

Financial Statement Analysis

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Preamble and Sources

The primary source for this paper is “The Analysis and Use of Financial Statements”,
While, Sondhi, and Fried, 2nd and 3rd ed., 1998, 2003.

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Basic Concepts

The US has the most complete financial reporting system in the world. Equity investors and creditors are the primary users of financial data. The Generally Accepted Accounting Principles (GAAP) are the accepted accounting standards in use in the US. GAAP rules look at relevance, timeliness, neutrality, consistency, compatibility, and materiality. The Financial Accounting Standards Board (FASB) seeks to delineate characteristics of information that must be possessed in order to be useful to investment decisions. The characteristics are of a qualitative basis as well as being quantitative. There are also international accounting standards, too.

Financial statements have several purposes, including 1) control and development of financial strategy; 2) measure the current financial health of a business; and 3) maximize shareholder wealth. Various stakeholders, including investors, employees, lenders, acquirers, government agencies, and public interest groups, should be interested in financial statements.

Financial statements include

- balance sheets
- income statement
- statement of comprehensive income
- statement of CF
- Statement of equity
- Footnotes
- Contingencies
- MDA
- Supplemental schedules

A balance sheet reports the major classes and amounts of assets, liabilities, and equities at specific points in time. An income statement reports on performance of the firm and its operating activities. The statement of cash flows reports the cash receipts and payments classified by operating, investing, and financing activities. Key performance measures include the cash effects of all transactions. The statement of shareholder equity reports the amounts and sources of equity from capital transactions. Footnotes are also part of the statements, and audited financial statements must report risk factors, either in the notes or in the body of statements.

The management discussion and analysis (MD&A) section of a financial statement requires a disclosure of the results of operating capital resources and liquidity, as well as the outlook based on known trends. There are numerous other sources for data, including fact books, corporate press releases, EDGAR, home pages, etc.

The auditor's role in a financial statement is to ensure that the statements conform to GAAP standards, and to report on uncertainties.

The Accrual Concept

Introduction

Accounting versus Economic Profit. There are two schools of thought when it comes to the recording of income. The first deals with the economic concept of income, while the second is the accrual method. This is reflective of the economic versus accounting divisions of business. Accounting income is not equal to economic definitions of income. The central inquiry that both branches of thought tries to answer is should income, expenses, and CF be defined and recognized? The fundamental goal of finance is to maximize the valuation of businesses, not maximize the NI of the business. The financial goal of economics is to maximize “economic profits”. For example, a taxable charge can be taken as interest charges for use of debt, , but use of equity for dividends on common or preferred cannot be taken as a charge.

Economic Income. As to the economic notions, the net cash flow plus the change in the market value of net assets = income. The market value of assets = the PV of FCF discounted at the risk free rate of return (RFRR). However, both FCF and interest rates are uncertain, so market value may be measured in various and contradictory ways. Distributive income is the amount of earnings paid out as dividends, and the dividends will then be said to represent firm value. With sustainable income, this is the income that can be maintained in the future given the firm’s stock of capital investment. On permanent earnings, this is the amount that normally can be earned, given the firm’s asset base. The market value of the firm = the firm’s required rate of return * permanent earnings. There are lots of problems with the economic earnings concept, primarily due to the uncertainties involved. As a result, accounting conventions are used, and accounting income has the accrual concept providing the information and the ability to generate future cash flows.

In a certain world, Economic earnings = net CF + changes in MV of net assets. MV of net assets = $\sum PV \text{ of FCF} / (1 + r)^n$. In an uncertain world, Future CF and r will be uncertain, so prices may be difficult to assess. This is at best a proxy for economic earnings. I from continuing operations + change in net assets = economic Income. Distributable earnings = amount of earnings that can be paid out as D without changing the value of the firm. Sustainable income = Income that can be maintained in the future given the firm’s stock of capital investment. Permanent earnings = normal earnings [Graham]. This establishes a “fair price” through PE multiples. No provisions are made for growth of the firm.

Accounting income will be quite different than economic income since it measure accrual income. The focus is on historical cost of assets and liabilities. There will be a selective recognition of CF and changes in asset values. The selected period “best” indicates the firm’s present and future ability to generate CF. Accrual methods are decision rules that tell people when to recognize the R and E consequence of CF and other events. A and L

recognition will thus flow from the accrual; concept of Income itself. The difference between I recognized and the receipt of CF will be treated as accrued A or L.

The accrual concept of income is based on GAAP rules, and will usually acknowledge actual transactions. There is a selective recognition of certain cash flows and a change in asset values. The accrual concept attempts to show the firm's present and continuing ability to generate cash flows. The asset and liability recognition is part of the accrual concept. The matching principle states that operating performance is measured (or recognized) only if revenues and expenses are accounted for during the same time period. GAAP uses a cost based approach on assets; so many unrealized gains and losses are not recognized until settled.

With an income statement, the exact format is not specified by GAAP. It varies by industry. Usually, there is a line for operating income from continuing operations, and this is generally equal to rev – exp (before interest). There is no recognition of capital expenses to derive the operating income (the capital expenses are recognized after the operating margin, to derive net profit margin). The primary focus should be on net income from recurring items after taxes; so non-recurring items are sometimes excluded, or noted with a further explanation. Generally, recurring activities are considered to be the best indicator of future income.

The question becomes: which will be the better measure of ability to generate future CF? Some studies show that recognition rules improved prediction of future CF.

Income Statement (IS). This is the the P&L statement. The statement shows the firm's revenues and expenses during a specified period of time. It is the basis for tax income accounting, and represents a tax accountant's view of the taxable income of the company. It shows P&L at one certain moment in time. Revenues are recognized when products are shipped, not when the firm receives the money. This generates an accounts receivable and payables. Four broad classes of expenses are used: cost of goods sold; general and administrative; interest expenses; taxes. GAAP does not mandate a format. A typical format is ---

Revenue - Op exp = op I from cont. oper.
other income = recurring I from cont. oper. - financing costs
= recurring Income b/f taxes, interest
+ - unusual or extraord items
= pre-tax I from cont. oper.
- tax
= NI from co
+ - discontinued operations
+ - extraordinary expenses
+ - accounting changes
= NI

The traditional format does not separately identify those items that would typically affect recurring from non-recurring expenses.

The IS reports revenues by the sale of goods and services from continuing operations (not financing or sale of assets). Costs of goods sold (COGS) are usually next to be listed, then R&D and other indirect expenses. This = Operating I from continuing operations. Other I or R is next recorded, This generates I before Interest and taxes from operations. Then financing costs are subtracting, resulting in recurring pre-tax I from operations. Unusual non-recurring I or R are then recorded, resulting in pre-tax I from operations. Subtracting taxes, we obtain NI from operations. Then add / subtracted will be I from discontinued operations, Extraordinary items, cumulative effect of accounting changes. This generates NI.

NI will contain all I from operations as well as some changes in MV of A and L. From an analyst's perspective, we will want to focus on the recurring I from operating activities. Transitory I or E should not be regarded as components of permanent or sustainable I. Recurring I from continuing operations or NI from operations after adjustment for unusual or infrequent items after tax should be the primary focus. One study showed that removal non-recurring and extraordinary items resulted in more predicative ability as to future ROE.

R and E recognition. This revolves around two issues: 1) timing; and 2) measurement.

When should R and E be recognized? How much should be recognized? Considerable discretion exists by management on this, but the focus should be on the matching principle. GAAP / SFAC 5 has two conditions for recognition: 1) completion of the earnings process; 2) assurance of payment. As to #1, the firm must have provided all of the services for which it is to be paid; #2 requires a reasonable expectation of payment. The general rule is that recognition occurs when goods or services have been provided and their cost can be reliably determined. Payment can be recognized in advance, but the recognition must be in proportion to the services provided (for a 3 year contract, allocate 1/3 of the payment in each year). The revenue may be recognized at time of production if the markets are highly liquid, but normally, recognition occurs at time of sale. The amount of recognition = Goods and services provide to date / total goods and services to be provided. This is cumulative in nature. The preference is for % of sales, because that is when expenses are generally matched to revenues.

Departures ---

Payment can be received prior to delivery of goods. Revenue is recognized as services are rendered.

R can be recognized BEFORE the delivery when the earnings process is complete and the proceeds of sale can be reasonably determined.

Conversely, R is not recognized even at time of sale if there is doubt as to collection of the sales price.

Percentage of completion is used on many LT contracts where revenues are predictable. Completion of the contract is used in many contracts where payment is in doubt, and must be used in ST contracts. The percentage of completion method provides a better understanding of operating abilities as well as providing more info on incomplete contracts.

A & L reporting will be affected by the recognition decision. CF will not be affected by the decision to use percentage of completion or completion of contract methods.

The completed contract method has larger total assets because it accumulates inventory, and lower net assets (equity) because no I is recognized until the end of the contract. R and I under completed contract will therefore be volatile and are driven by the timing of contract completion. Contract completion gives lumpy earnings.

Installment payments should be used for recognition when there are sales of noncurrent A and RE transactions.

When both future collectability and costs of a project are uncertain, all cash receipts should first be used as a recovery of costs. Only after all costs are recognized, will profit be recognized.

Classifications are often used in the IS to boost gross margins. This increases operating leverage ratios, while not improving overall NI. Costs such as marketing and discounts will be treated as “other” expenses rather than COGS, resulting in higher gross margin (i.e. NI from co b/f other expenses). This creates an artificial fixed expense rather than as a VC.

Three methods of recognition exist ---

- 1) % of completion method
- 2) Completed project method
- 3) Cost recovery

On contracts of performance, things become a bit more involved. For long-term contracts, many times, the items are recognized on a percentage of completion basis, with a pro rata allocation. This method is a better gauge of operating activity and may be more indicative of the status of partially complete contracts. The other method is for a completed contract – no recognition occurs until the contract is fully completed. Reported cash flows are identical with both methods, but the completed contract method will generate a longer hold on total assets, thus potentially overstating assets and understating recognition of revenues or costs. When there is no reasonable basis for collection, the installment method is used. But where costs cannot be determined at all (land development, for example), recognition occurs on the basis of actual cost recovery.

Summary of recognition issues. Important for predictability of future CF. Inconsistency of recognition decreases prediction ability. US GAAP has very well developed standards on recognition, while IAS needs more work on recognition.

Nonrecurring items. Not everything that management labels as non-recurring should be considered that way. There are four types: unusual or infrequent; extraordinary; discontinued; accounting changes.

On unusual OR infrequent items, may be reported separately as an expense on the I statement (they are that way in the above outline). They are to be reported pre-tax. Sometimes, however, they will be lumped in as “other income”. Examples include gains and losses from subsidiaries, or in the disposal of a business unit. Impairments, write-downs, and write-offs are other examples.

Extraordinary items as transactions or events that are unusual AND infrequent and are material in amount. They are reported post tax. These items are intended to be rare.

Discontinued operations are also segregated in the I statement, as they will not appear in the future. The discontinued operation must be separable from the firm. The analysts should think through why is something being discontinued, and what are the implications. Does it result from inadequate markets? Is the line of business below the WACC? Not a strategic fit? Or just sold at a large profit? This all could affect future CF projections. On discontinued operations, the discontinuation of a business segment should reflect the costs of closing the segment. This is defined as the estimated loss from operations during the phase out period from the date of measurement to the date of disposal of the asset.

