

issued, shares are repurchased, and dividends are paid. CFF is the sum of these two measures:

$$\text{net cash flows from creditors} = \text{new borrowings} - \text{principal repaid}$$

$$\begin{aligned}\text{net cash flows from shareholders} &= \text{new equity issued} - \text{share repurchases} \\ &\quad - \text{cash dividends}\end{aligned}$$

## Analysis of the Cash Flow Statement

### 1. Operating Cash Flow

The analyst should identify the major determinants of operating cash flow, primarily the firm's earning-related activities and changes in noncash working capital.

Equality of operating cash flow and net income is an indication of high quality earnings but can be affected by the stage of business cycle and of the firm's life cycle. Earnings that exceed operating cash flow may be an indication of premature recognition of revenues or delayed recognition of expenses.

### 2. Investing Cash Flow

Increasing capital expenditures, a use of cash, is usually an indication of growth. Conversely, a firm may reduce capital expenditures or even sell capital assets in order to conserve or generate cash. This may result in higher cash outflows in the future as older assets are replaced or growth resumes.

### 3. Financing Cash Flow

The financing activities section of the cash flow statement reveals information about whether the firm is generating cash by issuing debt or equity. It also provides information about whether the firm is using cash to repay debt, reacquire stock, or pay dividends.

The cash flow statement can be converted to **common-size format** by expressing each line item as a percentage of revenue. Alternatively, each inflow of cash can be expressed as a percentage of total cash inflows and each outflow of cash can be expressed as a percentage of total cash outflows.

**Free cash flow** is a measure of cash that is available for discretionary purposes; that is, the cash flow that is available once the firm has covered its obligations and capital expenditures.

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**Free cash flow to the firm (FCFF)** is the cash available to all investors, including stockholders and debt holders. FCFF can be calculated using net income or operating cash flow as a starting point.

FCFF is calculated from net income as:

$$\text{FCFF} = \text{NI} + \text{non-cash charges} + [\text{interest expense} \times (1 - \text{tax rate})] \\ - \text{net capital investment} - \text{working capital investment}$$

FCFF is calculated from operating cash flow as:

$$\text{FCFF} = \text{CFO} + [\text{interest expense} \times (1 - \text{tax rate})] - \text{net capital expenditure}$$

**Free cash flow to equity (FCFE)** is the cash flow that is available for distribution to the common shareholders; that is, after all obligations have been paid. FCFE can be calculated as follows:

$$\text{FCFE} = \text{CFO} - \text{net capital expenditure} + \text{net borrowing}$$

### Cash Flow Ratios That Measure Performance

- The **cash flow-to-revenue ratio** measures the amount of operating cash flow generated for each dollar of revenue.

$$\text{cash flow-to-revenue} = \frac{\text{CFO}}{\text{net revenue}}$$

- The **cash return-on-assets ratio** measures the return of operating cash flow attributed to all providers of capital.

$$\text{cash return-on-assets} = \frac{\text{CFO}}{\text{average total assets}}$$

### Cash Flow Ratios That Measure Coverage

- The **debt coverage ratio** measures financial risk and leverage.

$$\text{debt coverage} = \frac{\text{CFO}}{\text{total debt}}$$

- The **interest coverage ratio** measures the firm's ability to meet its interest obligations.

$$\text{interest coverage} = \frac{\text{CFO} + \text{interest paid} + \text{taxes paid}}{\text{interest paid}}$$

## FINANCIAL ANALYSIS TECHNIQUES

Cross-Reference to CFA Institute Assigned Reading #27

With respect to analysis of financial statements, there are a number of key ratios that should simply be memorized including:

- Current, quick, and cash ratios.
- All the ratios in the cash conversion cycle (the turnover ratios are more important, like receivables, inventory, and payables turnover).
- Turnover ratios use sales in the numerator, except for payables and inventory turnover ratios, which use purchases and COGS, respectively.
- Gross profit margin, net profit margin, and operating profit margin are readily available from a common-size income statement.
- Return on equity (ROE) is critical. Definitely know the three- and five-component DuPont ROE decompositions.
- Debt-to-equity, total debt, interest coverage, and fixed financial coverage ratios (remember to add lease interest expense to numerator and denominator).
- The retention ratio and growth rate are important concepts that also appear in Corporate Finance and Equity Investments.

