

Chapter 6

Depreciation and Financial Accounting

MSCI 261
SECTION 1 (CHE/GEOE) AND SECTION 2 (SOFTWARE)

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Overview

- ❑ Reasons for Depreciation
- ❑ Straight-Line vs Declining-Balance Depreciation
- ❑ Elements of Financial Accounting
- ❑ Financial Ratio Analysis

Reasons for Depreciation Estimates

- Financial statements
- Estimation of salvage values

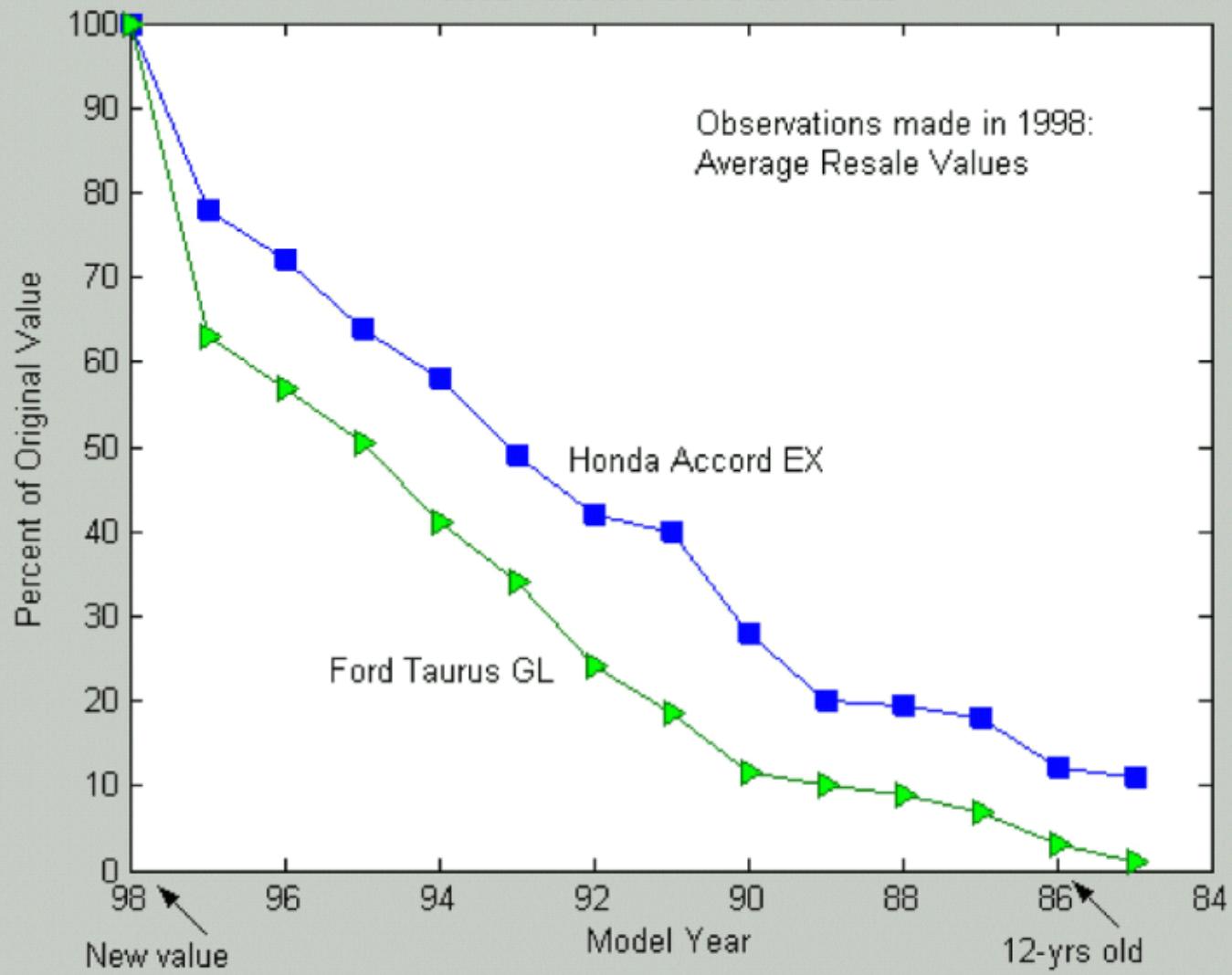
Example 6-1. Assets lose value for a variety of reasons. Give an example for each of the following types of reasons:

- use-related physical loss
- time-related physical loss
- loss due to obsolescence

Example 6-2. Give an example of an asset that might NOT lose value over time.

