Accounting for inventory

Objectives

- Understand three accounting decisions
  - Product Costing (managerial accounting)
  - Cost-flows from inventory to cogs
  - Valuation adjustments (after midterms)

- Begin to understand the related
  - Alternative accounting rules (focus on LIFO and FIFO)
  - Reporting consequences
  - Terms and concepts
  - Computations
  - Tax effects

Accounting for inventory

The “ins” and “outs” of inventory accounting

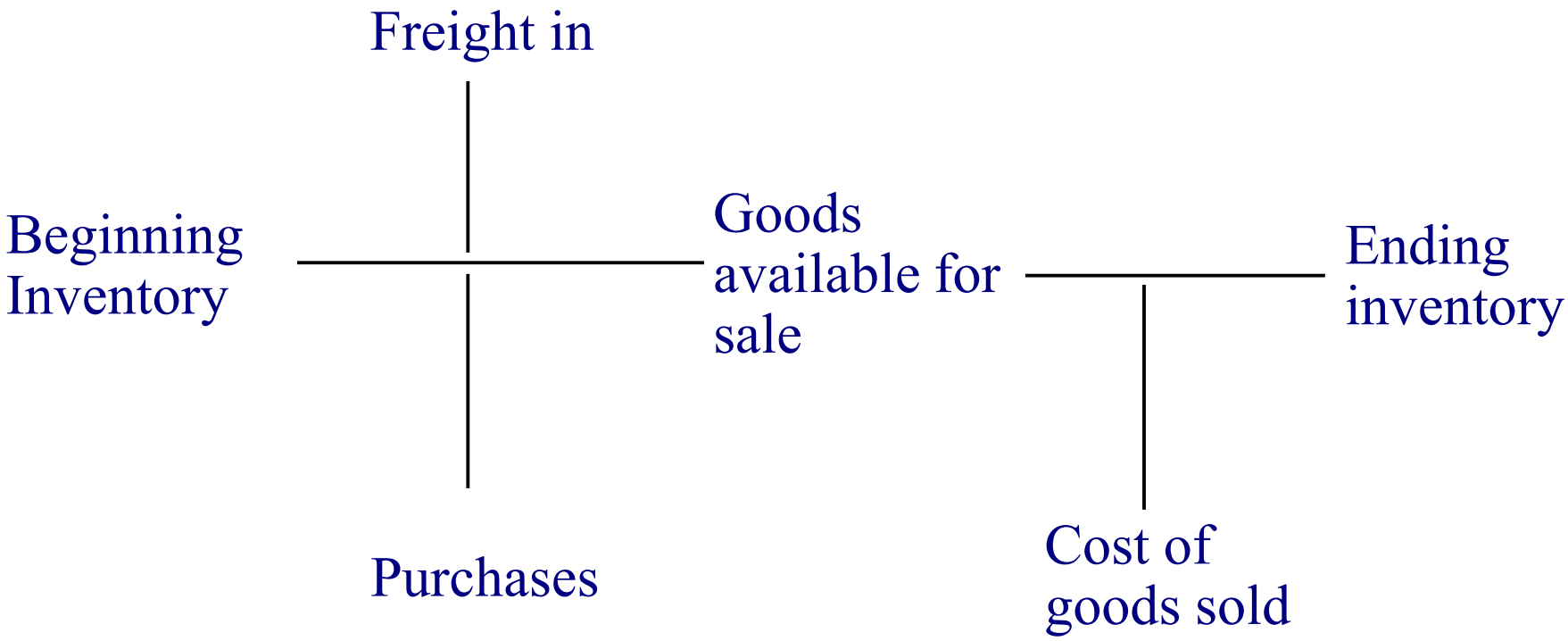
- Product Costing Decision:

  What costs flow into each product's inventory account?

- Cost Flow & Valuation Decisions

  When are costs transferred from the Balance Sheet to the Income Statement?

Accounting for inventory



The "ins" of inventory accounting

The "outs" of inventory accounting

Accounting for inventory

	Output Units Produced and Sold	
	Year 1	Year 2
Units at start of year	0	4
Units produced	7	5
Units available for sale	7	9
Units sold	3	4
Units at end of year	4	5

First year production

Second year production

Accounting for inventory

Do we need physical flow to dictate cost flow?

- Circuit City, Inc. (Retail operations) vs. CarMax Auto Superstore

Accounting for inventory

Alternatives

	Advantages	Disadvantages
Specific identification		
First-In,First Out (FIFO)		
Last-In,First Out (LIFO)		
Average Cost		

Accounting for inventory

A Comparison of LIFO and FIFO

	Income Statement	Balance Sheet
LIFO		
FIFO		

Accounting For Inventory

Cost of goods sold and ending inventory: LIFO vs. FIFO

	Product 1	
	Year 1	Year 2
Units at start of year	0	4@$8
Units produced	7@$8	5@$10
Units available for sale	7@$8	9
Units sold	3@$8	4
Units at end of year	4@$8	5

In year 2....