### Usefulness and Limitations of Ratio Analysis

Financial ratios provide useful information to analysts, including:

- Insights into the financial relationships that are useful in forecasting future earnings and cash flows.
- Information about the financial flexibility of the firm.
- A means of evaluating management's performance.

Financial ratios have limitations:

- Ratios are not useful when viewed in isolation. Ratios should be interpreted relative to industry averages, economy-wide firm averages, and the company's own historical performance.
- Comparisons with other companies are made more difficult because of different accounting methods. Some of the more common differences include inventory methods (FIFO and LIFO), depreciation methods (accelerated and straight-line), and lease accounting (capital and operating).

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- There may be difficulty in locating comparable ratios when analyzing companies that operate in multiple industries.
- Conclusions cannot be made from viewing one set of ratios. Ratios must be viewed relative to one another.
- Judgment is required. Determining the target or comparison value for a ratio is difficult and may require some range of acceptable values.

*Common-size balance sheets and income statements.* These statements normalize balance sheets and income statements and allow the analyst to make easier comparisons of different-sized firms. A vertical common-size balance sheet expresses each balance sheet account as a *percentage of total assets*. A horizontal common-size balance sheet expresses each account as a ratio to the first-year value (e.g., 1.1 indicates an increase of 10% above the first-year value). A vertical common-sized income statement expresses each income statement item as a *percentage of sales*.

*Measures of liquidity:*

$$\text{current ratio} = \frac{\text{current assets}}{\text{current liabilities}}$$

$$\text{quick ratio} = \frac{\text{cash} + \text{marketable securities} + \text{receivables}}{\text{current liabilities}}$$

*Measures of operating performance—turnover ratios and the cash conversion cycle:*

$$\text{receivables turnover} = \frac{\text{annual sales}}{\text{average receivables}}$$

$$\text{inventory turnover} = \frac{\text{cost of goods sold}}{\text{average inventory}}$$

$$\text{payables turnover ratio} = \frac{\text{purchases}}{\text{average trade payables}}$$

$$\text{days of sales outstanding} = \frac{365}{\text{receivables turnover}}$$

$$\text{days of inventory on hand} = \frac{365}{\text{inventory turnover}}$$

$$\text{number of days of payables} = \frac{365}{\text{payables turnover ratio}}$$

$$\text{conversion} = \left( \begin{array}{c} \text{cash} \\ \text{days of sales} \\ \text{outstanding} \end{array} \right) + \left( \begin{array}{c} \text{days of inventory} \\ \text{on hand} \end{array} \right) - \left( \begin{array}{c} \text{number of} \\ \text{days of} \\ \text{payables} \end{array} \right)$$

*Measures of operating performance—operating efficiency ratios:*

$$\text{total asset turnover} = \frac{\text{revenue}}{\text{average total assets}}$$

$$\text{fixed asset turnover} = \frac{\text{revenue}}{\text{average net fixed assets}}$$

$$\text{working capital turnover} = \frac{\text{revenue}}{\text{average working capital}}$$

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*Measures of operating performance—operating profitability:*

$$\text{gross profit margin} = \frac{\text{gross profit}}{\text{revenue}}$$

$$\text{operating profit margin} = \frac{\text{operating income}}{\text{revenue}} = \frac{\text{EBIT}}{\text{revenue}}$$

$$\text{net profit margin} = \frac{\text{net income}}{\text{revenue}}$$

*Return on total capital (ROTC):*

$$\text{return on total capital} = \frac{\text{EBIT}}{\text{average total capital}}$$

Total capital includes debt capital, so interest is added back to net income.