Used Values: Accord vs. Taurus

Observations made in 1998:
Average Resale Values



Normal use of depreciation as an "expense" instead of actual cash flow

Consider 10 years of income statements (simplified) for a company that must replace its equipment every 5 years @ \$120 thousand

A. Income Statement, with Depreciation Approach (thousands of \$)

	Year									
<u>Revenues</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>
Net Revenue from Sales	100	100	100	100	100	100	100	100	100	100
<u>Expenses</u>										
Operating Expenses	60	60	60	60	60	60	60	60	60	60
Depreciation Expenses	24	24	24	24	24	24	24	24	24	24
Total Expenses	84	84	84	84	84	84	84	84	84	84
<u>Profit Before Taxes</u>	16	16	16	16	16	16	16	16	16	16

Profit is steady in time: company performs just as well in every year.

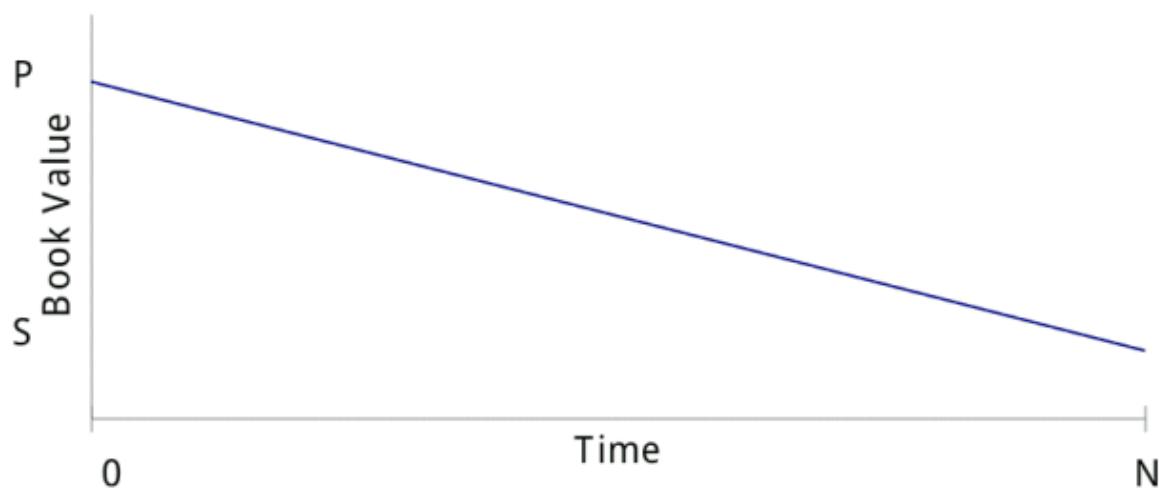
What is **never** done, because it is misleading

B. Income Statement, with "Cash Flow" Approach										
	Year									
<u>Revenues</u>	1	2	3	4	5	6	7	8	9	10
Net Revenue from Sales	100	100	100	100	100	100	100	100	100	100
<u>Expenses</u>										
Operating Expenses	60	60	60	60	60	60	60	60	60	60
Equipment Cash Outflow	120					120				
Total Expenses	180	60	60	60	60	180	60	60	60	60
<u>Profit Before Taxes</u>	-80	40	40	40	40	40	-80	40	40	40
Profit is high in most years, but disastrous "losses" when equipment is replaced. This suggests that equipment should not be replaced, thus killing the company!										

Estimation of Market Values by Book Value Formulas

(A) Straight-Line Depreciation (SLD)

- Dollar rate of loss is constant over its useful life, i.e., the value decreases linearly
- Easy to calculate but often inaccurate



Straight-Line Depreciation (continued)

P = purchase price

S = salvage value at the end of N periods

N = useful life of asset

Depreciation in period n using SLD:

$$D_{SL}(n) = \frac{P - S}{N}$$

Accumulated depreciation by period n:

