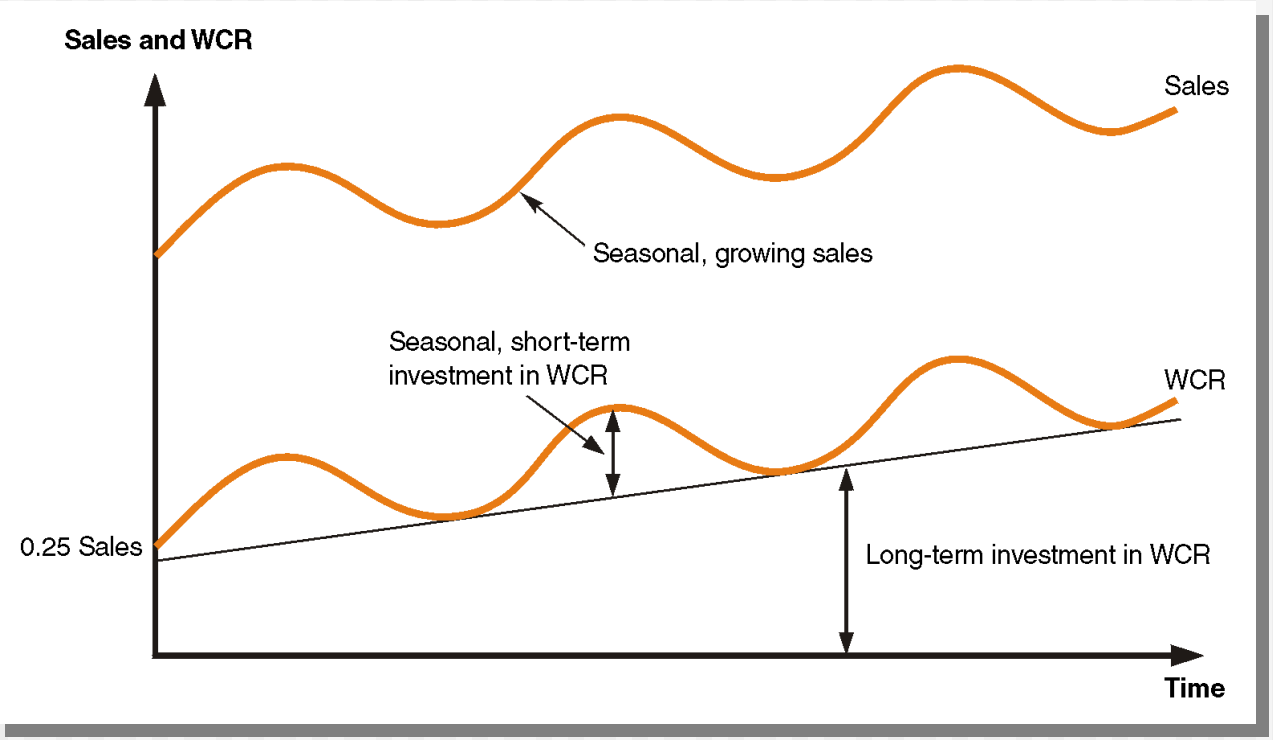


Exhibit 3.7 shows that when sales are seasonal WCR will have a seasonal component, and according to the matching strategy, the permanent component of WCR should be financed with long-term funds (long-term debt and equity) and the seasonal component of WCR with short term funds (short-term debt).

A Measure Of Liquidity Based On The Funding Structure Of Working Capital Requirement

- Although the objective may be a matching strategy
  - At times a significant portion of a firm's working capital is funded with short-term debt
    - Can create a liquidity problem
- This section presents a measure of liquidity based on the funding structure of working capital requirement

A Measure Of Liquidity Based On The Funding Structure Of Working Capital Requirement

- Any long-term financing in excess of net fixed assets (called net long-term financing or NLF) can be used to fund WCR and cash
  - See Exhibit 3.8 for OS Distributors' NLF
- The amount of short-term debt in excess of cash is called net short-term financing or NSF
  - Also shown in Exhibit 3.8
- The ratio of NLF to WCR is the firm's liquidity ratio
- Normally, the higher the proportion of WCR financed with long-term funds, the more liquid the firm

EXHIBIT 3.8a:
OS Distributor's Net Investment in Its Operating Cycle and Its Financing.