*Return on equity (ROE):*

$$\text{return on total equity} = \frac{\text{net income}}{\text{average total equity}}$$

$$\text{return on common equity} = \frac{\text{net income} - \text{preferred dividends}}{\text{average common equity}}$$

*Measures of solvency:*

$$\text{debt-to-equity ratio} = \frac{\text{total debt}}{\text{total shareholders' equity}}$$

$$\text{debt-to-capital} = \frac{\text{total debt}}{\text{total debt} + \text{total shareholders' equity}}$$

$$\text{debt-to-assets} = \frac{\text{total debt}}{\text{total assets}}$$

$$\text{financial leverage} = \frac{\text{average total assets}}{\text{average total equity}}$$

*Measures of interest coverage:*

$$\text{interest coverage} = \frac{\text{EBIT}}{\text{interest payments}}$$

$$\text{fixed charge coverage} = \frac{\text{EBIT} + \text{lease payments}}{\text{interest payments} + \text{lease payments}}$$

*Growth analysis:*

$$g = \text{retention rate} \times \text{ROE}$$

$$\text{retention rate} = 1 - \frac{\text{dividends declared}}{\text{net income available to common}}$$

*DuPont analysis.* The DuPont method decomposes the ROE to better analyze firm performance. An analyst can see the impact of leverage, profit margin, and turnover on ROE. There are two variants of the DuPont system: the traditional approach and the extended system.

Both approaches begin with:

$$\text{return on equity} = \left( \frac{\text{net income}}{\text{equity}} \right)$$

The *traditional DuPont equation* is:

$$\text{return on equity} = \left( \frac{\text{net income}}{\text{sales}} \right) \left( \frac{\text{sales}}{\text{assets}} \right) \left( \frac{\text{assets}}{\text{equity}} \right)$$

You may also see it presented as:

$$\text{return on equity} = \left( \frac{\text{net profit}}{\text{margin}} \right) \left( \frac{\text{asset}}{\text{turnover}} \right) \left( \frac{\text{leverage}}{\text{ratio}} \right)$$

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The traditional DuPont equation is arguably the most important equation in ratio analysis since it breaks down a very important ratio (ROE) into three key components. If ROE is low, it must be that at least one of the following is true: the company has a poor profit margin; the company has poor asset turnover; or the firm is under-leveraged.

The *extended DuPont equation* takes the net profit margin and breaks it down further. The extended DuPont equation can be written as:

$$\text{ROE} = \left( \frac{\text{net income}}{\text{EBT}} \right) \left( \frac{\text{EBT}}{\text{EBIT}} \right) \left( \frac{\text{EBIT}}{\text{revenue}} \right) \left( \frac{\text{revenue}}{\text{total assets}} \right) \left( \frac{\text{total assets}}{\text{total equity}} \right)$$

You may also see it presented as:

$$\text{ROE} = \left( \frac{\text{tax burden}}{\text{interest burden}} \right) \left( \frac{\text{EBIT margin}}{\text{asset turnover}} \right) \left( \frac{\text{financial leverage}}{\text{leverage}} \right)$$

## Pro Forma Financial Statements

Both common-size financial statements and ratio analysis can be used in preparing pro forma financial statements. A forecast of financial results that begins with an estimate of a firm's next-period revenues might use the most recent COGS from a common-size income statement. Similarly, the analyst may believe that certain ratios will remain the same or change in one direction or the other for the next period. In the absence of any information indicating a change, an analyst may choose to incorporate the operating profit margin and other ratios from the prior period into a pro forma income statement for the next period. Beginning with an estimate of next-period sales, the estimated operating profit margin can be used to forecast operating profits for the next period.

Following are three methods of examining the variability of financial outcomes around point estimates:

1. **Sensitivity analysis** is based on “what if” questions, such as: What will be the effect on net income if sales increase by 3% rather than the estimated 5%?
2. **Scenario analysis** is based on specific scenarios (a specific set of outcomes for key variables) and will also yield a range of values for financial statement items.
3. **Simulation** is a technique in which probability distributions for key variables are selected and a computer generates a distribution of outcomes based on repeated random selection of values for the key variables.

## STUDY SESSION 8: FINANCIAL REPORTING AND ANALYSIS— INVENTORIES, LONG-LIVED ASSETS, INCOME TAXES, AND NON-CURRENT LIABILITIES

### INVENTORIES

Cross-Reference to CFA Institute Assigned Reading #28

For a manufacturing firm, raw materials, goods in process, and finished goods are recorded on the balance sheet as a current asset called inventory.