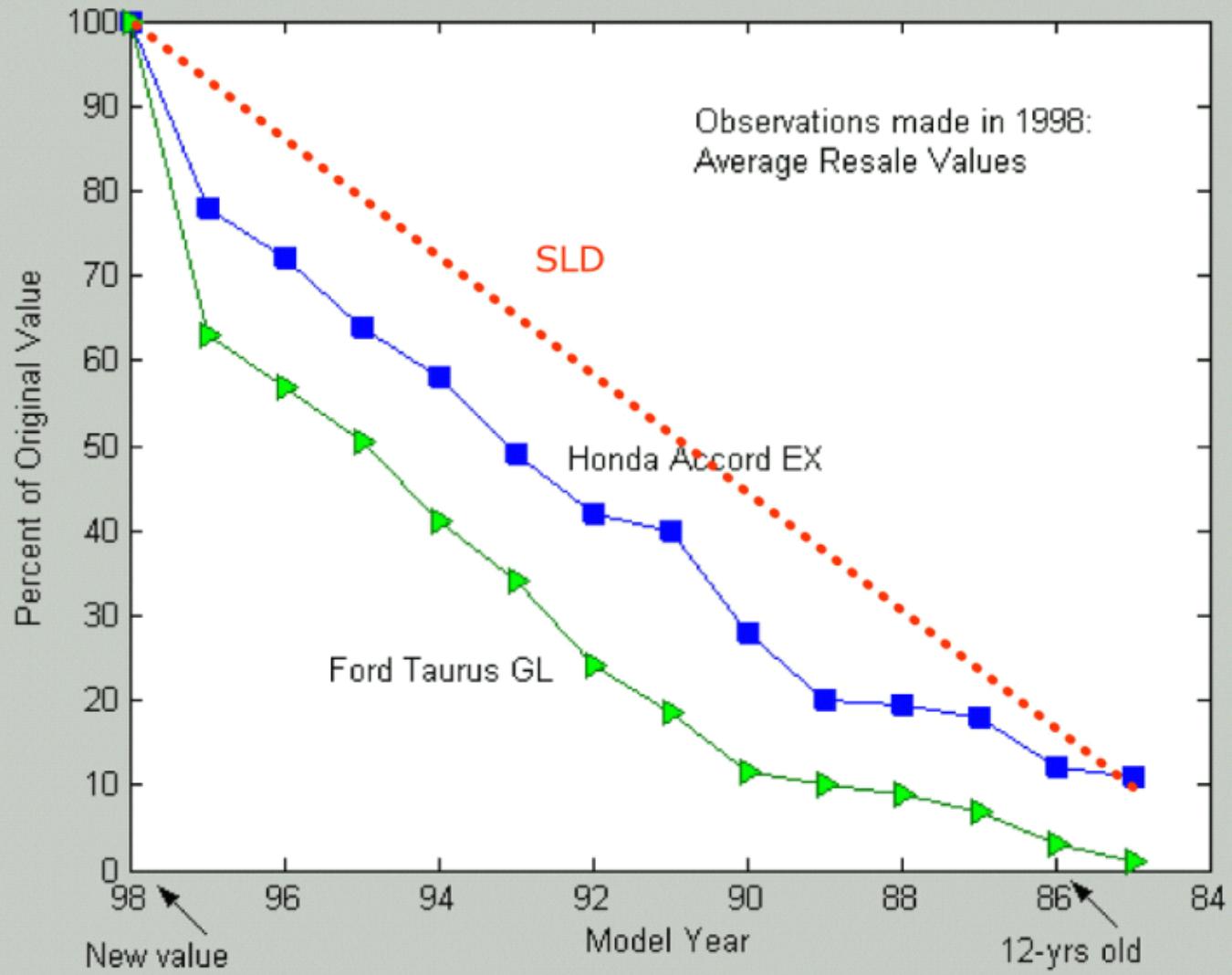
$$P - BV_{SL}(n) = n \left(\frac{P - S}{N} \right)$$

Book value at the end of period n :

$$BV_{SL}(n) = P - n \left(\frac{P - S}{N} \right)$$

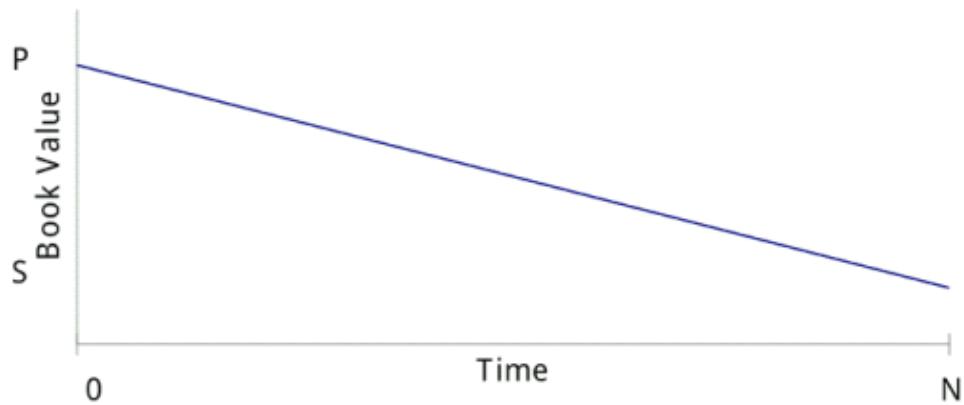
Used Values: Accord vs. Taurus

Observations made in 1998:
Average Resale Values



Example 6-3

An asset was purchased 7 years ago for \$10 000. It was estimated to have a 10 year service life and a salvage value of \$2000 at the end of its service life. If the value of the asset is believed to be depreciating at a constant rate each year (same number of dollars each year), what is its book value today?