Accounting changes involve those that are undertaken voluntarily and those mandates by accounting standard changes. They probably will not have an impact on CF. They will be reported post tax, or net of tax. There may have to be prior period I adjustment as a result. The analyst would normally exclude the item from earnings used for valuation purposes. Analysts should ask why did a voluntary change occur (LIFO to FIFO, for example), is the firm trying to inflate earnings or revenues in some fashion?

Some non-recurring items are a correction for prior period income. If the non-recurring expenses are really prior year's expenses taken too late, then ignoring this type of non-recurring charge would result in too high of an income projection.

The non-recurring item may also have an impact on future profitability from continuing operations (a plant closing may decrease future operating costs without affecting total revenue if the output is shifted somewhere else, for example).

IAS has differences with GAAP on non-recurring, with different definitions. IAS does not distinguish between unusual vs. extraordinary, and does not require presentation of Income statement before discontinued operations. IAS has more flexibility on error corrections.

On non-recurring expenses in general, should attempt to ascertain whether there is a systematic pattern of write-downs and losses. Non-recurring may have no CF impact, to having a current CF impact only, to having a large future CF impact. The analyst should identify those non-recurring items that have no impact on CF, will affect only current year CF, or have impacts on future CF.

Write-downs for “restructuring” charges are common. Such write-offs have been criticized as part of an overall desire by the management to paint a better earnings picture. The argument goes: how can repeated write-offs really be non-recurring or extraordinary in nature? Some of these non-recurring items also impact cash flows, too. So, one must attempt to limit the nonrecurring write-offs to only those that have no cash flow impact.

MDA Earnings manipulation can easily occur by:

- Timing of the occurrence as well as classification of the item (ordinary, unusual, or extraordinary) can be made within much of management discretion.
- MDA may classify something as good news /bad news, with good news being above the line revenue part of operations, while the bad news is reported below the line as part of extraordinary expenses.
- Management may engage in income smoothing. This can be done by timing the I or E, as well as be classifying items in various years.
- Big bath accounting occurs to clear the decks of all the bad news at once.
- Accounting changes can be made, and can be viewed as a form of earnings manipulation since they typically do not have a CF impact.

Look for quality of earnings, and in two regards:

- 1) use of accounting methods that do not overstate earnings. How well does the accounting reflect the true value of the firm? This is important for the investors / analysts.
- 2) Consistency of earnings. Look at volatility of earnings, this is important to the firm itself, as it affects the ability to borrow at low interest rates. High volatility of earnings generates a higher required rate of return.

The Balance Sheet. Balance Sheets contain a statement of the financial position of the firm – its assets, liabilities, and equity at a specific point in time. This is typically done at the end of each quarter. Double entry bookkeeping is used. The market value of the accounts is not necessarily reflected in the balance sheet, since this statement is oriented to book values. Assets and Liabilities are both classified by liquidity, with distinctions made for current assets and liabilities (collected or held for one year or less) and the LT assets and liabilities, for the items with a life of greater than 1 year. Tangible assets and liabilities are reported before the intangibles. Equity is listed in order of liquidity priority. Goodwill is noted, but may not be at market value, as it is defined as prior sale value – net asset value. The debt and equity is on the right side of the balance statement and the assets and use of funds is on the left side. Capital expenses are depreciated over the economic life of the asset.

Most components on the balance sheet are reported using the historical cost. Sometimes, there will be valuation allowances to approximate the net realizable value. In most cases, though, the market values are not reflected in the balance sheet prior to realization. And not all assets or liabilities are reported on the balance sheet, either – some are noted in the footnotes (contingencies for example). Assets held in foreign currency are noted on the balance sheets using the exchange rate as of the date of the statement.

The sheet provides info about the firm's resources and obligations. It also reports on earnings generating abilities, with A being those resources expected to provide future benefits.

There are several uses of a balance sheet. It is the starting point for fundamental analysis. The earnings generating ability, by both the going concern method and the asset method (ROA, ROE) start with the balance sheet. Future cash flows needs can be ascertained with a balance sheet. And, a balance sheet is the starting point for adjustments to book value to reflect the current cost and asset value. The usefulness of the balance sheet is limited, however, by selective reporting, the measurement at the historical cost, and delayed recognition.

Statement of Shareholder Equity. The Statement of Shareholder Equity lists the equities in order of liquidity preferences. Preferred and then common are listed. . It reconciles the BV and EV of retained earnings reinvested in the firm. The reconciliation reports the ME for the period, the dividends reported in the period, stock splits, acquisitions and reorganizations. The statement may (but not need to) report liability for pension plans; MV changes in non-current investments; cumulative effect in exchange rate changes; and unearned shares issued to ESOPs. These are examples of reserves that are allowed per GAAP. The various rights of equity holders must be ascertained. The growth of the international capital markets has increased the transparency of reserves reported by the multi-nationals.

Cash Flow Analysis

The Statement of Cash Flows reports all cash in and out over a period of time. It discloses non-cash investing and financing activities. CF from operating activities = amount of cash generated or used by a firm as a result of production of goods and services. Normally, the positive cash flow is essential for LT survival. Investing CF = cash used to acquire assets. This is necessary to maintain operating capacity and for future growth. CF from Financing is also noted in the Statement of CF.

The Income statement and SoCF represents flows over time. The Balance sheet is a point in time. Changes in CF from period to period must be accounted for in the CF statement. The outline for the CF statement can look like:

$CFO + CFI + CFF = \text{net CF} = \text{net changes in cash from one balance sheet to the next.}$

The three 3 types of CF should be separated and then related back to the I statement. Much of the focus is on classifying the cash into one of three components – CFO, CFI, CFF, and then adding or subtracting the changes in CF of these components to arrive at CF.

The SoCF is intended to report all CF inflow and outflows for a specified period. CF from operating activities (CFO) measures the amount of Cash generated or used by the firm as a result of production and sales of goods and services. Positive CF is essential for sustained existence, normally. Investing CF (CFI) is the amount of cash used to acquire assets, other investments, and other businesses. Cash flow from financing (CFF) includes CF related to firm's capital structure (debt and equity), including the issuance of equity, etc.

SFAS 95 permits firms to report CFO either directly, using major categories of gross receipts and payments, or indirectly by having a reconciliation from the accrual methods of NI.

CFO measures NI adjusted for cash balances. CFO is tantamount to operating profit, and can be measured for performance purposes. CFO will be less subject to distortion than NI. CFI tells us what is being done with the excess cash. CFF indicates the source of financing from the firm.

The direct and indirect methods can report directly the CF or indirectly from reconciliation of net income. The drawback with the indirect is that it is not possible to compare operating CF and the CF by function with the revenue and expenses that generated them. It simply recasts the income statement and the balance sheet. Transaction analysis can prepare a CF statement for firms not complying with SFAS 95 and convert to either the direct or indirect methods. This reconciles line items in the balance sheet with the related income statement components. The direct method is a cash

collection means, and looks at the cash outflow to generate cash collections. The direct method will generate financing CD line that looks at the additional borrowing and equity financing, as well as debt and dividend payments. The indirect method starts with net income and then adjusts for non-cash expenses and changes in the operating accounts (assets and liabilities). There will be discrepancies due to acquisitions and the translation of foreign subs currency and revenue being reported in foreign denominations.

With the indirect method, CFO is computed by NI and then + / - the following:

- Non cash revenues and expenses
- Non-operating items included in NI
- Noncash charges in operating A & L.

With the direct method, a reconciliation is also required, Thus, many firms just use the indirect method to begin with. With both methods, firms must disclose the CF outflows for taxes and interest within the CF statement or elsewhere (i.e. footnotes).

The indirect method suffers from a lack of comparison of operating CF in and out be function with the R and E that generate them. The direct method allows this. The indirect method thus simply recasts NI providing little additional insight into CF generation abilities. The analyst may then have to redo an indirect statement into a direct one to better understand the CF.

Transactional Analysis is used on firms that do not comply with SFAS 95 or where the indirect CF statement is to be converted into a direct statement. Points in time in the balance sheet are converted to flows and changes in CF statement. The goals are to classify CF among operating, financing, investing activities, as well as to understand the relationship between accrual of R, A, & L and their CF consequences. The method reconciles the line-item changes in the balance sheet with their related I statement components to derive CF consequences of the transactions and changes. These changes are groups by operating, Investing, or financing activities. A chart in the text (at 92) shows which changes are grouped into which activity.

The relationship between balance sheet and CF is summarized by:

- Increases (decreases) in assets represent net CF out (in). This is because of purchase of asset is from existing CF.
- Increases (decreases) in liabilities represent net CF in (out). When a firm increases liability, cash must have been received (or at least not given out in payments of the L).

In general, when assets are increased across two points in time, CF decreases because cash is used to buy the assets. We could also describe this as replacing one asset (cash) with another asset (a non-cash, physical type of asset). When liabilities are increased over time, CF increases because we have not yet paid for expenses. These unpaid expenses then appear in the balances sheet as a liability.

Thus, when A/R increases, period sales must have exceeded cash collections. The net change in AR is therefore deducted from sales to derive C collected from customers.

When interest payable increases, the firm did not pay all of its interest expense accrued during the period. An increase in interest payable must be deducted from the interest expense to compute the amount of interest actually paid in the period.

The Direct Method of CF. On cash collection, The primary component of CFO is the cash collected in the period. We start with sales, then subtract (add) the increase (decrease) in A/R, then also adjust for changes in cash advances received. This will be the amount of CF actually received from operations.

As to cash inputs, with CFO established, the operating Cash outflows are developed. The COGS is subtracted, and decreases in inventory are added to cash, and a decrease in accounts payable (where the firm owes money to someone) is a decrease in CF.

The rest of the accounts are treated likewise, with each transaction being linked back to the CF statement. Investing CF result from investments in capital components of the firm and investments. As net depreciation changes, the amount of depreciation, amortization, and depletion must be reported in this area of the CF statement.

Financing CF including debt and equity financing, repayment of old debt, dividend payments, and equity buybacks.

Cash collections from Operations

-cash inputs

-cash expenses

-cash interest expense (debt is in CFF, but interest is in CFO)

= CFO

+ - capital expense

+ - investment in other businesses

= CFI

+ - St borrowings

+ - dividends paid

= CFF

All summing up to

Total CF

The Indirect Method. The reporting of CF from financing and investing is the same as with the direct method. CFO however is different, with NI computed from the I statement and then + / -:

- Non cash revenues and expenses
- Non-operating items included in NI
- Noncash charges in operating A & L.

Reported vs. operating changes in A & L will often contain discrepancies. These are from acquisitions and divestures, and from foreign subs. As to acquisitions, inventory is increased as a result of purchase of inventory from someone else, or from an acquisition that has inventory. SFAS 95 only requires CFO include operating transactions. Changes in CF from A & L will then not match from eth balance sheet. The analyst can reconstruct the A & L obtained through a merger or acquisition. CF for subsequent periods may still be distorted, resulting in trends of CFO and investing CF being off.