Costs included in inventory on the balance sheet include:

- Purchase cost.
- Conversion cost.
- Allocation of fixed production overhead based on normal capacity levels.
- Other costs necessary to bring the inventory to its present location and condition.

All of these costs for inventory acquired or produced in the current period are added to beginning inventory value and then allocated either to cost of goods sold for the period or to ending inventory.

Period costs, such as unallocated overhead, abnormal waste, most storage costs, administrative costs, and selling costs, are expensed.

### Inventory Cost Allocation Methods

*First-in, first-out* (FIFO) assumes costs incurred for items that are purchased or manufactured first are the first costs to enter the cost of goods sold (COGS) computation. The balance of ending inventory is made up of those costs most recently incurred.

*Last-in, first-out* (LIFO) assumes costs incurred for items that are purchased or manufactured most recently are the first costs to enter the COGS computation. The balance of ending inventory is made up of costs that were incurred for items purchased or manufactured at the earliest time. Note that in the United States, companies using LIFO for tax purposes must also use LIFO in their financial statements, and that LIFO is not permitted under IFRS.

*Weighted average costing* calculates an average cost per unit by dividing cost of goods available by total units available. This average cost is used to determine both COGS and ending inventory.

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With the *specific identification* method, individual items in inventory, such as a car dealer's cars in inventory, are carried at their individual costs and added to COGS as they are sold.

All of these methods are permitted under U.S. GAAP, but IFRS do not permit LIFO inventory accounting.

### **Inventory Values on the Balance Sheet**

Under IFRS, inventories are valued at the lower of cost or net realizable value, which is estimated sales proceeds net of direct selling costs. Inventory "write-up" is allowed, but only to the extent that a previous write-down to net realizable value was recorded.

Under U.S. GAAP, inventories are valued at the lower of cost or market. "Market" is usually equal to replacement cost but cannot exceed net realizable value or be less than net realizable value minus a normal profit margin. No subsequent "write-up" is allowed.

### **Periodic and Perpetual Inventory Systems**

Firms account for changes in inventory using either a periodic or perpetual system. In a **periodic inventory system**, inventory values and COGS are determined at the end of the accounting period. No detailed records of inventory are maintained; rather, inventory acquired during the period is reported in a Purchases account. At the end of the period, purchases are added to beginning inventory to arrive at cost of goods available for sale. To calculate COGS, ending inventory is subtracted from goods available for sale.

In a **perpetual inventory system**, inventory values and COGS are updated continuously. Inventory purchased and sold is recorded directly in inventory when the transactions occur. Thus, a Purchases account is not necessary.

For the FIFO and specific identification methods, ending inventory values and COGS are the same whether a periodic or perpetual system is used. However, periodic and perpetual inventory systems can produce different values for inventory and COGS under the LIFO and weighted average cost methods.

## LIFO vs. FIFO

In periods of rising prices and stable or increasing inventory quantities:

<i>LIFO results in:</i>	<i>FIFO results in:</i>
Higher COGS	Lower COGS
Lower gross profit	Higher gross profit
Lower inventory balances	Higher inventory balances

In periods of falling prices:

<i>LIFO results in:</i>	<i>FIFO results in:</i>
Lower COGS	Higher COGS
Higher gross profit	Lower gross profit
Higher inventory balances	Lower inventory balances

For a firm using the (weighted) average cost inventory method, all of these values will be between those for the LIFO and FIFO methods.

## LIFO Reserve

Firms that report under LIFO must report a **LIFO reserve**, the amount by which LIFO inventory is less than FIFO inventory. To make financial statements prepared under LIFO comparable to those of FIFO firms, an analyst must:

1. Add the LIFO reserve to LIFO inventory.
2. Increase retained earnings by the LIFO reserve.

When prices are increasing, a LIFO firm will pay less in taxes than it would pay under FIFO. For this reason, analysts often decrease a LIFO firm's cash by the tax rate times the LIFO reserve and increase retained earnings by the LIFO reserve net of tax, instead of the full LIFO reserve.