(B) Declining Balance Depreciation for Market Value Estimation

Loss in value in a period is a constant proportion of current value

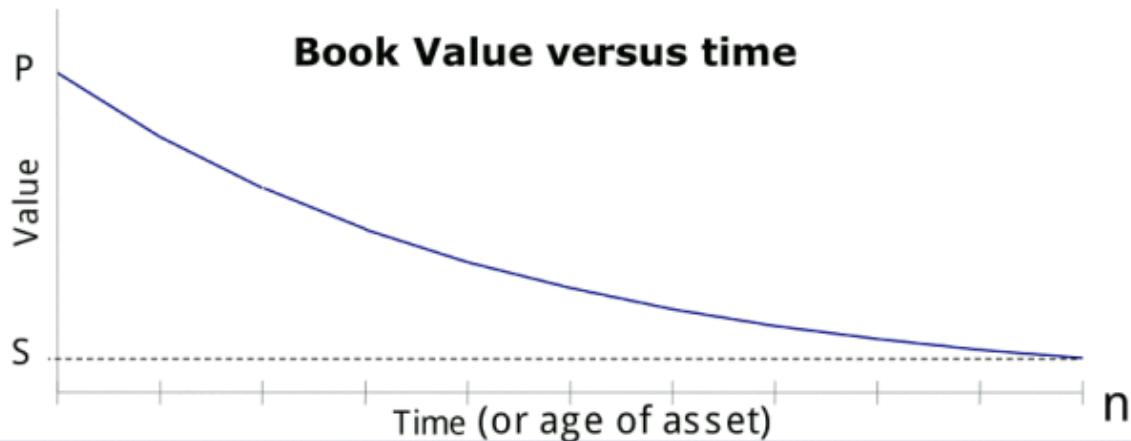
d = depreciation rate (note: $0 < d < 1$), P = purchase price

Initial book value: $BV_{db}(0) = P$

In 1 year: depreciation = $D_{db}(1) = Pd$, book value = $BV_{db}(1) = P - Pd = P(1 - d)^1$

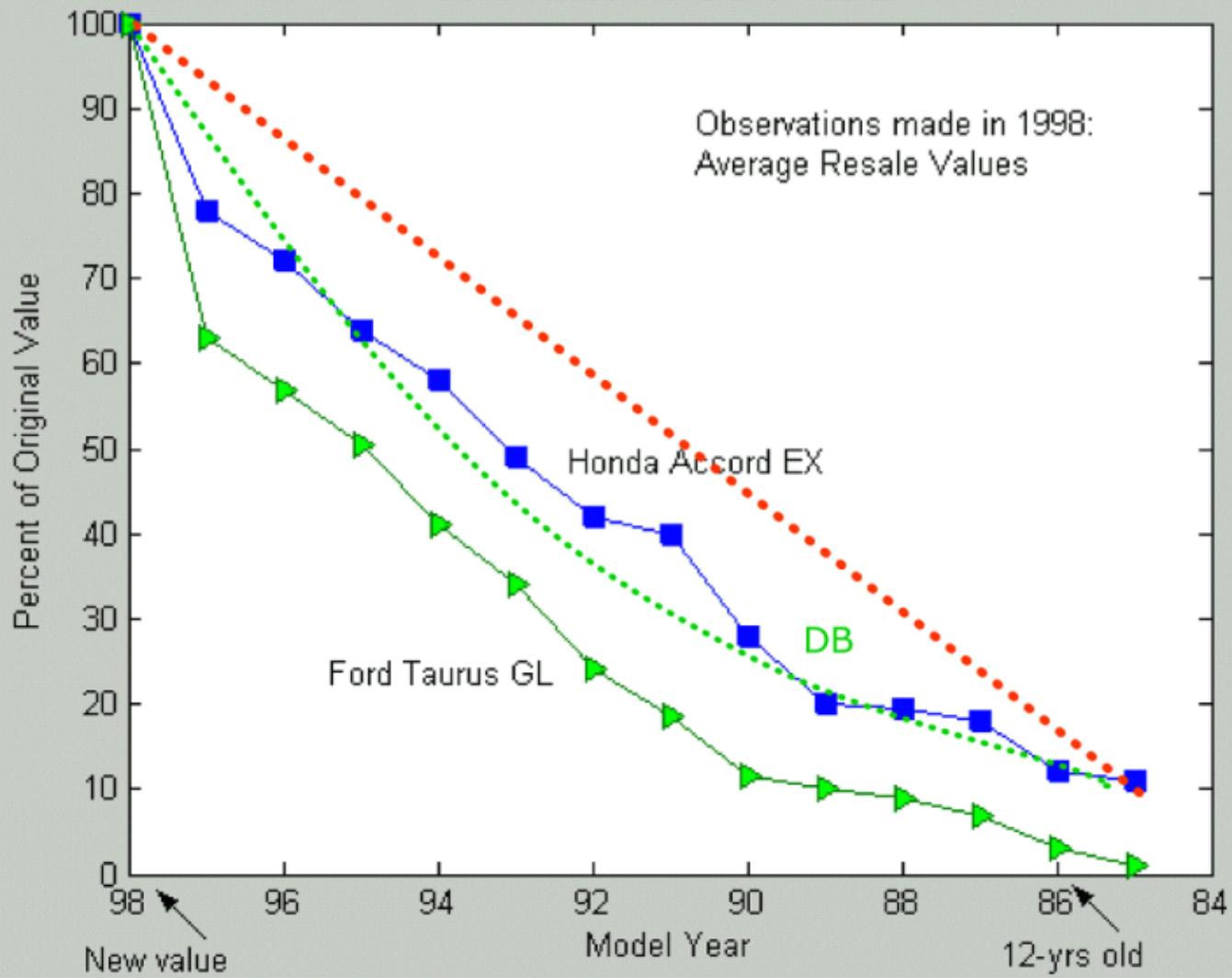
In 2 years: $D_{db}(2) = BV_{db}(1)d = Pd(1 - d)^1$, $BV_{db}(2) = BV_{db}(1) - D_{db}(2) = P(1 - d)^2$

