Inventory

Introduction

- Inventory is reported as one account
- Manufacturing firm three accounts
  - Raw materials
  - Work-in-process
  - Finished goods

Inventory Equation

- COGS
  - Cost of goods sold, cost of sales (COS) under IFRS.
- Δ inventory
  - Ending inventory – beginning inventory
- Purchase = COGS + Δ inventory
- Purchase = Accounts Payable + cash paid

Inventory Cost

- Similar under IFRS and GAAP. Some costs are expensed while others are capitalized.
- **Product costs (capitalized) 资本化 （延迟确认）**
  - **Purchase cost**
    - Raw materials
  - - trade discounts & rebates
  - **Conversion** (manufacturing) costs including labor and overhead
    - Conversion cost
  - Other costs necessary to bring the inventory to its present **location** and **condition**
    - Transportation-in, tax duties, import and sales taxes
- **Periods costs (expensed, not capitalized) 费用化 （立刻确认）**
  - **Abnormal** waste of materials, labor, or overhead 浪费
  - **Storage** cost (unless required as part of production) 存储
  - **Administrative** overhead 管理
  - **Selling** costs 销售
- **Capitalized** Product Costs
  - **Capitalized** in the inventories account on the BS
  - Expense recognition is **delayed** until the inventory is **sold** and revenue is recognized 费用延迟确认

Valuation Cost Flow

- **Cost flow**
  - GAAP: Cost flow assumption
  - IFRS: cost flow formula
- **Allocate cost to**
  - Income statement: **COGS**
  - Balance sheet: **ending inventory**
- **Choices**

- May use one or more cost flow methods
- But must use the same method for inventories of similar nature and use.

Inventory Valuation Methods

- **Specific Identification**
  - Each unit sold is matched to its **actual** cost
  - Suitable
    - items are not **interchange**
    - A **small** number of **costly** and easily **distinguishable** items (jewellery)
    - Special orders or projects outside **normal** course of business
- **FIFO**
  - The first item purchased is assumed to be first sold
  - Ending **inventory**: based on most recent purchases, close to current cost.
  - COGS: based on earliest purchase. In inflationary, it will be **underestimated**, and earning will be overstated.
- **LIFO (only in GAAP) 做低利润**
  - The **latest** item purchased is assumed to be first sold
  - Ending inventory: based on earliest purchase, less than current cost.
  - COGS: base on most recent purchases. In inflation, it will be **overestimated**, earnings will be lower, lower tax, **higher cash flow**.
- **Weighted Average**
  - Simple and objective method.
  - Average cost per unit (c)= total costs (beginning + purchased) / #units
  - Ending inventory: ending units * c
  - COGS: sold * c
  - Costs between FIFO and LIFO

Inventory Systems

- **Periodic 时间不重要**
  - Values are determined **at the end** of the accounting period.
  - **Maintenance**
    - **No detailed** records of inventory are maintained
    - A **purchase** account is maintained.
  - **Calculation at the end of period**
    - Purchase account: Keep all purchased items in time
    - #items sold: Sum all sold items to a single number
  - **Equation**
    - Inventory available for sale = beginning inventory + purchased
    - **COGS** = Inventory available for sale – ending inventory
    - Ending inventory = beginning inventory + purchased - COGS
- **Perpetual 时间很重要**
  - Inventory and COGS are **updated continuously.**
  - **Maintenance**
    - Purchased and sold are **recorded** when transaction occur
    - A **purchase** account is not needed
  - **Calculation**
    - An item is purchased => update purchased

        - An item is sold => update COGS
- **Impact on Methods**
    - No impact to Specific identification and FIFO
    - Impact LIFO and weighted average

Inflation and Deflationary

- Assume **stable or increasing** inventory quantities
    - **Inflationary**
        - LIFO (compared to FIFO) has
            - Higher COGS
            - lower gross & net income, lower tax, high cash flow
            - lower ending inventory
    - **Deflationary** (reversed)
        - The effects will be **reversed**
    - **Stable prices (same)**
        - FIFO = LIFO = weighted average
- **When prices are changing (trending)**
    - Inventory: FIFO provides most useful measure
    - COGS: LIFO provides most useful measure