The difference between LIFO COGS and FIFO COGS is equal to the change in the LIFO reserve for the period. To convert COGS from LIFO to FIFO, simply subtract the change in the LIFO reserve.

## LIFO Liquidation

A **LIFO liquidation** occurs when a LIFO firm's inventory quantities decline. In a rising price environment, COGS are based on older, lower unit costs, which makes

COGS artificially low. The reduction in COGS from a LIFO liquidation increases gross and net profits and margins, but these increases are not sustainable. A decrease in the LIFO reserve (disclosed in footnotes for LIFO companies) can alert analysts that a LIFO liquidation may be responsible for an increase in current-period profits and profit margins.

## Ratios for Evaluating Inventory Management

Ratios that are directly affected by the choice of inventory accounting method include inventory turnover, days of inventory, and gross profit margin.

High inventory turnover relative to other firms in an industry may indicate too little inventory and low turnover may indicate inventory that is too great. Comparing the firm's revenue growth to that of the industry can provide information on whether inventories are too large (slow moving or obsolete) or too small (so that sales are lost to a significant degree).

## Ratios and Inventory Method

*Profitability.* As compared to FIFO, LIFO produces higher COGS in the income statement and will result in lower earnings. Any profitability measure that includes COGS will be lower under LIFO. For example, higher COGS will result in lower gross, operating, and net profit margins as compared to FIFO.

*Liquidity.* Compared to FIFO, LIFO results in a lower inventory value on the balance sheet. Because inventory (a current asset) is lower under LIFO, the current ratio, a popular measure of liquidity, is also lower under LIFO than under FIFO. Working capital is lower under LIFO as well, because current assets are lower. The quick ratio is unaffected by the firm's inventory cost flow method because inventory is excluded from its numerator.

*Activity.* Inventory turnover (COGS / average inventory) is higher for firms that use LIFO compared to firms that use FIFO. Under LIFO, COGS is valued at more recent, higher costs (higher numerator), while inventory is valued at older, lower costs (lower denominator). Higher turnover under LIFO will result in lower days of inventory on hand (365 / inventory turnover).

*Solvency.* LIFO results in lower total assets compared to FIFO because LIFO inventory is lower. Lower total assets under LIFO result in lower stockholders' equity (assets – liabilities). Because total assets and stockholders' equity are lower under LIFO, the debt ratio and the debt-to-equity ratio are higher under LIFO compared to FIFO.

## LONG-LIVED ASSETS

Cross-Reference to CFA Institute Assigned Reading #29

The purchase cost of assets that will provide economic benefits to the firm over more than one year is typically not taken as an expense in the year of acquisition, but is capitalized (creating an asset on the balance sheet) and spread over an asset's useful economic life by recording depreciation of the asset's value.

Compared to taking the acquisition cost as an expense in the period of acquisition, capitalization decreases expenses (which increases net income), increases assets and equity (which decreases reported leverage), reduces income variability, and increases operating cash flow and decreases investing cash flow in the same amounts, since the cost of a capitalized assets is treated as an investing cash flow rather than an operating cash flow.

The following table summarizes the financial implications of capitalizing versus expensing:

	<i>Capitalizing</i>	<i>Expensing</i>
Income variability	Lower	Higher
Profitability—first year (ROA & ROE) and Net Income	Higher	Lower
Profitability—later years (ROA & ROE) and Net Income	Lower	Higher
Total cash flows (assuming no tax effects)	Same	Same
Cash flow from operations	Higher	Lower
Cash flow from investing	Lower	Higher
Leverage ratios (debt/equity & debt/assets)	Lower	Higher

*Capitalization of interest.* Interest costs incurred when constructing assets over multiple periods for firm use or for sale must be capitalized under both U.S. GAAP and IFRS, either to the balance sheet asset value or to inventory, respectively. The expense is recognized over time as either asset depreciation or in COGS when a constructed asset is sold.