In n years: $D_{db}(n) = Pd(1 - d)^{n-1}$ $BV_{db}(n) = P(1 - d)^n$



Used Values: Accord vs. Taurus

Observations made in 1998:
Average Resale Values



Example 6-4

A new press brake costs Medicine Hat Steel \$780 000. It is expected to last 20 years, with a \$60 000 salvage value. What rate of depreciation for the declining-balance method will produce a book value after 20 years that equals the salvage value of the press? Use this to estimate the book value after 5 years.

Financial Accounting: the Basic Documents

- **Journal:** records daily business transactions chronologically
- **Ledger:** groups those transactions that are recorded in journals into accounts, e.g. accounts receivable, inventory, cash, sales, etc.
- **Cash Flow Statement:** summarised statement of all receipts and payments, for an accounting period

- **Balance Sheet and Income Statement**
 - Produced monthly, quarterly or yearly

Example 6.5: Financial Statements for a New Startup Company

- ❑ Waterloo Widget Inc., during its first year of existence.
- ❑ Money flows into the company's bank account:
 - ❑ Investment startup money from owners and a bank (loan)
 - ❑ Revenue from sales of widgets, but not right away – nothing at first, then a slow buildup
- ❑ Money flows out of the company's bank account:
 - ❑ To buy equipment
 - ❑ To pay salaries
 - ❑ For materials, rent, utilities, etc.
- ❑ Accounting:
 - ❑ Records amounts & times of all cash inflows & outflows
 - ❑ Categorizes and summarizes the cash flows for various reports on the financial state of the company

**Ex. 6-5.
Raw Data**

Cash Inflows & Outflows, Waterloo Widget Inc.'s First Year (1000s of \$)				
Month	Inflow Item	Amount	Outflow Item	Amount
Jan.	owners' shares	200	equipment	150
	sales revenue	0	rent for year	15
			wages	15
			salaries	5
			miscellaneous	5
Feb.	loan from bank	100	materials	4
	sales revenue	10	advertising	50
			wages	35
			salaries	10
			interest	1
			miscellaneous	5
March	sales revenue	200	materials	80
			advertising	30
			wages	45
			salaries	10
			interest	1
			miscellaneous	10
(April to December: same as March)				
Totals for Year:			2310	
Cash Balance, end of Year (total in minus total out):				255
N.B.: corporate income tax has not been deducted yet! See income statement for taxes.				

Income Statement for Waterloo Widget's First Year (in 1000s of \$)	
	(relation to cash inflows & outflows)
<u>Revenues</u>	Money inflows
Sales	
Cost of Goods Sold	Labour, materials & any direct cost of production
Net Revenue from Sales	
<u>Expenses</u>	Money outflows
No assets purchases	Operating Expenses Non-direct costs to produce the goods or services e.g., sales and advertising costs, lease, administrative salaries
No Loans	Depreciation Expenses To recover the assets costs (noncash)
Interest Expenses	Only the interest from loans, mortgages, etc
Total Expenses	
<u>Profit Before Taxes</u>	Income=Net Revenue-expenses
-Income tax @ 30%	-0.3Income
<u>Profit After Taxes</u>	0.7Income

Equip Bought for \$100k
 Acc. Dep. \$50k
 $BV = \$50k$

Sell for \$130k; loss of 20k \Rightarrow decrease Ret. Earnings
 by \$20k.

\Downarrow Decrease: Equipment by \$50k } Decrease in Total
 Increase: Cash by \$30k } Assets by \$20k

Balance Sheet at End of Waterloo Widget's First Year
 (in 1000s of \$)

Assets

Current Assets

All the resources owned by the company

All that can be converted to cash within one year

Cash

Also receivables, inventories, securities

Long-Term Assets

Those used to produce and deliver the goods; last more than a year.

Equipment

Machinery, vehicles, owned buildings, copyrights

- accumulated depreciation

Total long-term assets

Total Assets

Liabilities

Current Liabilities

All that the company owes

All that is due within one year

Loans with a near-future maturity, accounts payable

Long-Term Liabilities

Loan Mortgages, etc (only the principal amount, not future interest payments)

Owners' Equity

Net worth of the company

Shares

Original injection of owners' share money

Retained Earnings

Operation profits plus any other gain/loss, minus dividends

Total Liabilities & Owners' Equity

Equal total assets

Example 6.5.