Foreign subsidiaries A & L must be translated into the reporting currency. This then generates a CF based on both the operating effects on CF and the currency rate fluctuation. CF changes from currency rate fluctuations will not normally be reported on the statement of CF, only the total change in CF in foreign subsidiary activity. Thus, unless the interest rate effect is segmented, the changes in CF in firms with foreign activity will be distorted from firms with pure CF changes and no interest rate changes (i.e. only domestic firms).

CFI and CFF are the same as direct method, but CFO is different:

NI

+ - noncash revenues
+ - nonoperating items in NI
+ - non cash changes in A & L
= net CF

This more detailed as:

NI

+ - non cash expenses
+ depreciation
= change in operating accounts
-(increase) in AR
+(decrease) in inventories
-(decrease) in A payable
+(increase) in accrued liabilities
+ (increase in interest payable)
+ (increase in taxes payable)
= CFO

CF statements have some problems. There will be non-cash transactions not noted on the CF statements, and generally the CF statement will not be in accord with the traditional accounting definitions of taxable income. There are also international problems, as definitions are much looser abroad. Many foreign nations will use a statement of change of funds. The focus is on the change in working capital. Prior to the 1970's the funds approach was generally used in the US. With the international statements, NT cash equivalents, cash, receivables, inventories are all cash substitutes, regardless of liquidity.

With the US methods, liquidity is given a priority status on the statements, and assets and liabilities are ranked in terms of liquidity.

Analysis of CF Info. The CF statement is intended to help predict the firm's ability to sustain and increase Cash from co. Free CF is the cash the firm has on a discretionary basis after required cash outlays. The concept of FCF varies widely. The basic definition is $FCF = CFO - \text{cash needed to maintain present production abilities (but with no capital outlays for expansion)}$. The larger the FCF, the healthier it is because it can use the FCF for growth, dividends, debt payment, etc. Often, it is impractical to separate capital expenditures into present vs expansion costs. Lacking any breakouts, $FCF = CFO - \text{all capital-related expenditures}$. Valuation models will use a similar definition, with operating CFO – capital expenditures for replacement and growth. Such models do differ however as FCFE (all providers of debt and capital) or FCFE. FCFE does not include interest and debt payment, so interest must then be subtracted from CFO to arrive at FCFE. Management decisions can be reviewed in regard to leverage, dividend policy, growth investing, etc. The income statement and the balance sheet can be combined with the CF statement to develop valuation measures.

Accrual accounting Income can be affected by management discretion. Further, accrual accounting by itself fails to provide adequate info about the liquidity and LT solvency of the firm. CF statements will be less likely to be affected by variations in accounting standards. A CF trend can be generated by comparing successive CF statements. The text has graphs for various companies on NI, CFO, FCF1 and FCF2.

The CF statement serves as a check on accounting assumptions (going concern, etc).

The CF statement also allows the analyst to differentiate between the actual events and the accounting assumption that have been used to report those events. Liquidity problems can occur if the firm grows too fast, since there will be high amounts of capital expenditures and possible negative CF in the ST to NT. The CF statement can highlight liquidity problems via negative CF resulting from expansion. The CF statement can be used to look at trends over time.

SFAS 95 requires the CF statement to classify a certain way, causing problems at times.

- Cash required for replacement of capital is not included in CFO.
- Positive CFO may not be sufficient to replace productive capacity used to generate operating CF.
- Leasing assets vs. ownership will generate CFO differences. Leasing reports lower CFO because rentals are operating expenditures and not investing CF.
- Cash payments from inventory may also be excluded from CFO. It sometimes will be included as investing CF.
- Investment is not precisely defined, either.

Since FCF subtracts any forms of capital expenditures from CFO, these problems may affect CFO but will ultimately not affect FCF.

FCF and valuation is intended to measure the cash available to the firm for discretionary use after all cash outlays. FCF is widely used by analysts for valuation models, but the FCF definition varies widely. FCF is similar to CFO minus the capital expenses required to maintain the present productive capacity (IAS 7). The historical cost of depreciation is arbitrary and measures the operating capacity only by coincidence. So, using the capital expenses made to maintain current capacity, excluding expansion of capital expenses is relevant. It is difficult to separate maintenance expenses from expansion costs, though. So, in many instances $FCF = CFO - \text{total capital expense}$. The finance valuation models will include growth related capital expenses in their calculations, in any event. CF is relatively free of drawbacks of the accrual concept, and is less likely to be affected by variations in accounting principles and estimates. $FCF1 = CF - \text{capital expenses}$. $FCF2 = FCF1 - CF \text{ from investing activities}$. This all assumes that the firm is a going concern, though. (I will define FCF as net operating margin before taxes, or EBITDA minus cap. exp. necessary for maintenance of existing operations but not expansion minus income taxes from net income).

There are some growth problems with all of this. Rapid growth can lead to CF problems, so the CF statement provides info on liquidity and the ability to finance the growth from the internally generated funds.

On classifications, CFO will be affected by reporting methods that alter the classification of CF among operating, investing, and financing activities. These differences in CFO as a result of classification are permanent (example of software expenditures).

Interest income and dividends received from investments in other firms are classified under SFAS 95 as operating CF. Return on capital is thus separated from return of capital. Analysts will reclassify interest income as financing CF, resulting in FCF that is only due to CFO of the firm's core business (KCK: but what do you do about Berkshire where investing is a core part of the firm?).

Interest paid is an operating CF per SFAS 95. Usually, analysts will subtract this from CFO so that the financing decision does not affect and is independent of the FCF determination.

Noncash transactions may need to be included in financing or investing activities (example is assumption of a RE mortgage, producing the same effect as a bond to a 3rd party to finance a building acquisition).

In general, these are the issues on classifications:

- property, plant, equipment (PPE)
 - o these are capitalized over time.
- Effect of different accounting methods.
 - a. CF not affected by timing differences. CF can be affected by reclassification, however.
- Interest paid

- a. Included in CFO, but really is a function of financing
- Non-cash transactions
 - a. Example given in the book of a two step process for mortgage assumption:
I and F activities both occur when a business takes over someone's mortgage.

International perspectives. No CF statement is required in many areas of the world. Even when statements are required, their format varies greatly.

Ratio Analysis

Purposes. Financial ratios allow risk and return characteristics of firms of different sizes to be compared with each other. Ratios can also provide a profile of an individual firm. The categories are:

- Activity analysis, evaluating revenue and output generated by firm assets.
- Liquidity ratios, measuring the adequacy of a firm's cash resources to meet NT cash obligations.
- LT debt and solvency examines the firm capital structure
- Profitability ratios measure the income of the firm relative to revenues and invested capital.

Limitations.

- With most financial ratios, an implicit assumption of proportionality exists between numerator and denominator. Economies of scale suggest however that certain factors may be non-linear in nature.
- There is also a lack of benchmarks to indicate optimum levels. Often, industry norms are used as benchmarks. But the industry as a whole may be performing poorly, or more poorly than alternative investments.
- And, time horizons may force a reevaluation whether the ratio result is positive (the text gives an example of high liquidity being good for ST investor, but indicative to a LT investor of poor management of working cash).
- Ratios depend upon data points generated at specific dates. This may be less than ideal for seasonal business activities. Year-end figures may be more subject to management manipulations.
- Use of ratios when negative numbers are involved may produce misleading figures.
- Accounting methods can greatly affect (and distort) ratio analysis.
- Window dressing and big baths will distort ratio analysis until taken into account.

Common-size statements. Firms of differing sizes are difficult to compare performance against. Common size statements are used to standardize financial components by expressing them as a % to a relative base (i.e. % of sales; % of assets). Thus, moving from a comparison of the absolute value of a line item to a common-size method may allow better comparisons to be made. This is meant to be a first step in the process, however. Margins ratios and many other ratios may then be more meaningfully compared across industries to ascertain which industries have the lowest or highest profitability ratios (etc). Common size also allows a comparison of a single firm over time.

Activity Analysis. Activity ratios describe the relationship between the firm's level of operations (sales) and the assets needed to sustain the operations.

ST activity ratios.

$$\text{Inventory turnover} = \text{COGS} / \text{average inventory}$$
$$\text{Average inventory} = (\text{beg Inv} + \text{end. Inv.}) / 2$$

These measure how many times the inventory is turnover over per year. High inventory indicates high holding expenses.

This measures the efficiency of the firm's inventory management. The inverse is:

$$\text{Ave days inventory in stock} = 365 / \text{inventory turnover}$$

$$\text{Receivables turnover} = \text{sales} / \text{ave trade receivables}$$

$$\text{Ave Days receivable outstanding} = 365 / \text{receivable turnover}$$

On receivable turns, sales generated from investing and financing should be excluded, as we are only looking at operational considerations.

$$\text{Accounts payable turnover} = \text{purchases} / \text{ave accounts payable}$$

$$\text{Ave days payable outstanding} = 365 / \text{payable turnover}$$

$$\text{Working capital turns} = \text{sales} / \text{ave working capital}$$

Only operating A & L should be used to calculate working capital, as we are again concerned with operational issues. Using operating capital as a proxy for CF is dependent upon the going concern assumption.

The length of operating cycle is important:

$$\text{Op cycle} = \text{time to sell inv} + \text{days to convert to cash}$$

$$\text{Cash cycle} = \text{op cycle} - \text{days payable outstanding}$$

LT ratios.

$$\text{Fixed asset turnover} = \text{sales} / \text{ave fixed assets}$$

Asset turnover may be affected by the company product cycle (start-up, growth, maturity and decline) as well as when assets were purchased (due to depreciation of the assets, a higher turn rate will be generated by older assets).

$$\text{Total asset turns} = \text{sales} / \text{ave total assets}$$

Liquidity Analysis. This is used to determine ability of a firm to meet ST or current obligations. Liquidity ratios should be compared to ratios of companies in the same industry, since industries will vary considerably. The operating and cash cycle of a firm is the sum of the days it will take to sell inventory and the number of days until the

receivables are converted to cash. The cash cycle is the days a firm's cash is tied up by its current operating cycle. The shorter the cycle, the more efficient the cash management.

Types of current Assets:

- Cash and cash equiv
- Marketable securities
- Accounts receivables
- Inventories
- Pre-paid expenses

Types of current liabilities:

- ST debt
- Accounts payable
- Accrued liabilities

Current ratios involve an asset or liability with a maturity of less than 1 year.

$$\text{Current ratio} = \text{current assets} / \text{current liabilities}$$

$$\text{Quick ratio} = \text{cash} + \text{marketable securities} + \text{accts receivable} / \text{current liabilities}$$

$$\text{Cash ratio} = \text{cash} + \text{marketable securities} / \text{current L}$$

The cash ratio is the most conservative, as only cash and near cash assets are used in the ratio.

$$\text{CFO ratio} = \text{CFO} / \text{current L}$$

$$\text{Defensive interval} = 365 * (\text{cash} + \text{market sec.} + \text{accts rcvble}) / \text{projected exp.}$$

The defensive interval shows how many times we can support projected expenses

LT debt issues include debt covenants, capitalization tables and debt ratios; interest coverage ratios, CFO to debt ratios

$$\text{Debt to total capital} = \text{total debt} / \text{total capital}$$

$$\text{Debt to equity} = \text{Total debt} / \text{total equity}$$

Interest coverage ratios ----

$$\text{Int. coverage} = \text{EBIT} / \text{int exp}$$

$$\text{Fixed charge coverage} = \text{Earnings before Fixed charges \& taxes} / \text{fixed charges}$$

$$\text{Times int earned} = \text{adj. op cash flow} / \text{int exp}$$

$$\text{Fixed charge coverage ratio} = \text{adj. op cash flow} / \text{fixed charges}$$

Capital expenditures ----

$$\text{Cap exp ratio} = \text{CFO} / \text{cap. Exp.}$$

$$\text{CFO to debt} = \text{CFO} / \text{total debt}$$

Risk analysis / Leverage Ratios. Business risk is the uncertainty of income in a firm measured by the variability of a firm's operating income over time. Business risk = the standard deviation of operating expenses / mean operating earnings. Sales variability is the prime determinant of earnings variability, and is a function of the coefficient of variance of sales.