Capitalization of construction interest reduces interest expense in the period of capitalization and increases either depreciation or COGS. Capitalized interest expense is treated as an investing, rather than operating, cash outflow and an analyst should take account of this difference. To better measure interest coverage, an analyst should add capitalized interest to interest expense and increase EBIT by adding depreciation expense from previously capitalized interest.

## Internally Created Intangible Assets

For internally generated intangible assets, firms reporting under IFRS must expense research costs as incurred but may capitalize development costs (costs incurred after technological feasibility and the intent to use or sell the completed asset have been established).

Under U.S. GAAP, generally both research and development expenditures related to internally created intangible assets must be expensed as incurred. An exception is the creation of software for internal use or sale to others. After specific criteria are met, costs to develop software must be capitalized under U.S. GAAP.

## Depreciation

The historical cost of capitalized physical assets is allocated over their economic (useful) lives by recording depreciation expense. Depreciation methods include straight-line (an equal amount each period), accelerated (greater in the early years of an asset's life), and units-of-production (proportional to asset use).

*Straight-line depreciation:*

$$\text{depreciation expense} = \frac{\text{original cost} - \text{salvage value}}{\text{depreciable life}}$$

*Double-declining balance (an accelerated method):*

$$\text{DDB depreciation in year } x = \frac{2}{\text{asset life in years}} \times \text{book value at beginning of year } x$$

Note that the salvage value is not used to compute annual depreciation under the double-declining balance method. The end-of-period book (carrying) value of an asset, however, is not allowed to go below its estimated salvage value.

*Units of production and service hours depreciation.* Under this method, an asset's depreciable basis is divided by estimated units of production or total service hours. Each period, depreciation is calculated as cost-per-unit (hour) times the number of units produced (hours of service).

## Financial Statement Effects of Depreciation Methods

Compared to straight-line depreciation, an accelerated depreciation method will result in greater depreciation expense in the early years of an asset's life. This will reduce EBIT, net income, assets, and equity, and decrease ROA and ROE, compared to straight-line depreciation. When an accelerated method is used for tax reporting, taxable income is less in the early years of an asset's life, reducing taxes and increasing reported cash flows.

Over an asset's useful life, total depreciation and income are the same under all methods; only the timing of expense and income is affected.

Note that increasing (decreasing) the estimated salvage value or estimated asset life will decrease (increase) periodic depreciation expense, increasing reported income.

## Useful Lives and Salvage Values

Calculating depreciation expense requires estimating an asset's useful life and its salvage (residual) value. Firms can manipulate depreciation expense, and therefore net income, by increasing or decreasing either of these estimates.

A longer estimated useful life decreases annual depreciation and increases reported net income, while a shorter estimated useful life will have the opposite effect. A higher estimate of the salvage value will also decrease depreciation and increase net income, while a lower estimate of the salvage value will increase depreciation and decrease net income.

A change in an accounting estimate, such as useful life or salvage value, is put into effect in the current period and prospectively. That is, the change in estimate is applied to the asset's carrying (book) value and depreciation is calculated going forward using the new estimate. The previous periods are not affected by the change.

## Intangible Assets

Purchased assets that do not have physical substance but have finite lives (e.g., patents and franchises) are reported on the balance sheet at their fair values, which are reduced over their economic lives by amortization (like depreciation of a physical asset).

Internally developed intangible assets are not reported on the balance sheet. Values of intangible assets that do not have finite lives (e.g., goodwill) and of those that can be renewed at minimal cost (e.g., trademarks) are not amortized, but must be checked periodically for impairment.

## Derecognition of Long-Lived Assets

Long-lived assets are *derecognized* and removed from the balance sheet when they are sold, exchanged, or abandoned.

When a long-lived asset is sold, the asset is removed from the balance sheet and the difference between the sale proceeds and the carrying value of the asset is reported as a gain or loss in the income statement. The carrying value is equal to original cost minus accumulated depreciation and any impairment charges.

The gain or loss is usually reported in the income statement as a part of other gains and losses, or reported separately if material. Also, if the firm presents its cash flow statement using the indirect method, the gain or loss is removed from net income to compute cash flow from operations because the proceeds from selling a long-lived asset are an investing cash inflow.