Income Statement for Waterloo Widget's First Year (in 1000s of \$)	
(relation to cash inflows & outflows)	
<u>Revenues</u>	
Sales	
-Cost of Goods Sold	
Net Revenue from Sales	
<u>Expenses</u>	
Operating Expenses	
Depreciation Expenses	D
Interest Expenses	
Total Expenses	
Profit Before Taxes	A-D
-Income tax @ 30%	$-.3(A-D)$
Profit After Taxes	.7(A-D)

Example 6.5.

Balance Sheet at End of Waterloo Widget's First Year (in 1000s of \$)				
<u>Assets</u>				
Current Assets				
Cash	L+	E+	A-	B-.3(A-D)
Long-Term Assets				
Equipment		B		
-accumulated depreciation		D		
Total long-term assets		B-D		
Total Assets	$[L+E+A-B-.3(A-D)]+(B-D) = L+E+.7(A-D)$			
<u>Liabilities</u>				
Current Liabilities				
Long-Term Liabilities				
Loan		L		
Owners' Equity				
Shares		E		
Retained Earnings		.7(A-D)		
Total Liabilities & Owners' Equity		L+E+.7(A-D)		

Example 6-5.
Use the data
to fill in the
statements.

Cash Inflows & Outflows, Waterloo Widget Inc.'s First Year (1000s of \$)				
Month	Inflow Item	Amount	Outflow Item	Amount
Jan.	owners' shares	200	equipment	150
	sales revenue	0	rent for year	15
			wages	15
			salaries	5
			miscellaneous	5
Feb.	loan from bank	100	materials	4
	sales revenue	10	advertising	50
			wages	35
			salaries	10
			interest	1
			miscellaneous	5
March	sales revenue	200	materials	80
			advertising	30
			wages	45
			salaries	10
			interest	1
			miscellaneous	10
(April to December: same as March)				
Totals for Year:			2310	
Cash Balance, end of Year (total in minus total out):				255
N.B.: corporate income tax has not been deducted yet!				
See income statement for taxes.				

Example 6.5:
Year 2003.

Income Statement for Waterloo Widget's First Year (in 1000s of \$)		
(relation to cash inflows & outflows)		
<u>Revenues</u>		
Sales	All sales	$0+10+200*10=2010$
-Cost of Goods Sold	Materials and wages $(4+80*10)+(12+35+45*10)=804+500=1304$	
Net Revenue from Sales		$2010-1304=706$
<u>Expenses</u>		
Operating Expenses	Salaries+rent+misc.+adv. $(5+10+10*10)+15+(5+5+10*10)+(50+30*10)=590$	
Depreciation Expenses	Declining balance at 20% $150*.2=30$	
Interest Expenses	$1+1*10=11$	
Total Expenses		$590+11+30=631$
Profit Before Taxes		$706-631= 75$
-Income tax @ 30%		$0.3*75=22.5$
Profit After Taxes		$0.7*75=52.5$

Example 6.5:
Year 2003

Balance Sheet at End of Waterloo Widget's First Year	
(in 1000s of \$)	
<u>Assets</u>	
Current Assets	
Cash	$200+100+105-150-22.5=255-22.5=232.5$
Long-Term Assets	
Equipment	150
-accumulated depreciation	$150*.2=30$
Total long-term assets	$150-30=120$
Total Assets	$232.5+120=352.5$
<u>Liabilities</u>	
Current Liabilities	0
Long-Term Liabilities	100
Loan	
Owners' Equity	
Shares	200
Retained Earnings	52.5 (assuming no dividends)
Total Liabilities & Owners' Equity	$100+200+52.5=352.5$

Example 6-6: Fill in the 9 blanks in the balance sheet for 2004, using information in the income statements for 2003 and 2004, the balance sheet for 2003, and the additional information below the 2004 income statement.

Income Statement, Waterloo Widget, 2004 (in 1000s of \$)		Balance Sheet, Waterloo Widget, 2004 (in 1000s of \$)	
<u>Revenues</u>		<u>Assets</u>	
Sales	3090.0	Current Assets	
-Cost of Goods Sold	<u>1978.0</u>	Cash	
Net Revenue from Sales	1112.0	Long-Term Assets	
<u>Expenses</u>		Equipment	
Operating Expenses	964.0	-accumulated depreciation	
Depreciation Expenses	44.0	Total long-term assets	
Interest Expenses	<u>11.0</u>	Total Assets	
Total Expenses	1019.0		
<u>Profit Before Taxes</u>		<u>Liabilities and Owners' Equity</u>	
-Income tax @ 30%	27.9	Current Liabilities	0.0
Profit After Taxes	65.1	Long-Term Liabilities	
Additional Information about 2004: Profit went to retained earnings (no dividends). New equipment was purchased for \$100 thousand. Only the interest was paid on the loan, no principal.		Loan	
		Owners' Equity	
		Shares	
		Retained Earnings	
		Total Liabilities & Owners' Equity	