Financial risk can be measured through debt and leverage ratios, since in the presence of debt and leverage, additional uncertainty exists that returns to the equity holders are due to a firm's use of fixed obligation debt. Several above noted ratios are felt to be indicators of financial risk. The Debt to Equity Ratio is measure of both financial strength and vulnerability. LT debt / total capital includes all LT debt, and preferred stock total equity. The interest coverage = EBIT / debt interest charges. Consideration of lease payments = EBIT / interest expense + lease payments. The cash flow ratio = CFO (and not earnings) / LT debt. This looks at the cash flow coverage on the debt, and is of interest to the lending institutions. Other variables include the fixed charges coverage ratio, and operating CF / cap. exp.

The above ratios measuring CF and debt ratios are part of a group of indicators showing the likelihood of default risk. This becomes very important for bond rating analysis, but is also helpful for commercial loans and the interest rates on those loans. The Altman Z score attempts to measure the probability of a business failure due to lack of CF and/or the lack of CF to service the debt load.

Operating leverage ----

$$\text{Contr margin} = \text{contr} / \text{sales} = (1 - \text{VC}) \text{ sales}$$

$$\text{OLE} = \text{contr margin ratio} / \text{return on sales} = \text{contr} / \text{NI}$$

$$\% \text{ change in Income} = \text{OLE} * \% \text{ change in sales}$$

$$\text{Financial Leverage (FLE)} = \text{Op I} / \text{NI}$$

$$\text{Total leverage effect (TLE)} = \text{OLE} * \text{FLE}$$

Operating Performance. The classification scheme can be rearranged to reflect operating abilities. When done in this manner, operating ratios include ---

- total asset turnover = net sales / ave total net assets; inventory turnover (sales);
- working capital turnover; net fixed asset turnover = net sales/ ave net fixed assets;
- equity turnover = net sales / ave equity.

Growth variables. There is also a set of ratios looking at growth potential. The sustainable growth potential is dependent upon the rate of return on the investment and the amount of earnings or cash flow reinvested. The Internal Rate of Reinvestment, or

IRR, = % of earnings retained * ROE. This can be seen as the potential for sustainable growth, if solely financed through internal resources.

Profitability Analysis.

Return on sales ----

Gross margin = (sales- cogs) / sales. This comes from COGS as a percentage of sales.

Operating Profit Margin = operating profit / net sales. This ratio is a prime indicator of business risk for a firm over time. It is also EBITDA/sales.

Net margin = Op I (or net income) / sales. It should be computed from continuing operations because we want to know about future expectations. Margin bf Int & Taxes = EBIT / sales. Pre-tax margin = EBT / sales. Profit margin = NI / sales

Return on Investment ---

ROA indicates the degree of efficiency in the use of assets.

$$\text{ROA} = \text{NI} + \text{after-tax int} / \text{ave total assets OR}$$

$$\text{ROA} = \text{EBIT} / \text{ave total assets}$$

$$\text{ROE} = \text{pretax I} / \text{ave equity}$$

$$\text{ROE} = \text{NI} / \text{equity}$$

Return on total Capital = net income + interest expense / ave total capital. This relates earnings (not CF) to all capital in the firm (debt plus equity).

The Return on Invested Capital = Net Income + Interest + depreciation + Amortization – income taxes due – capital expenses for maintenance, then with other adjustments / ave total assets, with also with adjustments. It is similar to the Return on Working Capital, except more of a cash flow to assets ratio.

Return on equity. A very important profitability ratio is the Return on Equity or ROE, and this is = net income / ave total equity.

The return on owners equity, or return on common equity (ROCE) = net income – preferred dividend / ave common equity.

Integrated Analysis. ROA and ROE can be disaggregated along the lines of the Dupont equation.

$$\text{ROA} = \text{Total asset turnover} * \text{Return on sales}$$

$$\text{Return on sales} = \text{sales} / \text{assets} * \text{op I} / \text{sales}$$

$$\begin{aligned} \text{ROE} &= \text{profit margin} * \text{asset turnover} * \text{equity multiplier} \\ \text{ROE} &= (\text{NI} / \text{sales}) * (\text{sales} / \text{ave total assets}) * (\text{ave total assets} / \text{ave equity}) \\ \text{ROE} &= (\text{ROA} - \text{int cost} / \text{assets}) * (\text{assets} / \text{equity}) \end{aligned}$$

Three components ---

$$\begin{aligned} \text{ROE} &= \text{profitability} * \text{activity} * \text{solvency} \\ \text{ROE} &= (\text{NI} / \text{Sales}) * (\text{sales} / \text{ave total assets}) * (\text{ave total assets} / \text{ave common equity}) \end{aligned}$$

Five components ----

$$\begin{aligned} \text{ROE} &= \text{taxes} * \text{financing} * \text{operations} * \text{turnover} * \text{solvency} \\ \text{ROE} &= (\text{NI} / \text{EBT}) * (\text{EBT} / \text{EBIT}) * (\text{EBIT} / \text{sales}) * (\text{sales} / \text{ave total assets}) * (\text{ave total} \\ &\quad \text{assets} / \text{ave common equity}) \end{aligned}$$

Economic Characteristics and Strategies. By disaggregating, competing strategies can be ascertained. A high-turnover / low-margin Approach will focus on controlling cost to profit by low price high volume of sales, but it has to control investments to achieve acceptable ROI. A low-turnover / high-margin approach, competes on basis other than price (quality or product differentiation). This Allows higher prices and profit margins, cost control less important

A product life cycle can also be reviewed in a similar context.

- Startup
 - o High short-term activity ratios but low liquidity ratios
 - o Profits and Cash flows low and even negative
 - o Debt (both short and long term) high
- Growth
 - o Profits Grow, but cash from operations lag
 - Cash receipts based on prior sales
 - Disbursements made in anticipation of sales
 - Ratios based on income improve prior to improvement in cash-based ratios
 - o Investment in capacity grows, decreasing long-term activity ratios
 - Expansion in productive capacity delays benefit of operating leverage
 - Fixed costs high relative to sales
 - Profits and ROA remain low
- Maturity
 - o Ratios tend to stabilize
 - o Sales, production approach capacity
 - o Cash-based ratios begin to “catch up” with income-bases ratios
- Decline (Harvest)
 - o Firm reaches optimal operating levels,
 - ratios approach industry norms,
 - turnover ratios high
 - Debt to equity declines due to increase in RE
 - Liquidity High
 - o As firm begins the decline (harvest) stage

- Cash flows positive even when current profits decline
 - ROA peaks due to reduced asset base (as sales decline, so does the need for assets to support sales)
- Life cycle primarily product based

Earnings Per Share Calculations. EPS is the earnings per share. Preferred and dividend payments are subtracted from net income to arrive at EPS. The figure is based on the weighted average of common shares throughout the year. In some countries, the EPS is based on the ending # of common shares as of 12-31 of the year. If net loss exists, however, and there is no preferred payment issued and the preferred is cumulative, then, then that becomes a credit against the company, and should be treated as a loan by shareholders to the company. This has the effect of increasing the net loss on the reporting period. The disclosure of EPS as an extraordinary item must be reported either in the face of the income statement or in notes of financial statements.

The weighted average of the # of common shares outstanding is weighted by a function of the period they are outstanding. Stock splits or stock dividends require restatement of outstanding shares to the beginning of the year, however. The cash is restated, since splits do not generate new cash. The total investment does not change.

Dilutive EPS problems exist. This is basic EPS – convertible impact – options, warrants, etc. A dilutive effect should not be reported, however, if the effect of the capital structure is anti-dilutive in nature. For instance, where the exercise of the option increases the EPS or reduces the loss per share, no dilution occurs.

On the convertible securities, the conversion is assumed to begin at the beginning of the period and there is an elimination of related interest. Thus, the numerator is increased by the interest, and the denominator is increased by the number of shares to convert. The conversion rate that is used will be the one that is most advantage to the note holder, not the company. A worst-case scenario is built against against the company, on conversion rights of the note holders.

On options and warrants, the treasury stock method is normally used. The exercise of options at the start of the year is assumed, and then the proceeds of options are used to purchase common stocks from the firm treasury. The # of shares issued on warrants - # of shares that could be bought from the firm treasury at FMV. This increases the shares outstanding. Dilution n results if the options and warrants are exercised with prices higher than the current FMV. There is an antidilutive effect, though, if the exercise price is under the FMV, so only assume an exercise of the options and a dilutive effect if the exercise price is above the FMV in the period being reported. On contingency issues, if a contingency is met by the end of the year, then the issuance of the # of shares possible to issue is to be assumed.

Anti-dilution. The aggregate of all dilutive effects must be considered. Any anti-dilutive effect is to be excluded and not used to offset other dilutive effects. If the conversion or exercise increases the EPS, no dilution occurs, and the offset d\should not be applied.

Anti-dilution effects should be ignored on each calculation of convertibles, warrants, options, and contingencies. Reconciliation should occur for basic and diluted EPS. The basic message on the dilutive effect is to assume the worst-case scenario on each separate issue, and if there is no dilutive impact on any one issue, then you should move onto the next issue without considering the positive effects of an anti-dilutive impact.

In Conclusion, an analysis of ratios between firms and the industry can be done through internal liquidity, operating performance, profitability, financial risk, and growth analysis. An analysis of non-US financial statements show that the statements vary widely, and there is much less detail in many foreign statements. There is also an issue of quality as to the balance sheet and the income statements. The various ratios can be used for stock valuation models, CAPM, systematic risk, bond ratios, and bankruptcies. There are limitations, though, as there are different accounting methods, different divisions within the company, a need for a total profile of the company instead of merely a usage of the ratios, and the acceptable range of values for the ratios per company and industry.