If a long-lived asset is abandoned, the treatment is similar to a sale, except there are no proceeds. In this case, the carrying value of the asset is removed from the balance sheet and a loss of that amount is recognized in the income statement.

If a long-lived asset is exchanged for another asset, a gain or loss is computed by comparing the carrying value of the old asset with fair value of the old asset (or the fair value of the new asset if that value is clearly more evident). The carrying value of the old asset is removed from the balance sheet and the new asset is recorded at its fair value.

## Impairments

Under IFRS, the firm must annually assess whether events or circumstances indicate an **impairment** of an asset's value has occurred. For example, there may have been a significant decline in the market value of the asset or a significant change in the asset's physical condition. If so, the asset's value must be tested for impairment.

An asset is impaired when its carrying value (original cost less accumulated depreciation) exceeds the **recoverable amount**. The recoverable amount is the greater of its fair value less any selling costs and its **value in use**. The value in use is the present value of its future cash flow stream from continued use.

If impaired, the asset's value must be written down on the balance sheet to the recoverable amount. An impairment loss, equal to the excess of carrying value over the recoverable amount, is recognized in the income statement.

Under IFRS, the loss can be reversed if the value of the impaired asset recovers in the future. However, the loss reversal is limited to the original impairment loss. Thus, the carrying value of the asset after reversal cannot exceed the carrying value before the impairment loss was recognized.

Under U.S. GAAP, an asset is tested for impairment only when events and circumstances indicate the firm may not be able to recover the carrying value through future use.

Determining an impairment and calculating the loss potentially involves two steps. In the first step, the asset is tested for impairment by applying a **recoverability test**. If the asset is impaired, the second step involves measuring the loss.

**Recoverability.** An asset is considered impaired if the carrying value (original cost less accumulated depreciation) is greater than the asset's future *undiscounted* cash flow stream. Because the recoverability test is based on estimates of future undiscounted cash flows, tests for impairment involve considerable management discretion.

**Loss measurement.** If impaired, the asset's value is written down to fair value on the balance sheet and a loss, equal to the excess of carrying value over the fair value of the asset (or the *discounted* value of its future cash flows if the fair value is not known), is recognized in the income statement.

Under U.S. GAAP, loss recoveries are not permitted.

## Asset Revaluations

Under U.S. GAAP, long-lived assets cannot be revalued upward, except that held-for-sale assets can be revalued upward to the extent of previous impairment writedowns.

Under IFRS, assets may be revalued upward to fair value. Gains reversing previous writedowns are reported on the income statement, and any excess gains are taken as an adjustment to equity in an account called **revaluation surplus**.

The initial effects of upward asset revaluations are to increase assets and stockholders' equity, and net income where gains are taken into income. If a depreciable asset is revalued upward, depreciation will be greater, and income less, in subsequent periods.

## Analysis of Long-Lived Assets

An analyst can use financial statement disclosures to estimate the **average age** and **useful life** of a firm's long-lived assets. Older, less-efficient assets may make a firm less competitive. The average age of assets is useful in estimating the timing of major capital expenditures and a firm's future financing requirements. These estimates are most accurate for a firm that uses straight-line depreciation.

$$\text{average age} = \frac{\text{accumulated depreciation}}{\text{annual depreciation expense}}$$

$$\text{total useful life} = \frac{\text{gross PP\&E}}{\text{annual depreciation expense}}$$

$$\text{remaining useful life} = \frac{\text{net PP\&E}}{\text{annual depreciation expense}}$$

## Investment Property

Under IFRS (but not U.S. GAAP), property a firm holds for capital appreciation or to collect rental income is classified as *investment property*. Firms can value investment property using either a cost model or a fair value model. Under the fair value model, increases in value above historical cost are recognized as gains on the income statement. This differs from the revaluation model for property, plant, and equipment, where increases above historical cost are recognized in equity as revaluation surplus.

## Asset Purchases vs. Leases

Firms may lease long-lived assets rather than purchasing them. Leases are classified as either finance leases or operating leases.

An **operating lease** is essentially a rental arrangement. No asset or liability is recorded on the balance sheet by the lessee, and the periodic lease payments are simply recognized as rental expense in the income statement.