Petit Ourson Ltée
Comparative Balance Sheets
for the Years Ending 1997 and 1998
(in thousands of dollars)

	1997	1998
Assets		
<i>Current Assets</i>		
Cash	500	375
Accounts receivable	1 125	1 063
Inventories	1 375	1 563
Total Current Assets	<u>3 000</u>	<u>3 000</u>
<i>Long-Term Assets</i>		
Plant and equipment	5 500	6 500
Less: Accumulated depreciation	2 500	3 000
Net Plant and Equipment	<u>3 000</u>	<u>3 500</u>
Total Long-Term Assets	<u>3 000</u>	<u>3 500</u>
Total Assets	<u><u>6 000</u></u>	<u><u>6 500</u></u>
Liabilities and Owners' Equity		
<i>Current Liabilities</i>		
Accounts payable	500	375
Working capital loan	000	375
Total Current Liabilities	<u>500</u>	<u>750</u>
<i>Long-Term Liabilities</i>		
Bonds	1 500	1 500
Total Long-Term Liabilities	<u>1 500</u>	<u>1 500</u>
<i>Owners' Equity</i>		
Common shares	750	750
Contributed capital	1 500	1 500
Retained earnings	1 750	2 000
Total Owners' Equity	<u>4 000</u>	<u>4 250</u>
Total Liabilities and Owners' Equity	<u><u>6 000</u></u>	<u><u>6 500</u></u>

Petit Ourson Ltée
Income Statements
for the Years Ending in 1997 and 1998
(in thousands of dollars)

	1997	1998
Revenues		
Sales	3 000	3 625
Cost of goods sold	1 750	2 125
Net revenue from sales	<u>1 250</u>	<u>1 500</u>
Expenses		
Operating expenses	75	100
Depreciation expense	550	500
Interest expense	125	150
Total expenses	<u>750</u>	<u>750</u>
Profit before Taxes	<u>500</u>	<u>750</u>
Income taxes	200	300
Profit after Taxes	<u>300</u>	<u>450</u>

*accrual method of accounting
- include, in sales, accounts receivable*

Example 6-7.
Fill in the
yellow blanks

Balance Sheets for Zorra Inc.		Income Statements for Zorra Inc.	
		Year ending	
Assets		Revenues	
<i>Current Assets</i>		Sales	359000
Cash		- Cost of goods sold	84500
Accounts receivable	21400	Net Revenue	
Raw materials inventory	37500		
Finished goods inventory	41800		
<i>Long-term Assets</i>			
Property	185000	Expenses	
Equipment	310000	Salaries	
Less accumulated depreciation	181000	Advertising	16700
Total Assets		Rent	21000
		Insurance	15540
		Interest	4800
		Depreciation	35780
<i>Current Liabilities</i>		Total Expenses	220820
Accounts payable	11200	Profit Before Taxes	
<i>Long-term Liabilities</i>		Taxes @25%	
Bank loan	96000	Profit After Taxes	
Total Liabilities	107200		
<i>Owners' Equity</i>			
Original capital from owners	250000		
Accumulated retained earnings	132000		
Total Owners' Equity	382000		
Total Liabilities and Owners' Equity			

Financial Ratio Analysis

Decision makers inside and outside a firm ask:

- 1) can the firm meet short term financial obligations?
- 2) are profits sufficient for the firm's assets?
- 3) how dependent is the firm on its creditors?

We can use information from financial statements

- scale to make independent of firm size:

financial ratio analysis.

- trend analysis** - ratios over a number of periods
- compare to **industry standards**, e.g. from Dun and Bradstreet and Statistics Canada.

Five Ratios

Liquidity Ratios

A firm's reserve of cash and liquid assets is called working capital (needed for emergencies, and expected fluctuations)

Working capital: = total current assets - total current liabilities

$$\underline{1. \text{ current ratio}} \quad = \quad \frac{\text{current assets}}{\text{current liabilities}}$$

(sometimes called the working capital ratio)

A current ratio of 2 is considered adequate.

Larger ratio means ? (good, or bad ?)

Five Ratios (Liquidity ratios, continued)

$$\underline{2. \text{ acid test ratio}} = \frac{\text{quick assets}}{\text{current liabilities}}$$

(also known as quick ratio)

“quick” assets can be quickly converted to cash:

- cash, accounts receivable and marketable securities.
- doesn't include inventory.

An acid test ratio of 1 is considered adequate

Larger ratio means ?

Five Ratios (Debt Management ratios)

Too much debt is a bad thing:

- if sales drop in a recession, then interest payments could be difficult to meet

$$3. \text{ equity ratio} = \frac{\text{total equity}}{\text{total liabilities} + \text{total equity}} = \frac{\text{total equity}}{\text{total assets}}$$

Larger ratio means ?

Equity ratios of 40% are not uncommon, but varies by industry.