All data from the balance sheets in Exhibit 3.1; figures in millions of dollars

DECEMBER 31, 1998	DECEMBER 31, 1999	DECEMBER 31, 2000
NET INVESTMENT IN THE OPERATING CYCLE OR WORKING CAPITAL REQUIREMENTS (WCR)		
WCR = [Accounts receivable + Inventories + Prepaid expenses] – [Accounts payable + Accrued expenses		
[$44 + $52 + $2] – [$37 + $2] = $59	**[$48 + $57 + $2] – [$40 + $4] = $63**	**[$56 + $72 + $1] – [$48 + $4] = $77**
THE FINANCING OF THE OPERATING CYCLE		
Net long-term financing (NLF) = Long-term debt + Owners' equity – Net fixed assets		
$42 + $64 – $56 = $50	**$34 + $70 - $51 = $53**	**$38 + $77 - $53 = $62**
Net short-term financing (NSF) = Short-term debt – Cash		
$15 - $6 = $9	**$22 - $12 = $10**	**$23 - $8 = $15**
Net long-term financing ÷ working capital requirement **Percentage of working capital financed long term**		
$50/$59 = 84.7%	**$53/$63 = 84.1%**	**$62/$77 = 80.5%**
Net short-term financing working capital requirement **Percentage of working capital requirement financed short term**		
$9/$59 = 15.3%	**$10/$63 = 15.9%**	**$15/$77 = 19.5%**

EXHIBIT 3.8b:
OS Distributor's Net Investment in Its Operating Cycle and Its Financing.

All data from the balance sheets in Exhibit 3.1; figures in millions of dollars

DECEMBER 31, 1998			DECEMBER 31, 1999			DECEMBER 31, 2000		
WORKING CAPITAL REQUIREMENT AND ITS FINANCING								
WCR $59	NSF $9	15.3%	WCR $63	NSF $10	15.9%	WCR $77	NSF $15	19.5%
	NLF $50	84.7%		NLF $53	84.1%		NLF $62	80.5%
		100%			100%			100%

Improving Liquidity Through Better Management Of The Operating Cycle

- A firm's liquidity is the consequence of decisions that affect its NLF and WCR
  - Liquidity position will improve if:
    - Long-term financing increases, and/or
    - Net fixed assets decrease, and/or
    - WCR decreases
- Decisions related to the management of long-term financing and net fixed assets are strategic in nature
  - Infrequent and prepared well in advance
    - Therefore, their impact on the firm's liquidity can be easily forecast

Improving Liquidity Through Better Management Of The Operating Cycle

- Decisions affecting the firm's WCR are related to the management of the firm's operating cycle
  - Made frequently and are difficult to forecast
    - Therefore, the lower their frequency, the less volatile is the firm's liquidity position and the easier it is to manage
- Controlling WCR successfully requires the understanding of three basic factors that affect its size (through their impact on WCR's components):
  - Nature of the economic sector
  - Degree of managerial efficiency
  - Level and growth of sales

The Impact Of The Firm's Sector On Its Working Capital Requirement

- The sectoral effect can be measured by the ratio of WCR to sales
  - Exhibit 3.9 reports this ratio for a number of U.S. industries
    - Should understand why an equipment manufacturer normally needs more working capital than a grocery store chain to support the same level of sales
  - Exhibit 3.10 illustrates the ratio calculations for OS Distributors

EXHIBIT 3.9a:
Some Benchmark Ratios of Working Capital Requirement to Sales for a Sample of U.S. Economic Sectors in 1999[1].

WORKING CAPITAL REQUIREMENT AS PERCENTAGE OF SALES			
Sector		Sector	
Machinery & equipment	25%	Beverages	10%
Apparel products	24%	Food	9%
Textile	22%	Wood products and buildings	9%
Aircraft	21%	Publishing	9%
Wholesales: Durables	19%	Soap & perfumes	6%
Department stores	18%	Electric services	4%
Steel works	16%	Retail: Nongrocery stores	4%
Plastic products	13%	Natural gas distribution	2%
Paper	13%	Wholesale: Nondurables	0%
Computer equipment	12%	Grocery stores	0%
Motor vehicles	12%	Air transport	-3%
Average all sectors: 11%			

[1] Source: Calculated by the authors using *Compustat* data.

The Impact Of Managerial Efficiency On Working Capital Requirement

- Several ratios can be used to estimate the efficiency with which a firm manages the components of its working capital requirement
  - Inventory turnover
    - Defined as the ratio of its cost of goods sold to its end-of-period inventories
      - The higher the inventory turnover the higher the efficiency with which the firm manages its inventories
  - Average collection period
    - The number of days' worth of sales that have not yet been collected at the date of the balance sheet
      - The faster the bills are collected, the lower the firm's WCR
  - Average payment period
    - The number of days worth of purchases that have not yet been paid
      - The longer the average payment period, the lower the firm's WCR

EXHIBIT 3.10:
OS Distributor's Management of Its Operating Cycle.