A **finance lease** is, in substance, a purchase of an asset that is financed with debt and must be capitalized. At the inception of a finance lease, the lessee adds a lease

asset and an equal lease liability to the balance sheet. Over the term of the lease, the lessee recognizes both depreciation expense on the asset and interest expense on the liability. This treatment is the same as if the asset were purchased with only borrowed funds.

Do not confuse capitalizing a lease with capitalizing a purchased asset. When a firm capitalizes a purchase, it recognizes an asset on the balance sheet. When it capitalizes a lease, it recognizes both an asset and a liability.

## INCOME TAXES

Cross-Reference to CFA Institute Assigned Reading #30

Definitely know this terminology. From the tax return we have:

- *Taxable income*: Income subject to tax as reported on the tax return.
- *Taxes payable*: The tax liability based on taxable income, as shown on the tax return.
- *Income tax paid*: The actual cash outflow for taxes paid during the current period.
- *Tax loss carryforwards*: Losses that could not be deducted on the tax return in the current period but may be used to reduce taxable income and taxes payable in future periods.

On the financial statements, we find *pretax income*, which is income before income tax expense. Pretax income on the income statement is used to calculate:

- *Income tax expense*: A noncash income statement item that includes cash tax expense plus any increase (minus any decrease) in the deferred tax liability minus any increase (plus any decrease) in the deferred tax asset.
- *Deferred income tax expense*: The excess of income tax expense over taxes payable.
- *Valuation allowance*: A contra account that reduces a deferred tax asset for the probability that it will not be realized (U.S. GAAP).

## Deferred Tax Liabilities

Deferred tax liabilities are balance sheet amounts that result from an excess of income tax expense over taxes payable and are expected to result in future cash outflows.

The most common reason for creation of a deferred tax liability is that depreciation expense on the income statement (straight-line) is less than depreciation expense on the tax return (accelerated). Pretax income is therefore greater than taxable income, and income tax expense is greater than income tax payable. The taxes that are “deferred” by using accelerated depreciation on the tax return are carried as a deferred tax liability on the balance sheet.

## Deferred Tax Assets

Deferred tax assets are balance sheet amounts that result when taxes payable are greater than income tax expense. This results when revenues are recognized for tax prior to their recording on the financial statements, or when expenses for financial reporting are recorded prior to recognizing them as deductible expenses for tax. Prior losses in excess of those that can be used to offset previous income represent a tax-loss carryforward, which is an asset as it will reduce future taxes.

An example of an expense item that can give rise to a deferred tax asset is warranty expense. On the income statement, estimated warranty expense is deductible; on the tax return, only warranty expense actually incurred is deductible. Early on, this leads to taxes payable being greater than income tax expense, which gives rise to a deferred tax asset. In future periods, taxes payable will be less than income tax expense, and the “benefit” of the asset will be realized.

*Calculating deferred tax liabilities and assets.* Under the liability method, all temporary differences between taxable income and pretax income are multiplied by the expected future tax rate (typically the current rate) to calculate deferred tax assets and liabilities. They are not netted; deferred tax assets and liabilities can be on the balance sheet simultaneously and separately.

*Financial analysis.* If a company’s assets are growing, it may be the case that a deferred tax liability is not expected to reverse in the foreseeable future; an analyst should treat this “liability” as additional equity (decrease the DTL and increase equity). If the liability is expected to reverse, the liability should be adjusted to present value terms to the extent practicable. Decide which is more appropriate on a case-by-case basis.

*Tax basis.* Gains or losses can result when an asset is sold or a liability is paid when there is a difference between the proceeds or payment and the tax basis of the asset or liability. The tax basis for a long-lived asset is its historical cost minus accumulated tax depreciation. The tax basis for debt is historical proceeds adjusted for the amortization of any original discount or premium to par.

*Change in tax rates.* A change in tax rates will be reflected by an adjustment to both deferred tax asset and liability accounts. A decrease (increase) in the tax rate will decrease (increase) both deferred tax assets and liabilities; the net change is reflected in income tax expense for the current period.