Summary of Useful Financial Ratios

Short-term Solvency Ratios

Current ratio = Current assets ÷ Current liabilities

Quick ratio = (Current assets – Inventory) ÷ Current liabilities

Activity Ratios

Total asset turnover = Total operating revenues ÷ Average total assets

Receivables turnover = Total operating revenues ÷ Average receivables

Average collection period = Days in period ÷ Receivables turnover

Inventory turnover = Cost of goods sold ÷ Average inventory

Days in inventory = Days in period ÷ Inventory turnover

Financial Leverage Ratios

Debt ratio = Total debt ÷ Total assets

Debt-equity ratio = Total debt ÷ Total equity

Equity multiplier = Total assets ÷ Total equity

Interest coverage = Earnings before interest and taxes ÷ Interest

Profitability Ratios

Net profit margin = Net income ÷ Total operating revenue

Gross profit margin = Earnings before interest and taxes ÷ Total operating revenues

Net return on assets = Net Income ÷ Average Total Assets

Gross return on assets = Earnings before interest and taxes ÷ Average total assets

Net[Gross] Return on assets (ROA) = Net[Gross] Profit margin × Asset Turnover

Return on equity (ROE) = Net income ÷ Average stockholders' equity

Payout ratio = Cash dividends ÷ Net Income

Retention ratio = Retained earnings ÷ Net Income = 1 – Payout ratio

Market Value Ratios

Price-to-earnings (P/E) ratio = Market price per share \div Earnings per share

Dividend yield = Dividend per share \div Market price per share

Market-to-book (M/V) ratio = Market price per share \div Book value per share

Tobin's Q ratio = (Market value of debt + equity) \div Replacement value of total assets

Empirical Research

The Classical Approach was prevalent until late 1960's. The focus was on finding the most correct accounting representation of some true economic reality. This approach suffers from a lack of testability.

The market-based approach refers to the EMT, MPT, and tests of the theories.

Positive accounting looks into disclosure and regulatory requirements and agency theories.

Agency Theories. Several different version of agency analysis exists. Many studies will envision a typical agency situation of managers vs equity owners. A bonus plan will be hypothesized, with managers being compensated for how well they manage the firm. Financial statements are often used as benchmarks. This may produce an incentive to distort accounting policies to improve bonuses.

Another agency theory is the debt covenant hypothesis. Managers may be motivated to choose the accounting measures that minimize the likelihood of debt covenant violation. These include, working capital levels, interest coverage, net worth, etc.

A third agency theory is the political cost hypothesis. Large firms are more susceptible to regulation and disclosure requirements. These firms may try to minimize reported earnings (e.g. a big oil business when oil prices are high).

Lev's findings were that researchers used reported earnings without adjustment for accounting manipulations. Lev suggested that more research was needed on quality of earnings. Bernard's findings included the need for more formal modeling.

Market anomalies are also noted.

Analysis of Inventories

Basic relationships. FIFO, LIFO, and weighted averages are the three methods most commonly used with inventories. With FIFO, COGS have the oldest costs attached to them, so the ending inventory has the most recent items attached. FIFO provides measure of inventory closest to current or economic value, because it is closest to current time and current valuations of prices. On the weighted average cost, an average cost is used for all items in the inventory. COGS will vary, depending upon which of the three methods are used. This is due to the oldest costs attaching to COGS with FIFO, the newest costs with LIFO, and the weighted average of costs with the third method.

The equation most often used for an inventory is Ending Inventory (EI) = Beginning Inventory (BI) + Purchase of goods (P) – COGS.

With stable prices, $BI + P = EI - COGS$. With rising prices, calculation of EI and COGS needs assumption on flow of costs. Weighted ave COGS = sales * weighted ave of BI and P.

Typically, inventory valuation is at the lower of cost or market.

- GAAP requires lower of cost or MV.
- This follows the principle of conservatism, with losses recognized as they occur. Gains are then only recognized at time of sale.
- For LIFO firms, the lower of cost or MV (LCM) can be used for financial reports, but cannot be used for tax purposes.

During times of changing prices or growing inventories, LIFO provides best measure of future profitability and current income. FIFO provides more realistic measure of balance sheet, and closest to current or economic value. LIFO measurements are complex in multi-product environment, affected by management choices.

On the Balance Sheet, inventories based on FIFO are preferable, as the carrying values most closely reflect the current costs on the inventory. GAAP requires the use of the lower of cost or market valuation, with market value = replacement cost. So, use the lesser of cost or replacement value to the inventory valuation. For tax purposes, LIFO cannot be used because LIFO cannot recognize write-downs and declines in market value for tax purposes.

As to COGS, the difference between original cost of inventory and the cost of replacement is a holding gain or inventory profit (or loss). It is debatable whether this is income. Lifo is most informative with periods of rising prices and stable and growing inventories. Lifo allocates the most recent purchases to COGS. This has the effect of a lower reported income and reported taxes. But fifo presents us with the best measure for the balance sheet, normally. Firms may use more than one inventory method, though.

LIFO is rarely used outside of the US, and Lifo is complex in a multi-product environment.

LIFO vs FIFO. This is the great accounting debate without clear answers. Lifo results in higher COGS, lowered reported income and taxes. IRS requires the same method of accounting as financial reporting. With rising prices, Lifo becomes a better choice. Since inventory will have lower costs with Lifo, there will be higher cash flow, but lower capital. Lifo can generate misleading liquidity measures, though, as the working capital is understated due to inventory being understated. With Fifo, COGS is lower (normally), pre-tax income is higher, income taxes are higher, net income is higher, the inventory balance is higher, and the working capital is higher.

With stable prices or rising inventories:

COGS Higher LIFO
 Pre-tax lower LIFO
 Taxes lower LIFO
 Tax savings ---- Higher LIFO
 NI lower LIFO
 CF higher LIFO (because taxes are lower)
 Inv bal. lower LIFO
 Wk cap lower LIFO
 Assets decrease LIFO

In general ----

	LIFO	FIFO
COGS	Higher	Lower
Income	Lower	Higher
Income taxes	Lower	Higher
Net Income	Lower	Higher
Cash Flow	Higher	Lower
Inventory balance	Lower	Higher
Working Capital	Lower	Higher

Current ratio is lower with LIFO b/c CA / CL; LIFO decreases assets also therefore equity.

Adjustment of inventory balances. LIFO inventories have normally older costs and lower costs. Firms are required to disclose a LIFO reserve, if they use LIFO. This is = inventory FIFO – inventory LIFO. Where the Lifo reserve is large, the balance sheet is carrying significantly understated inventories. Lots of old items are then in the inventory. When prices are declining, Lifo produces lower costs than FIFO. $COGS_{lifo} = COGS_{fifo} + (BI_{fifo} * inflation\ rate)$.

$$LIFO\ reserve = inv_F - inv_L .$$

$$P = \text{COGS} + \text{EI} - \text{BI}$$

Adjustment of FIFO COGS to reflect current cost is done to estimate the impact of price changes on COGS and earnings. This allows comparison of other firms in the industry. The inventory is often not adjusted however, because LIFO costs are outdated and usually meaningless.

Adjustment from FIFO: $\text{COGS}_L = \text{COGS}_F + (\text{BI}_F * r)$ where inflation is also factored in, or $\text{COGS}_L = \text{COGS}_F + \text{LIFO Reserve}$.

Adjustment from weighted average: $\text{COGS}_L = \text{COGS}_W + (\text{BI}_W * r/2)$, with $r = \Delta \text{LIFO reserves} / \text{BI}_F$

On Lifo Reserves, the analyst should back out the effect of a Lifo liquidation to arrive at a better indication of operating results. For price declines of the product, no adjustment is needed, however. This is all the result of Lifo reserves declining from either price declines or from inventory liquidation. A liquidation would decrease the reserves, and thereby artificially impact the asset balances and increase earnings, if the operating results were not revised. Operating margins would increase with a Lifo asset liquidation. Thus, a Lifo liquidation may be a telltale sign of a long-term decline in the firm's operating capabilities, especially if these things are occurring on a regular basis. In such an instance, the company is using the Lifo liquidation to write-off assets that are no longer economically viable and also simultaneously increasing profit margins. Studies have shown that corporate restructurings may follow a series of Lifo liquidations. So, the profit from Lifo liquidations are not operating in nature, and should be excluded from recurring earnings. With declining prices, no adjustment is made to the operating results, and this is due to Lifo effectively overstating closing inventories (with inventory costs per item higher under Lifo) and any artificial tax reason to use Lifo would be lost. So, Lifo would probably understate income with declining prices, and the analyst does not need to adjust earnings any further.

More thoughts on inventories. Ordering of inventory traditionally has been done on the basis of demand: as demand increases, inventory should increase by proportional amounts. But, some studies have shown that inventory levels are proportionate to the square root of demand. So, if demand increases by 4 times, inventory should increase by 2 times. This results in greater operating efficiencies. This is all called Economic order quantity, or EOQ. Additionally, people will switch into available products on the shelves right then, and not demand a proportional increase in each item to the inventory, so this may make some sense. Just in time provides for the shipment of inventory on an as needed basis. So, as an order is received, the items are manufactured and then shipped out. In the past, this was impossible, but with current levels of technology, Just in time can be a reality in numerous industries. Inventory turn ratios increase with the Just in time usage, so the distinction between Lifo and FIFO is less meaningful, since there are little or no inventories to begin with.

LIFO: A Historical and Empirical Perspective

- Estimated Tax Savings is larger for LIFO firms. This is expected to be larger for LIFO companies
- As to inventory Materiality - the larger the imbalance the greater the incentive to use LIFO
- Tax Loss Carry forward - the larger the TLC, the less the incentive to use LIFO
- Inventory Variability - the more variable, the greater the incentive to use FIFO, due to the probability of inventory liquidations
- Size as proxy for bookkeeping costs - the larger the accounting costs required to use LIFO, the less likely the firm would choose LIFO. Larger firms can absorb the cost
- Leverage - Under the debt covenant Hypothesis, Firms with higher leverage would tend to prefer FIFO because current ratio will be higher
- Current ratio - Under the debt covenant hypothesis, firms with low current ratios would prefer FIFO

Financial Ratios. These are based on median values. Lifo firms have higher turnover ratios, less inventory as a % of sales, and lower variation in inventory levels. These differences are due to accounting choices and are not based on operating efficiencies. The general recommendation is to use Lifo for ratio numbers that are income related and Fifo for balance sheet related components.

Traditional Literature in US focuses on Economic Order Quantity. Most recently, following Japanese management practices focus is on Just-in-time inventory policies. *Economic Order Quantity uses the assumption of linearity* leading to a policy that as demand increases, quantity of inventory held should increase proportionately. EOQ argues that optimal level of inventory is proportionate to the *square root* of demand, i.e if COGS increases by four times, average inventory should double.

With Just in Time, Japanese management practices strive for the ideal that firms should not hold inventory but should receive and ship orders “just in time”, as needed. Japanese TO ratios s/b much higher than those of American firms.

The FIFO/LIFO Choice and Inventory Holding Policy may be tied to inventory holding choice:

1. Firms with higher inventory balances have larger potential tax savings from the use of LIFO
2. These higher balances may result from the LIFO choice, as LIFO firms seek tax advantages from higher inventory levels
3. To avoid LIFO Liquidations, and higher income taxes, LIFO firms must buy (produce) as many items as they sell.

Gross profit margin = Sales – COGS. COGS would be higher with LIFO and an increasing price environment, so gross margins would be lower. Gross profit margins are better stated using Lifo, since fifo will overstate the margin.

The income differential between LIFO and FIFO is the after-tax effect of COGS, and = $(1 - \text{tax}) + \text{COGS difference}$.

The CF difference will be tax rate * COGS difference.

Liquidity is affected by LIFO decision, with LIFO able to generate negative working capital (because COGS are higher, and Assets are lower); LIFO effectively understates working capital ratios. The firm equity is understated because the firm is holding inventory whose current value exceeds its carrying value. This can be adjusted by a LIFO reserve. We then end up with ratios that are more related to current COGS & inventory cost.

