Accounting for Inventory

Objectives

Understand

- Cost-flow assumptions are necessary to determine ending inventory and cost of goods sold (COGS)
- LIFO and FIFO are two cost-flow assumptions
- How the COGS and ending inventory numbers differ under LIFO and FIFO?
- How to convert LIFO COGS and ending inventory to FIFO COGS and ending inventory (understand the LIFO reserve)
- How inventory assumptions affect taxes
Accounting for Inventory

Inventory accounting has two fundamental components:

1) Product Costing Decision (This component is discussed in managerial accounting)

What costs flow into each product's inventory account?

2) Cost Flow & Valuation Decisions

Once costs are in the inventory account (i.e., on the Balance sheet), when are costs transferred to the Income Statement?
Accounting for Inventory

**The “ins” of inventory accounting**
- Beginning Inventory
- Freight in
- Purchases

**The “outs” of inventory accounting**
- Goods available for sale
- Cost of goods sold
- Ending inventory
# Accounting for Inventory

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beg. Units</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>+ Units produced</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>= Units available</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>- Units sold</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>= End. Units</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>First-year production</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second-year production</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Accounting for Inventory

Circuit City, Inc.  vs.  CarMax
(Retail operations)  Auto Superstore
## Accounting for Inventory

### A Comparison of LIFO and FIFO

<table>
<thead>
<tr>
<th>Income Statement</th>
<th>Balance Sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LIFO</strong></td>
<td></td>
</tr>
<tr>
<td><strong>FIFO</strong></td>
<td></td>
</tr>
</tbody>
</table>

Session 6
# Accounting for Inventory

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

### Product 1

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units at start of year</td>
<td>0</td>
<td>4@$8</td>
</tr>
<tr>
<td>Units produced</td>
<td>7@$8</td>
<td>5@$10</td>
</tr>
<tr>
<td>Units available for sale</td>
<td>7@$8</td>
<td>9</td>
</tr>
<tr>
<td>Units sold</td>
<td>3@$8</td>
<td>4</td>
</tr>
<tr>
<td>Units at end of year</td>
<td>4@$8</td>
<td>5</td>
</tr>
</tbody>
</table>

**In year 2....**

- LIFO cogs
- LIFO ei
- LIFO cogs + ei

- FIFO cogs
- FIFO ei
- FIFO cogs + ei
Accounting for Inventory

BSE Entries

• Inputs for product 1 purchased for cash, year 2

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

• 4 units sold for $20 each in cash, but FIFO used for matching
Accounting for Inventory

LIFO vs. FIFO over time

• Different “cost layers” of inventory

<table>
<thead>
<tr>
<th>LIFO</th>
<th>FIFO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1@$10</td>
<td>5@$10</td>
</tr>
<tr>
<td>4@$8</td>
<td></td>
</tr>
</tbody>
</table>

Cumulative difference: $\text{EInv}_{\text{FIFO}} - \text{EInv}_{\text{LIFO}} = “LIFO Reserve”$ pretax

• Under increasing input prices,

\[
\text{EInv}_{\text{LIFO}} \leq \text{EInv}_{\text{FIFO}}
\]

Year 2: $42 \leq 50$

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 \leq $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: \( \frac{4}{[\frac{(4+5)}{2}]} = 0.89 \)
Based on FIFO $: \( \frac{32}{[\frac{(32+50)}{2}]} = 0.78 \)
Based on LIFO $: \( \frac{40}{[\frac{(32+42)}{2}]} = 1.08 \)

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

\[ \text{ITO}_{\text{LIFO}} \geq \text{ITO}_{\text{FIFO}} \]

Year 2: 1.08 \hspace{1cm} 0.78

Are LIFO firms more efficient?
Inventory Turnover by Industry
## Circuit City v. Best Buy

<table>
<thead>
<tr>
<th></th>
<th>2002 Gross profit %</th>
<th>2002 ROE</th>
<th>2002 I--Turn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best Buy</td>
<td>21%</td>
<td>26%</td>
<td>6.9×</td>
</tr>
<tr>
<td>Circuit City</td>
<td>25%</td>
<td>8%</td>
<td>4.2×</td>
</tr>
</tbody>
</table>
Accounting for Inventory

\[ E\text{Inv}_{\text{FIFO}} = B\text{Inv}_{\text{FIFO}} + \text{Inputs} - COGS_{\text{FIFO}} \]

\[ E\text{Inv}_{\text{LIFO}} = B\text{Inv}_{\text{LIFO}} + \text{Inputs} - COGS_{\text{LIFO}} \]

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

\[ E\text{Inv}_{\text{FIFO}} - E\text{Inv}_{\text{LIFO}} = B\text{Inv}_{\text{FIFO}} - B\text{Inv}_{\text{LIFO}} + COGS_{\text{LIFO}} - COGS_{\text{FIFO}} \]

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

The change in LIFO Reserve tells us the difference in cost between LIFO and FIFO.
## Accounting for Inventory

<table>
<thead>
<tr>
<th></th>
<th>Intel ITO 2002</th>
<th>USX ITO 2002</th>
<th>Adj. USX ITO 2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>COGS</td>
<td>13,446</td>
<td>6,158</td>
<td>“FIFO” COGS = 6,258</td>
</tr>
<tr>
<td>Beg Inv</td>
<td>2,253</td>
<td>870</td>
<td>“FIFO” Beg Inv = 1,280</td>
</tr>
<tr>
<td>End Inv</td>
<td>2,276</td>
<td>1,030</td>
<td>“FIFO” End Inv = 1,340</td>
</tr>
<tr>
<td>ITO</td>
<td>5.9</td>
<td>6.5</td>
<td>“FIFO” ITO = 4.8</td>
</tr>
</tbody>
</table>
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.