LIFO reserve

- **LIFO reserve (positive)**
    - Firms use LIFO must report a LIFO reserve
    - $\textbf{LIFO reserve} = \textbf{FIFO inventory} - \textbf{FIFO inventory} > 0$
- **ΔLIFO Reserve 期末 - 期初**
    - $\Delta\textbf{LIFO reserve} = \textbf{ending LIFO reserve} - \textbf{beginning LIFO reserve}$
    - $\rightarrow \Delta\textbf{LIFO reserve} = \Delta\textbf{FIFO inventory} - \Delta\textbf{FIFO inventory}$
- **Effects**
    - If prices are **rising** and inventory quantities are **stable or increasing**
        - LIFO reserve **increase**
    - If prices are falling or liquidating its inventory -> reserve **decline**
- **Equation**
    - **Purchase** = ΔFIFO inventory + FIFO COGS = ΔLIFO inventory + LIFO COGS
        - FIFO COGS - LIFO COGS = - Δ**LIFO reserve**
    - **Revenue** = FIFO EBT + FIFO COGS + other = LIFO EBT + LIFO COGS + other
        - FIFO EBT - LIFO EBT = Δ **LIFO reserve**
    - Tax = EBT * tax rate
        - FIFO tax - LIFO tax = Δ LIFO reserve * tax rate
    - NI = EBT * (1 – tax rate)
        - FIFO NI – LIFO NI = Δ LIFO reserve * (1 - tax rate)
- **LIFO -> FIFO**
    - Balance sheet
        - LIFO inventory **+ LIFO reserve** -> FIFO inventory
    - Income statement
        - LIFO COGS **- ΔLIFO reserve** -> FIFO COGS
        - LIFO EBT **+ ΔLIFO reserve** -> FIFO EBT

        - LIFO Tax + Δ **LIFO reserve * tax rate** -> FIFO Tax
        - LIFO NI + **Δ LIFO reserve * (1-tax rate)** -> FIFO NI
    - Cash flow
        - LIFO Cash **- ΔLIFO Reserve * tax** rate -> FIFO Cash
    - Equity
        - LIFO RE + ΔLIFO Reserve * (1-tax rate) -> FIFO RE
- **LIFO effects**
    - Higher inventory -> lower COGS -> high profit -> high tax
    - Higher inventory -> Higher asset -> higher equity

LIFO liquidation

- **Liquidation** occurs when inventory **decline**.
- If prices are falling or liquidating its inventory -> reserve **decline**

Inventory cost

- **IFRS**
    - Inventory value = **min (cost, NRV)**
    - NRV = fair value - selling cost
- **IFRS - Inventory Write Down**
    - NRV < inventory balance value -> write-down
    - B/S: to BRV
    - I/S: a loss (small amount -> increase COGS)
- IFRS – write up / recovery
    - I/S: a gain by reducing COGS -> result a gain
    - Cannot be more than its previous write down
- valuation allowance account – written down and write up
- GAAP
    - If not LFIO or nor retail method -> min(cost, NRV)
    - LIFO or retail method -> min(cost, market)
    - Market = max(NRV-normal profit margin, min(**replacement** cost, NRV))
        - Market = replacement cost
        - Range: [NRV-normal profit margin, NRV]
        - replacement cost is bounded by the range
- GAAP – write down
    - If market value > cost -> write down
    - I/S:
        - Small loss -> increase COGS
        - Large loss -> a loss
- GAAP – write up -> NO!
    - Recognize higher profit when the inventory is sold
- Write down chances
    - **LIFO** less likely to do, because its inventory is **smallest** among them

Inventory Disclosure

- Usually found in footnotes, IFRS and GAAP are similar
- Disclosure

- Cost flow **method** (FIFO, LIFO, etc.) used
- Total **carrying value** of inventory, with classification (raw material, work-in-process, and finished goods) if necessary
- Carrying value of inventories at **net realizable value** (fair value – selling cost)
- Inventory **write downs**
- IFRS: **Reversals** of inventory write downs and its circumstances
- Carrying value of inventories **pledged** as collateral

Inventory Change

- Change of cost flow method
- **Retrospectively**
  - **Prior** years' statements are **recast** based on the new method
  - **Cumulative** effects are adjustment to the beginning **retained earnings** of earliest year presented
- **Prospectively (-> LIFO)**
  - Other methods -> LIFO (low revenue, conservative)
  - No adjustment to prior period.
  - The carrying value of inventory simply become the **first layer** of inventory under LIFO
- **Reason**
  - IFRS: show the change will provide more **reliable and relevant** information
  - GAAP: explain why the change is **preferable**

Analysis

- Increase in raw material/work-in-progress -> demand increase
- Finished goods faster than sold goods -> demand decline
- High turnover is desirable