On debt ratios, understated LIFO inventory balances should be restated by adding the LIFO reserve (to reflect replacement costs). Equity should be increased by the same amount, because equity is understated with current value exceeding carrying value. D/E ratio should be based on FIFO, since LIFO will understate inventory balances, thus impacting the equity calculation – equity may actually decrease (and not increase as some would believe) because LIFO forces current value to exceed carrying value of the asset, thereby understating equity of the firm.

The LIFO reserve can decline for either liquidation of inventory, or price declines.

On inventory turnover, in general, LIFO is meaningless here due to the mismatch of costs, so use FIFO. Higher inventory turnover is assumed to be better, but this may be too simplistic. FIFO will have higher inventory turnover because COGS are lower, inventory is therefore higher, and then inventory / sales will be higher.

- In US literature, assumption of linearity leads to proportional increases in inventory as demand increases.
- EOQ, or economic order quantity, argues that inventory is proportional to the square root of demand. If COGS increases by 4, inventory should increase by two.
- Just in time is a Japanese practice that originated with the high cost of land, so to keep warehouse space down, just in time developed. Just in time will generate much higher turnover than other inventory methods.
- In practice, the LIFO / FIFO decision may be tied to inventory holding. Firms with higher inventory will save more by using LIFO, since taxes will be lower. To avoid LIFO liquidations, LIFO firms must then produce as many items as they will sell, as it is costly to reduce inventory levels.

International Accounting and Reporting Practices

Most common practice world wide is to use FIFO or weighted-average method.

In 1993, the International Accounting Standards Board revised IAS2, designating FIFO and weighted-average costs as the benchmark treatments and LIFO as the allowed alternative. LIFO firms required to provide FIFO /Weighted-average or current cost disclosures. Inventories reported as the lower of cost or market: Cost depends on the method used. Market is net realizable value w/specific limitations.

Long-Lived Assets - Capitalization Decision

Long Lived Assets. The costs of acquiring resources over more than one operating cycle are capitalized and carried as assets. All costs incurred until the asset is ready for use must be capitalized. Management choices regarding capitalization versus expensing the cost will have a very large impact on the profitability of the accounting statement. Capitalized costs over time will show a smoother pattern of reported income while there will be greater variance in reported income from expensed costs. Expenses will lower profitability in earlier years and high raise profit in later years. Expensing will lower the equity balances and income. The Debt ratios will therefore be higher for firms that expense, since equity will be lower.

Major Issues include:

1. Should some components of acquisition cost be included in the capitalized costs (e.g. interest during construction)?
2. Do some types of costs merit capitalization (e.g. software development and R&D costs)?
3. What accounting method should be used to determine the amount of costs capitalized (e.g. oil and gas properties)?

If capitalized, not on income statement, only on balance sheet, with incremental changes then occurring on the Balance Sheet. GAAP principal is to match revenue to expenses.

Conceptual Issues. Statement of Financial Accounting Concepts (SFAC) 6: Accounting assets – probable future economics. Concept serves as:

1. Index of initial investment outlays, used as base for measuring profitability (ROA)
2. Measure of firm's wealth, used for valuation and to measure solvency
3. inputs in the firm's production function, used to measure capital intensity

Financial Statement Effects of Capitalization. On income variability, firms that capitalize costs and depreciate them show smoother patterns of reported income. Firms that expense costs have greater variability. Variance declines as firm matures. Lower for larger firms or those with other sources of income.

On Profitability, In early years expensing lowers profitability. Profitability remains lower for expensing firms as long as there is positive growth. Lower assets can lead to higher ROA/ROE. Depends on relationship between profitability and growth.

Cash flow. The net cash flow is immune from these accounting decisions, but CFO will be impacted. CFO will be higher for firms that capitalize. Capitalization will also produce a permanent shift from CFO to cash used for investment. Net cash flow is

unaffected by accounting alternatives. Capitalization has significant impact on components, with a trade-off between CFO and CFI. Capitalized assets affect CFI while expensed assets impact CFO. CFO is always lower for firms that expense while CFI is higher. On Leverage, expensing firms report lower assets and equity. The D/E and D/A appear lower for such firms.

Interest. SFAS 34 requires capitalization of interest during construction periods. Financial analyst books will recommend the expensing of all interest, (to capture the economic impact of interest activity), so analysts should adjust earnings statements by considering interest to be an expense and not a capitalized cost, thereby reducing income. The Interest is capitalized only if firm is leveraged.

The feeling is that the capitalization of interest distorts CF classification, with CFO too high and cash for investments too low. The interest coverage ratio should therefore be adjusted for this impact. IAS 23 makes expensing interest to be the benchmark. The capitalized interest should be added back to interest expense. Adding capitalized interest lowers NI. Capitalized interest should also be added back to CFI. The interest coverage ratio should be adjusted by adding capitalized interest back to interest expense, so that it will not be overstated

For interest capitalization outside of the United States, IAS 23 provides for the expensing of all borrowing costs directly attributable to acquisition of capital assets may be capitalized

Intangible assets, generally. These are leases, licenses, brand names, copyrights, trademarks, etc. The cost of acquiring intangibles is capitalized at the acquisition as per pricing at that time. The market value can be used when there is a market pricing for the intangible, but many costs are not so easily identifiable.

The cost of intangible assets from unrelated entities is capitalized. Intangible assets received from government grants are usually have no cost. Usually have no market value, so cost is only reasonable basis.

The cost of internally generated intangible assets most troublesome because costs incurred in developing these assets may not be easily separable. It is difficult to measure amount and duration of benefits such as advertising. There may be little relationship between the costs incurred and value of the asset developed

R&D. SFAS 2 Accounting for R&D costs requires that virtually all R&D costs be capitalized. Empirical evidence is that R&D benefits last, on average, 7 to 9 years.

Outside the US, the research costs are expensed while the development costs are capitalized. This gives an incentive to make many artificial distinctions between research versus development, depending on whether the firm is attempting to keep taxable income down or whether it wants to report as high of earnings as possible. Expensing is required when the following conditions met:

- Product (process) clearly defined
- Costs can be clearly identified
- Technical feasibility has been established
- Firm intends to produce the product or process
- Market clearly defined
- Firm has sufficient resources to complete the project

Patents and copyrights. These are expensed as a R&D cost. Only the revenues from the patents are capitalized, but the full acquisition cost is capitalized when a patent is purchased from another company. Patents have 17 year lives and copyrights have 50 year lives. This is a situation whereby assets are treated differently, depending on whether the firm develops it versus purchases it. There is a difficulty in determining actual benefit period due to: Successfully patented products invite competition; gap between time patent is registered and product comes to market e.g; pharmaceutical products require period of testing before sale.

Franchises/licenses. Firms will capitalize the cost of purchasing the license.

Brands. The cost of a brand is capitalized on purchase, but internally generated brands are expensed (this is similar to how patents are treated).

Ad Costs. Benefits are uncertain, so the items are expensed. Practice Bulletin 113 of AICPA requires that cost of direct-response advertising that results in probable future benefits be capitalized, however.

Goodwill. This is the amount paid for the ability to earn excess profits or value that cannot be assigned to tangible assets. The goodwill is only expressly accounted for when the asset is acquired as a purchase, otherwise, the FMV is not normally noted on the balance sheets. The cost of the asset is carried forward. This is why there will be differences between book value and market value – the book just carry the asset cost, after depreciation, while the market value is the economic value of the asset as part of a going concern. The difference shows up as goodwill.

US GAAP and most international GAAP limit recognition of goodwill to purchase method of acquisition (as opposed to mergers)

Computer software. The R&D costs are expensed to establish the feasibility. Subsequent costs are capitalized as part of a product inventory. Arguably, all R&D costs should be treated this way.

Asset Revaluation. This involves Balance Sheet adjustments to Market Value. US GAAP prohibits recognition of changes in market value of fixed assets. IASB allows such revaluations. IAS 16- PP&E may be valued at fair market value minus depreciation. IAS 41- Agriculture produce and biological assets must be measured at fair market value. Have to mark to market for financial assets if “for trade”

Industry Issues

Regulated Utilities are allowed to earn profits equal to specified allowable ROR on assets. $\text{Revenues} = \text{Expenses} + \text{ROR} \times \text{Rate Base (assets)}$. Regulatory Assets and Regulatory liabilities. Examples of Regulatory assets include capitalization of ROE as well as interest; Capitalization of employee costs; Demand-side management costs (expenditures to reduce demand); Cost to buy out coal or gas purchase contracts. Effects of Deregulation (e.g. telephone industry) provides for Write down of fixed assets to reflect shorter economic lives and Write off of regulatory assets that are no longer recoverable.

Computer Software Development Costs. SFAS 86 – software intended for sale or lease. Requires costs incurred to establish technological/economic feasibility be viewed as R&D and thus be expensed. Subsequent costs may be capitalized. Some firms have not taken advantage of provision, leading to less comparability of CS firms. Example of effects for companies of capitalization.

Accounting for Oil and Gas Exploration. Exploration can lead to productive wells as well as dry holes. Cost of drilling dry holes can be considered part of cost of drilling productive ones. Value of oil discovery often unrelated to cost of drilling. SFAS 17(1977) required firms to successful efforts (SE) accounting methods that expense all dry hole costs. SFAS 17 (1979)- SEC forced FASB to suspend SFAS 17, in order to not curtail oil exploration. SEC (ASR 253) allows public companies to use SE or Full Cost (FC) accounting.

Differences in CFO from SE vs. FC: SE

- Lower carrying costs of oil and gas reserves
- Lower SH Equity due to lower asset values
- Lower earnings than FC firms during periods of rising exploration efforts
- Lower CFO than from FC firms

Other Issues

Adjustments. There is a need for Analytical Adjustments, Due to choices between capitalizing and expensing firms in software industry. Analyst must adjust financial data to reflect differences in capitalization policy among firms, and evaluate the flow of new products resulting from R&D expenditures.

Valuation Implications. R&D expenditures usually expensed due to difficulty of estimation of future benefits. Valuation models can be earnings based or asset based.

Other Economic Consequences. There are real consequences of differences in accounting methods. Firm's borrowing capability may be limited by unfavorable profitability or leverage ratios as a result of treatment (e.g. Expensing R&D); Unfavorable ratios may cause firms to curtail expenditures, leading to scaling back operations; Market perception that firm is curtailing R&D may lead to adverse market reaction.

Fixed Asset Data. Events resulting in changes in balance sheet cost of fixed assets:

- Capital spending (Acquisition of fixed Assets)
- Sale, impairment or retirement (no longer in use) of fixed assets
- Increases (decreases) in fixed assets due to acquisitions (disposals)
- Changes due to the effects of foreign currency translation

Capital Expenditures. McConnell and Muscarella (1986) and Kerstein and Kim (1995) provide evidence that there is positive (negative) market reaction to unexpected increases (decreases) in capital expenditures. Lev and Thiagarajan (1993) show that firms with higher (lower) changes in capital expenditures than is the average of industry experience positive (negative) market reactions. Capital expenditures tend to be made in fourth quarter.