LIFO cogs	4x$10	=	$40
LIFO ei	1x$10 + 4x$8	=	$42
LIFO cogs + ei		=	$82
FIFO cogs	4x$8	=	$32
FIFO ei	5x$10	=	$50
FIFO cogs + ei		=	$82

Accounting for inventory

BSE entries

- Inputs for product 1 purchased for cash, year 2

32 BB ⬅

Cash	+ Inventory	= L + E
-50	+50	

- 4 units sold for $20 each in cash. LIFO cost used for matching

Cash	+ Inventory	=	L	+ RE
80		=	80	
	- 40	=	- 40	

Note: profit = $40
EInv, yr. 2 = $42

- 4 units sold for $20 each in cash, but FIFO used for matching

Cash	+ Inventory	= L	+ RE
80		= 80	
	-32	= - 32	

Note: profit = $48
EInv,yr. 2 = $50

Accounting for inventory

LIFO vs. FIFO over time

- Different "cost layers" of inventory

LIFO	FIFO
1@$10	5@10
4@$8	

Cumulative difference: $EInv_{FIFO}$- $EInv_{LIFO}$ = "LIFO Reserve"$_{pretax}$

- Under increasing input prices,

	$EInv_{LIFO}$	≤	$EInv_{FIFO}$
Year 2:	$42		$50

Are FIFO firms' inventories more valuable?

Accounting for inventory

LIFO vs. FIFO over time

- Under increasing input prices and continuous buildup of cost layers,

	$\text{Gross profit}_{\text{LIFO}}$	$\leq$	$\text{Gross profit}_{\text{FIFO}}$
Year 2:	$40		$48

Are FIFO firms more profitable?

Accounting for inventory

LIFO vs. FIFO over time

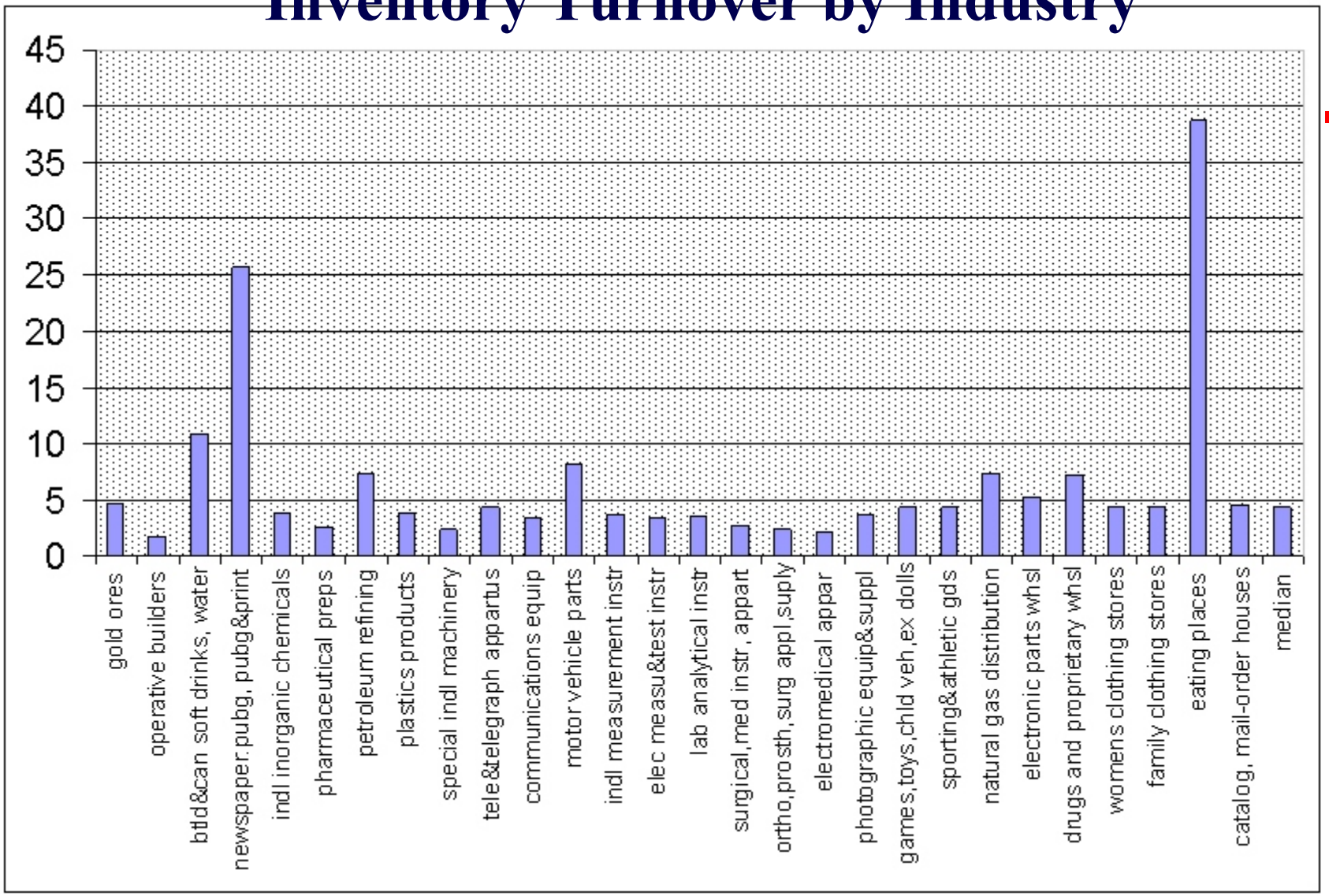
- Inventory turnover: units sold per average units in inventory
  - Based on physical units : $4/[(4+5)/2)] = 0.89$
  - Based on FIFO \$: $32/[(32+50)/2] = 0.78$
  - Based on LIFO \$: $40/[(32+42)/2] = 1.08$