All data from the balance sheets in Exhibit 3.1 and the income statements in Exhibit 2.2; figures in millions of dollars

	OBJECTIVE	DEC. 31, 1998	DEC. 31, 2000
$\frac{\text{Working capital requirement (WCR)}^{1}}{\text{Sales}}$	To evaluate the overall efficiency with which the firm's operating cycle is managed	$\frac{\$59}{\$390} = 15\%$	$\frac{\$77}{\$420} = 16\%$
$\frac{\text{Cost of goods sold (COGS)}}{\text{Inventories}}$	To evaluate the efficiency with which inventories are managed	$\frac{\$328}{\$52} = 6.3$ times	$\frac{\$400}{\$72} = 5.6$ times
$\frac{\text{Accounts receivable}}{\text{Average daily sales}^{2}}$	To evaluate the efficiency with which accounts receivable are managed	$\frac{\$44}{\$390/365} = 41$ days	$\frac{\$56}{\$480/365} = 43$ days
$\frac{\text{Accounts payable}}{\text{Average daily purchases}^{2,3}}$	To evaluate the efficiency with which accounts payable are managed	$\frac{\$37}{\$332/365} = 41$ days	$\frac{\$48}{\$415/365} = 42$ days

[1] WCR is found in Exhibit 3.6.
[2] We assume the year has 365 days.
[3] Purchases are equal to COGS plus the *change* in inventories (see equation 3.11). In 1994, inventories were $48, thus purchases (1995) = $328 + ($52 – $48) = $332. Purchases (1996) = $353 + ($57 – $52) = $358; and purchases (1997) = $400 + ($72 – $57) = $415.

The Impact Of Sales Growth On Working Capital Requirement

- If there is no change in the efficiency with which the firm's operating cycle is managed
  - Can expect WCR to grow approximately at the same rate as sales
    - Thus, sufficient funding has to be secured so the firm's WCR keeps up with the projected sales growth
  - An unplanned or unexpected growth in sales may create liquidity problems
- Inflation also puts pressure on the firm's WCR
- Exhibit 3.11 illustrates the quest of some manufacturing firms for zero WCR

Traditional Measures Of Liquidity

- Traditional measures of liquidity are often not reliable indicators of the firm's liquidity
  - Net working capital
    - Traditional definition of net working capital (NWC) has a limited value because of its liquidation view of the firm as opposed to the going-concern approach
    - NWC is the same as NLF defined earlier, which once again indicates that NWC is the net result of the firm's long-term strategic decisions
    - Exhibit 3.12 shows NWC calculations (both ways) for OS Distributors

EXHIBIT 3.12:
OS Distributor's Net Working Capital (NWC) and Current and Quick Ratios.

All data from the balance sheets in Exhibit 3.1; figures in millions of dollars

	DEC. 31, 1998	DEC. 31, 1999	DEC. 31, 2000
NWC = [Current assets – Current liabilities][1]	$104 – $54 = $50	$119 – $66 = $53	$137 – $75 = $62
NWC = [Long-term financing[2] – Net fixed assets][3]	($42 – $64) – $56 = $50	($34 + $70) – $51 = $53	($38 + $77) – $53 = $62
Current ratio = $\frac{\text{Current assets}}{\text{Current liabilities}}$	$\frac{\$104}{\$54} = 1.93$	$\frac{\$119}{\$66} = 1.80$	$\frac{\$137}{\$75} = 1.83$
Quick ratio = $\frac{\text{Cash + Accts receivable}}{\text{Current liabilities}}$	$\frac{\$6 + \$44}{\$54} = 0.93$	$\frac{\$12 + \$48}{\$66} = 0.91$	$\frac{\$8 + \$56}{\$75} = 0.85$

[1] This is the traditional definition of net working capital.
[2] Long-term financing = Long-term debt + Owners' equity.
[3] According to this definition, net working capital is the same as net long-term financing (see equation 3.4).

Traditional Measures Of Liquidity

- Current ratio
  - Often said that the larger the current ratio, the more liquid the firm is
    - However, a firm's current ratio can be increased by
      - Having clients pay their bills as late as possible
      - Maximizing inventories
      - Paying the firm's suppliers in a hurry
    - These strategies obviously would not increase the firm's liquidity
    - Therefore, the current ratio cannot be considered a reliable measure of liquidity
- Acid test or quick ratio
  - Although the quick ratio is an improvement over the current ratio, it still emphasizes a liquidation view of the firm
  - Also, a firm's inventories (which are excluded from the quick ratio on the assumption that they are less liquid than receivables) are often as liquid as the firm's receivables