Sale, Impairment or Retirement of Assets. Reasons analysts should focus on gains and losses on sale or retirement of fixed assets:

- Gains and losses from sale of fixed assets are considered to be nonrecurring and their inclusion in reported income statements lowers the quality of those statements
 - Recurring sales, acquisition may be at management discretion, leading to their use to smooth income
 - Highly leveraged firms sell more long-lived assets than less leveraged firms to improve D/E ratios
- Sale of significant portion of fixed assets is indicator of change
- Pattern of gains suggests company's depreciation method is conservative, understating reported net income and net carrying value of fixed assets.

Long-Lived Assets - Depreciation and Impairment

Introduction. Economic depreciation overstates profits if no allowance is made for the replacement of an asset, while accounting depreciation determines the amount to allocate in any one year. Analysts will consider a variety of ways for reporting long-lived assets over their useful lives.

Methods Used. For accountants, depreciation is an allocation method, not a valuation process. Analysts should differentiate between accounting depreciation and economic depreciation.

Annuity or sinking fund depreciation. This is an economic perspective. Income reported should reflect rate of return earned by asset. This leads to increasing depreciation amounts by year. It is not permitted in US, but is allowed in Canada for income-producing assets.

Straight Line Depreciation. This uses matching principle when income is the same each year. It is the most dominant method in US and most countries worldwide.

$$\text{Depreciation in Year } t = 1/n \times (\text{Original Cost} - \text{Salvage Value})$$
$$\text{Salvage value} = \text{Book Value}$$

Accelerated Depreciation. This method recognizes that the usefulness of an asset may be higher in the earlier years and declining in later years as efficiency falls off and the asset wears out. Maintenance also increases over time. This is difficult to forecast however, and accelerated depreciation could have the effect of reducing income in the earlier years and increasing it in the later years. Primary arguments for accelerated depreciation methods include: 1) benefits (revenues) from an asset may be higher in early years, declining in later years as asset wears out; and 2) even if revenues are constant, asset requires maintenance and repairs over time, which increases in cost as the asset ages.

Accelerated depreciation methods compensate for increasing trend in maintenance and repair costs so that total asset costs are level over the asset's life. Depreciation is now in proportion to their actual use rather than a function of time. Thus, depreciation becomes a variable cost and not a fixed cost of production. This decreases the variability of reported earnings.

Various methods exist. With the *sum-of-years' digits (SYD) Method*:

$$\text{SYD} = n \times (n+1)/2$$
$$\text{Depreciation in Year } t = [(n-t+1)/\text{SYD}] \times (\text{Original Cost} - \text{Salvage Value})$$

Salvage value = Book Value. Salvage value used in ATSV from sale is Market Value

With the *Double-Declining-Balance*:

Depreciation in Year $t = (2/n) \times (\text{Original Cost} - \text{Accumulated Depreciation})$,
Or, Depreciation in Year $t = (2/n) \times \text{Book Value}$

As to the *Units-of-production and Service Hours Method*, assets are depreciated in proportion to their actual use rather than as a function of time. More depreciation is recognized in years of higher production. Depreciation becomes a variable rather than a fixed cost, decreasing volatility of reported earnings. The problem with this method is that it overstates earnings in periods of low production. Further, there will still be a residual value to the asset after it has been fully depreciated, thereby resulting in a restructuring charge to correct the problem.

Sometimes, *group or composite depreciation methods* are used. The carrying costs are allocated by the units of production method. This method applies to single assets, so it is impractical for firms with large numbers of similar asset. Costs of similar (dissimilar) assets are allocated using depreciation rates based on weighted-average of the service lives of the assets. Gains or losses on disposal of assets depreciated using these methods are either recognized in reported income; or are reported instead as component of accumulated depreciation.

Depletion. This is used for financial reporting of natural resources (e.g. oil and gas reserves). Carrying costs include the costs of acquiring land or mines, and costs of exploration and development. Costs may be capitalized or expensed as function of firm's accounting policies (e.g. successful efforts or full cost). Carrying costs (excluding equipment and machinery used in extraction or production) are allocated to accounting periods using units-of-production method. An initial estimate of total units in the resource base is required in order to compute unit cost. It applies to actual units produced, extracted, or harvested.

Amortization of intangibles may be based on the useful life by operation of law, as with patents, or by periods of use, as with computer software. Goodwill may be amortized over periods not exceeding 40 years, and the straight line or unit of production methods are normally used. Companies depreciating such assets use either straight line or units-of-production. Amortization periods are limited by law in many instances, such as goodwill and indefinite-term franchises and licenses are limited to 40 years.

Depreciation Method Disclosures. The method of Depreciation must be disclosed. Disclosures are often found in footnotes. Straight line is used by more than 90% of U.S. Firms, as used of Accelerated depreciation is declining. Accelerated depreciation is more common in other countries.

Depreciation Lives and Salvage Methods. Comparability of firms may be lacking from the various methods employed. Further, useful lives can vary even within the same depreciation method. Beware of this problem and learn to approximate the differences. Salvage value can also affect the comparisons between firms. Variation in useful life and salvage value may affect comparative results. Useful life variation is normally more critical than salvage value.

Useful life definition varies from firm to firm. This makes comparisons of depreciation costs from firm to firm difficult, even if the same method is used. Excessively long useful life definitions lead to understating reported depreciation expense (i.e. overstating income).

Salvage value is a less significant factor but, variation in management practices for determination can lead to comparison problems. High estimates lead to lower depreciation costs. Salvage values are not usually disclosed, except when estimates are changed. Salvage values are not used in declining-balance methods

Impact of depreciation methods. There is an impact to both the income statement and balance sheet. Depreciation is the allocation of CF, so there is no impact on CF, though. With accelerated depreciation, net income in the early years will go down, equity goes down, taxes go down and the ratios go down. In later years, the reverse is true. There will be a beneficial tax impact in the earlier years from ACR.

Accelerated depreciation methods will tend to depress net income and stockholders' equity in early years, reversing in later years of assets' lives. This leads to return ratios, so are considered conservative. The primary reason for accelerated depreciation is to reduce a firm's taxes. The Intent of allowing accelerated depreciation was to encourage investment.

Since 1954, US has frequently changed tax depreciation regulations. The current system is MACRS – Modified Accelerated Cost Recovery System. It uses double-declining balance and 150% declining balance methods. It is seldom used by companies for financial reporting purposes, but frequently for tax purposes

Impact of inflation on Depreciation. When inflation is high, depreciation of expenses does not fully account for the replacement cost of the items involved. Public firms have to report the effect the effect of inflation on their fixed assets. Inflation adjusted data does not seem to have any extra information content, though, beyond the historical cost information.

Inflation will affect straight line depreciation (and others to a lesser extent), because the goods being depreciated may very well increase in value, resulting in a much higher salvage value at end of depreciation. Historical-cost based depreciation expense may be used as long as total expense over asset's life is sufficient to replace the asset. However, if replacement cost increases, depreciation expenses will be insufficient. Accelerated depreciation methods partially compensate for this.

In 1982, SFAS 33 was implemented, and required very large firms to disclose unaudited, supplementary data on the effects of changing prices, including: current cost of fixed assets; and depreciation expense on a current cost basis.

Changes in depreciation methods. With a depreciation change made on only newly acquired assets, the impact will be gradual, but may ultimately be very large. With a change applicable to all assets, the effect is immediate and potentially large. Studies show that there is an 8 to 10% change in reported income just from a change in depreciation methods, and the effect is cumulative. With a change in only the asset lives and salvage values, the impact is prospective only, and these changes will only effect accounting estimates of useful lives. These types of changes to salvage values and useful lives only have to be place in the footnotes of a financial statement, so beware.

Companies may change reported depreciation in different ways: change in method, which is applicable only to newly acquired assets; a change in method applicable to all assets; or a change in asset lives or salvage value.

Change in method, applicable only to newly acquired assets will not affect existing assets. The Impact will be gradual as older assets are removed from the books. It is a common method, as it does not require restatement of previous financial statements

Change in method applicable to all assets is considered a change in accounting principle under APB 20, accounting changes. The accumulated effect of changes must be reported separately, net of taxes.

Changes in Asset Lives or Salvage Value changes the accounting estimates, not changes in accounting principle. It is only prospective, and not retroactive or cumulative effects are reported. It has been used to increase asset lives common in recent years.

Estimating Relative Age and Useful Lives. On the relative age (%) = Accumulated Depreciation/Ending Gross Investment. This is accurate as long as straight line depreciation is used. Neither changes in asset mix nor the timing of asset purchases affect calculations. It is a useful measure of whether firm's asset base is old or new. The calculation is affected by firm's accounting methods for depreciation lives and salvage values.

On the average depreciable life of fixed assets, average depreciable life = Ending Gross Investment/Depreciation Expense. It is a rough approximation. It is a useful measure over long time periods of firm's depreciation policy.

On estimating the age of assets, the average age = accumulated depreciation / depreciation expense. It may be distorted by changes is changes in asset mix and by acquisitions. It is useful for comparisons for two reasons: older assets tend to be less efficient, making a firm less competitive; and knowing past patterns of capital replacement helps estimate when major capital expenditures may be required.

Fixed Asset Disclosures. Varying methods exist, notably, lives and salvage value assumptions hamper comparability between firms. An analyst must use financial statement disclosures to gain insight into depreciation expense. In 1994, SEC deleted

requirement for disclosure details of property accounts. IAS and foreign GAAP require detailed disclosures about fixed assets.

Impairment of long-lived assets. Change in technology or a change in the normal market condition could impair the usefulness of long lived assets.

Fixed assets used in continuing operations are typically carried at acquisition cost less accumulated depreciation. The carrying amount can be affected by changes in market conditions and technology. US GAAP does not allow firms to recognize increases in market value, only decreases. Foreign countries and IASB do allow recognition of increases.

Impairments sometimes are reported as part of “restructuring”. Some elements including write downs, write off past cash flows. Others may result in current and expected future cash outflows. SFAS 144 broadened the application of “discontinued operation” accounting and changed treatment of assets intended for disposal, superseding provisions of FASB 121 and APB, nullifying guidance on the obligation associated with disposal activities.

Standard requires that assets held for sale be written down to fair value less cost to sell when lower than carrying amount. In most cases, FV is PV of expected cash flows. Costs exclude costs associated with ongoing operations of assets held for sale. The assets stop being depreciated after reclassification as held for sale. The MV may have to be used for FV in the write-down. If not held for sale, may not have to write-down (i.e. holding to maturity). FASB still requires write-down where it is evident that recoverability is impaired (see below).

Standard requires recognition of impairment when there is evidence that carrying amount of asset may no longer be recovered. Evidence of non-recoverability include: significant decrease in market value, physical change, or use of the assets; adverse changes in the legal or business climate; significant cost overruns; current period operating or cash flow losses combined with history of same and a forecast of a significant decline in long-term profitability of asset.

SFAS 144 provides for a two-step process: 1) Recoverability test: Asset impaired when carrying value exceeds the undiscounted expected future cash flows; and 2) Measurement: Excess of carrying amount over the fair value of the assets. Recoverability test and measurement are based on assets grouped at the lowest level for which cash flows can be identified. Impairment loss is reported pretax as component of income from continuing operations.

Standards prohibit restoration of previous impairments do not require disclosure of cash flow and discount rates.

The balance sheet may be affected by impairments. Lower carrying amount of assets is directly related to write-downs. It affects fixed asset turnover ratio and total asset

turnover ratio, making comparisons difficult with firms that have not recognized impairments.