- Under increasing input prices and continuous buildup of cost layers,

	ITO_{LIFO}	$\geq$	ITO_{FIFO}
Year 2:	1.08		0.78

Are LIFO firms more efficient?

Inventory Turnover by Industry



Accounting for inventory

Comparability

$$EInv_{FIFO} = BInv_{FIFO} + Inputs - COGS_{FIFO}$$

$$EInv_{LIFO} = BInv_{LIFO} + Inputs - COGS_{LIFO}$$

The amount of input does not depend upon the choice of LIFO/FIFO.

$$EInv_{FIFO} - EInv_{LIFO} = BInv_{FIFO} - BInv_{LIFO} + COGS_{LIFO} - COGS_{FIFO}$$

$$\text{Change in LIFO Reserve} = COGS_{LIFO} - COGS_{FIFO}$$

The change in LIFO Reserve tells us the difference in cost between LIFO and FIFO.

U.S. Steel

Statement of Operations (in millions)	**2001**	**2000**	**1999**
Revenues and other income:			
Revenues	$6,286	$6,090	$5,536
Income (loss) from investees	64	(8)	(89)
Net gains on disposal of assets	22	46	21
Other income	3	4	2
Total revenues and other income	6,375	6,132	5,470
Costs and expenses:			
Cost of revenues	6,091	5,656	5,084
SG&A expenses (credits)	92	(223)	(283)
Depreciation, depletion, and amort.	344	360	304
Taxes other than income taxes	253	235	215
Total costs and expenses	6,780	6,028	5,320
Income (loss) from operations	**(405)**	**104**	**150**

Balance Sheet (in millions), December 31	**2001**	**2000**
Assets		
Current assets:		
Cash and cash equivalents	$147	$219
Receivables, less allowance for doubtful accounts (of $165 and $57)	802	625
Receivables subject to a security interest	---	350
Receivables from Marathon	28	366
Inventories	870	946
Deferred income tax benefits	216	201
Other current assets	10	10
Total current assets	**2,073**	**2,717**

- Courtesy of U.S. Steel, 2001 Annual Report

U.S. Steel

Inventories are carried at lower of cost or market on a worldwide basis. Cost of inventories is determined primarily under the last-in, first-out (LIFO) method.

December 31, in millions	**2001**	**2000**
Inventories		
Raw materials	$184	$214
Semi-finished products	388	429
Finished products	202	210
Supplies and sundry items	96	93
TOTAL	870	946

Current acquisition costs were estimated to exceed the above inventory values at December 31 by approximately $410 million in 2001 and $380 million in 2000.

- Courtesy of U.S. Steel, 2001 Annual Report

Accounting for inventory

Intel ITO 2001	USX ITO 2001	Adj. USX ITO 2001
COGS = 13,487	COGS = 6,091	"FIFO" COGS = 6,061
Beg Inv = 2,241	Beg Inv = 964	"FIFO" Beg Inv = 1,326 =964+380
End Inv = 2,253	End Inv = 870	"FIFO" End Inv = 1,280 =870+410
ITO = 6.0	ITO = 6.7	"FIFO" ITO = 4.7

Accounting for inventory

- Suppose no inventory is acquired at start of year 2 (sales = 4)
  - FIFO COGS = 4 x $8 = $32 (as before)
  - LIFO COGS = 4 x $8 = $32 (same)
- Liquidating LIFO layers, if multiple layers exist
  - Decrease LIFO COGS (possibly less than FIFO)
  - Increase profitability
  - Decrease LIFO reserve
  - Decrease turnover ratio
- Earnings manipulation?

Accounting for inventory: Tax considerations

- LIFO conformity rule: if a firm uses LIFO for tax purposes, it must also use LIFO for financial reporting purposes
  - Choice should minimize the present value of tax payments
  - Given the tax effects, what types of firms would you expect to choose each inventory method?

Summary

- Matching principle requires a "cost flow" assumption, leading to different accounting methods (e.g. LIFO/FIFO)
- Computation/record-keeping trivial, but implications not: LIFO and FIFO produce *temporary differences* in accounting numbers.
- No accounting method is innately superior: choice depends upon business environment, incentives of users, possibility of manipulation, etc.
- Disclosures available to make numbers comparable across firms.