Five Ratios (Efficiency Ratios)

One such ratio examines inventory management:

$$4. \text{ inventory turnover ratio} = \frac{\text{sales}}{\text{inventories}}$$

Larger ratio means ?

Five Ratios (Profitability Ratios)

Show how profitably assets have been employed.

5. return on total assets

$$= \frac{\text{profits after taxes}}{\text{total assets}}$$

6. return on equity

$$= \frac{\text{profits after taxes}}{\text{equity}}$$

Larger ratio means ?

Example 6-8: It is 1999. A friend is thinking of investing in Petit Ourson Ltd., a recent listing in the Toronto Stock Exchange. You have the 1997 and 1998 financial statements for Petit Ourson Ltd. and industry norms. What would you advise your friend?

Petit Ourson Ltée Comparative Balance Sheets for the Years Ending 1997 and 1998 (in thousands of dollars)		
	1997	1998
Assets		
<i>Current Assets</i>		
Cash	500	375
Accounts receivable	1 125	1 063
Inventories	1 375	1 563
Total Current Assets	<u>3 000</u>	<u>3 000</u>
<i>Long-Term Assets</i>		
Plant and equipment	5 500	6 500
Less: Accumulated depreciation	2 500	3 000
Net Plant and Equipment	<u>3 000</u>	<u>3 500</u>
Total Long-Term Assets	<u>3 000</u>	<u>3 500</u>
Total Assets	<u>6 000</u>	<u>6 500</u>
Liabilities and Owners' Equity		
<i>Current Liabilities</i>		
Accounts payable	500	375
Working capital loan	000	375
Total Current Liabilities	<u>500</u>	<u>750</u>
<i>Long-Term Liabilities</i>		
Bonds	1 500	1 500
Total Long-Term Liabilities	<u>1 500</u>	<u>1 500</u>
<i>Owners' Equity</i>		
Common shares	750	750
Contributed capital	1 500	1 500
Retained earnings	1 750	2 000
Total Owners' Equity	<u>4 000</u>	<u>4 250</u>
Total Liabilities and Owners' Equity	<u>6 000</u>	<u>6 500</u>

Petit Ourson Ltée Income Statements for the Years Ending in 1997 and 1998 (in thousands of dollars)		
	1997	1998
Revenues		
Sales	3 000	3 625
Cost of goods sold	1 750	2 125
Net revenue from sales	<u>1 250</u>	<u>1 500</u>
Expenses		
Operating expenses	75	100
Depreciation expense	550	500
Interest expense	125	150
Total expenses	<u>750</u>	<u>750</u>
Profit before Taxes	<u>500</u>	<u>750</u>
Income taxes	<u>200</u>	<u>300</u>
Profit after Taxes	<u>300</u>	<u>450</u>

accrual method of accounting
- include, in sales, accounts receivable

Summary of Financial Analysis - Petit Ourson

<input type="checkbox"/> Ratio	Industry Norm	1997	1998
<input type="checkbox"/> Current	4.5	$3000/500=6.0$	$3000/750 =4.0$
<input type="checkbox"/> Acid Test	2.75	$1625/500=3.25$	$1438/750=1.917$
<input type="checkbox"/> Equity Ratio	0.6	$4000/6000=0.667$	$4250/6500=0.654$
<input type="checkbox"/> Inv. Turnover	2.2	$3000/1375=2.182$	$3625/1563=2.32$
<input type="checkbox"/> Return Assets	9%	$300/6000=5\%$	$450/6500=6.9\%$

Difficulty with short term debt in 1998, even though it relies on a reasonable level of debt for its operations. Its inventory management is more efficient in 1998. But its return on assets is very poor.

Don't invest ???

What about the share price ? Maybe it is already depressed.

Example 6-9. Industry Norms Ret.Equity=15% Acid Test = 1.4 Total Inventory Turnover = 4.2 How is Zorra doing?	Balance Sheets for Zorra Inc.			Income Statements for Zorra Inc. Year ending	
	Assets			Revenues	
	Current Assets		74500	Sales	359000
	Cash			- Cost of goods sold	84500
	Accounts receivable		21400	Net Revenue	274500
	Raw materials inventory		37500		
	Finished goods inventory		41800		
	Long-term Assets			Expenses	
	Property		185000	Salaries	127000
	Equipment	310000		Advertising	16700
	Less accumulated depreciation	181000	129000	Rent	21000
	Total Assets		489200	Insurance	15540
		Liabilities & Owners' Equity		Interest	4800
	Current Liabilities			Depreciation	35780
	Accounts payable		11200	Total Expenses	220820
	Long-term Liabilities			Profit Before Taxes	53680
	Bank loan		96000	Taxes @ 25%	13420
	Total Liabilities		107200	Profit After Taxes	40260
	Owners' Equity				
	Original capital from owners		250000		
	Accumulated retained earnings		132000		
	Total Owners' Equity		382000		
	Total Liabilities and Owners' Equity		489200		

Read for next class

Chapter 7 from textbook