Standards used Net Realizable Value (NRV). This meant different things to different firms and definition were rarely disclosed. SFAS 121 requires undiscounted cash flows, which reduces probability of recognition of impairments and overstates asset values (due to failure to recognize time value of money).

Empirical Findings. Poor financial results as well as stock market performance usually precedes write-offs. Negative returns occur around the time of the write-offs and for up to 18 months following the write-off. Problems leading to write-offs are rarely short-lived and generally persist after the write-off.

Liabilities for Asset Retirement Obligations (ARO). Governments often require owners of operating assets remedy environmental damage when the asset retired. The Practice regarding expensing or capitalizing expenditures prior to SFAS was inconsistent. SFAS 143 changed accounting standards for AROs in following ways:

- Applies to all entities
- Affected firms must recognize fair value of ARO liability in period in which it is incurred
- Absent a Market Value, FV is PV of expected CF required to extinguish the liability
- Firm must recognize accretion expense in income statement, due to liability carried at PV
- Amount equal to initial liability must be added to carrying value of asset and depreciated over its useful life
- Changes in estimated liability are accounted for prospectively, with prior periods not restated
- Required disclosure includes
 - New liabilities incurred
 - Liabilities extinguished
 - Accretion expense
 - Revision of the estimated AROs
- Fair Value of any restricted assets set aside for AROS

Analysis of Income Taxes

Basic Items. On deferred tax liabilities, standards mandates the recognition of deferred tax liabilities for all temporary differences expected to generate net taxable amounts in future years. Operating losses are due to an excess of taxable deductions over taxable revenues. They can be carried backward to prior years in order to obtain refund of taxes paid. Income tax expense is recognized in loss year because amount is measured and recoverable. Unused tax loss carryback amounts can be carried forward. Realization depends on future taxable income, making them a deferred tax asset. This requires valuation allowance due to the uncertainty of recoverability. One can deduct for tax losses only up to the amount of the taxable income (cannot have a negative tax). If you still have a tax loss left after deductions then can do a loss carry forward. This becomes a tax deferred asset, which can be applied to taxable income in the future.

Management must defend recognition of all deferred tax assets. A valuation allowance is required when it appears that it is unlikely that some portion will not be realized. The tax deferred asset is a relatively known amount. But the valuation allowance has uncertainty attached to it, and thus has to be defended by management. Firms also cannot reduce US taxes based on foreign income. Foreign losses must be used to offset foreign gains. Foreign losses cannot be taken into domestic gains, as 80% of foreign sub is needed in order to use foreign gains / losses to recognize domestic tax losses.

If liability is likely to never be repaid, then the deferred tax asset should be treated as equity rather than as a liability. The reverse is also true.

SFAS109 requires disclosures for several items:

- Separate disclosure of all deferred tax assets and liabilities, valuation allowance and change in that allowance for each reporting period
- Disclosure of any unrecognized deferred tax liability for the undistributed earnings of domestic or foreign subsidiaries and joint ventures
- Disclosure of the current-year tax effect of each type of temporary difference
- Disclosure of the components of income tax expense
- Recognition of reported income-tax expense with the amount based on the statutory income tax rate
- Disclosure of tax loss carry-forwards and credits

Long-Term Liabilities and Debt

Liabilities. The central question is whether the liabilities should be recognized in the current year, thus impacting net income and taxation. This is the difference between tax based accounting decisions and GAAP. An example of this is depreciation, where an asset can be expensed at one rate for GAAP purposes but at a modified rate for tax purposes. Thus, a “tax expense” will vary the timing of liability recognition. This is called Deferred Income Tax Expensing.

Deferred tax assets and liabilities. Deferred liabilities exist when future taxable income is greater than the pre-tax income. You can also have deferred tax assets when future pre-tax income is less than taxable income.

SFAS 109. The deferred liabilities and assets are measured as part of a future tax consequence. With the liability method, the balance sheet is important, and recognition is mandated for all temporary differences expected to generate net taxable amounts in future years. This meets the definition of “liability”. The rationale for this is that a legal obligation is imposed by the tax law, so an expected reversal of the temporary difference would then require that the tax difference is reported as a liability on the balance sheet, to be paid out in future years when the deferral is recognized. You can also get into the same issue of deferred tax liability when there is a tax rate change in the corporation or to the tax code. SFAS 109 requires a change in tax rates affecting future tax liability to be recognized in reported income in the year when the change is enacted.

Operating Losses, in general. Taxes losses from operations can be carried back and applied to prior years to obtain deferrals of taxes previously paid. They can also be carried forward to future periods. But expected benefits are treated as deferred tax assets to offset possible future taxable income.

Valuation allowance. SFAS 109 permits (but does not require) recognition of a deferred taxable asset whenever the temporary difference results in operating losses or credit carry forward. Management must make the decision. The allowance is required, though, if the future taxable income is not to be realized in all likelihood. The allowance must be disclosed, as they are included in income from continuing operations unless operated by unrecognized changes in the carrying amount of the assets or liabilities. The accounting standard permits offsets of tax-deferred assets only within each tax-paying component and within each tax jurisdiction. The allowances must also be separated into current and non-current components, too.

Deferred taxes: Analytical Issues. Taxes to be paid in the future (deferred capital gains taxes, for example) are considered a liability that should be reported on the balance sheet. You must consider the change in deferred tax assets and liabilities, the deferred tax expense, and any change in valuation allowances. The key is whether the deferred tax asset or liability will reverse in the future (this is the case with capital gains – they will be

recognized at some point in the future, and thus, the asset will have a realized capital gain, along with the attendant tax liability). If no reversal will occur, it is likely that the deferral should never have been classified as such in the first place. The deferral should have been classified as an equity, instead. The temporary differences originated by individual transactions will reverse and offset future taxable income and payments. But these reversals in themselves may be reversed by consequences of other tax debits and credits (such as shifts in tax rates and tax laws, shifts in the growth rate of the firm, the impact of nonrecurring expenses, etc).

The component of deferred tax liability should be analyzed and evaluated in terms of the likelihood of reversal versus continued growth. Only reversals should be considered a deferred liability. Even then, the liability should be discounted to PV based on estimates of the number of years of the reversal. To the extent that deferred taxes are not a liability, they should be considered as accretive of shareholder equity. Many analysts will ignore the impact of deferred taxes, altogether. Even S&P does not consider deferred tax liabilities as a debt, but only as a permanent capital for the computation of pre-tax return on capital.

More Analysis of deferred tax assets. When the asset is realized, taxable income goes up, CF and shareholder equity all goes up, too. But if no allowance has been provided for, there will be no effect on taxable income. If the deferred tax asset is not realizable and there has been no allowance made, then income and equity both fall. This area has management discretion to it, so the allowance is another factor to evaluate in the quality of earnings. A change in the allowance often affects earnings and can be used to manage the earnings.

Valuation models forecasting income or CF use effective tax rates as one input. Eff tax rate = income tax expense / pre-tax income. Other equations include taxable payable / pre-tax income; and income tax paid / pre-tax income.

Accounting for the taxes. Some differences never reverse at all. An example of this is undistributed earnings on unconsolidated subs and joint ventures. The US tax code requires 80% ownership to consolidate for tax purposes. Foreign subs are not consolidated at all. If there is an indefinite reversal you can omit the deferred tax provision of the deficits. This must be permanent though. Temporary differences must still be reported. Temporary differences are due to depreciation, impairment, restructurings, inventories, post-employment benefits, and deferred compensation. Deferred taxes are reinvested, in many of these situations.

Other issues. Watch for companies reporting financial reporting increases, but with little or no taxes payable. This indicates an aggressive revenue and expense recognition differentiation between the financial reporting and tax income reporting. Look for current or pending reversal of past temporary differences. The deferred tax asset and liability may have CF consequences. Example: restructuring generates substantial CF problems in future years, only. Tax law changes may result in a reversal of a temporary difference.

Specific Types of Liabilities.

Current liabilities include operating liabilities and financing activities (ST debt, current portion of LT debt). A shift from operating to finance liabilities may signal a liquidity problem.

LT debt includes both the interest on the debt and the principal debt itself. With LT bond debt, the face value of the bond is the lump sum payable at maturity. The coupon rate is the stated cash interest rate. The market rate of the bond may be less or more than the face value. Bonds issued at a premium have additional balances on interest. At any time then, the liability on the bond = PV of the remaining payments discounted at the effective interest rate. LT debt value = Debt equals PV of remaining future stream of payments (both interest and principal) calculated at the time the debt is incurred. Interest expense is the amount paid by the debtor to the creditor in excess of the amount borrowed. Allocation of interest to specific time periods (both cash outflows and interest expense accrual in income statements) may vary with type of debt.

Bond Valuation. Level-coupon bond: $PV = C \div YTM \times \{1 - 1 \div (1 + r)^T\} + FV \div (1 + r)^T$

Where, C is the coupon amount; YTM is Market Yield to Maturity; T is the number of years to maturity, and FV is the Face Value of the bond. Or,

$$N = \text{number of coupons, } I/YR = YTM,$$

where, PV = Price of Bond, Pmt = Coupon amt, FV = Face Value

Financial Statement Effects. The balance sheet liability = PV of remaining payments discounted at the effective interest rate on the issuance date. Interest expense is effective interest on the loan based on the market rate in effect at issuance times the balance sheet liability at the beginning of the period. Actual cash Payments may not equal interest expense, but do equal the reduction in CFO. The CF classification of debt payments depends on the coupon rate, not the effective interest rate. CFO may be misstated from the current interest rate. Most debt is issued at par or close to it. When the discount is large (zero coupons, for example), there is a significant distortion of reported CF.

Zero-Coupon Debt. The bonds have no periodic payments, so they are issued with a deep discount to the face value. The lump sum at maturity = all unpaid interest from the time of issuance to maturity. Basically, with a zero coupon, interest received at maturity = the face value – discount at purchase. CFO is often overstated, because the interest is allocated per year. An analyst may need to reclassify CFO to account for the actual CFO versus the amortized CFO from the zero coupon interest allocation. If the current pricing of a zero runs up to a premium, then CFO becomes understated, though.

Variable-Rate Debt. Interest rate will float with some benchmark rate, such as a specified maturity U. S. Treasury obligation or some other benchmark such as the LIBOR. This can be offset with interest rate-swaps to hedge interest rate risk.

Debt Denominated in a Foreign Currency. More Favorable terms can sometimes be obtained in foreign markets than domestic ones. Assets denominated in foreign currency and denominated in that currency can hedge against exchange rate movements. There may also be a need for foreign currency for a particular investment.

Project Debt. This is debt issued to finance a particular project. Payments may be contingent upon cash flows expected from the project

Debt with Equity Features ---

Convertible bonds are debt instruments that can be converted into common stock, usually at the option of the bondholder. Convertibility is usually ignored at issuance, and the instrument is considered to be debt. Upon the conversion, the entire proceeds are then reclassified from debt to equity. When the stock price is higher than the conversion price, the debt will probably not be reported because of the high probability of conversion. So, the bond should then be treated as equity for purposes of D/E ratios, and the like. When pricing of the stock is at the conversion price, the security should be considered as debt. . So, you can use option-pricing models for the allocation of Debt and equity. Or, both scenarios can be adjusted where the bond is converted versus where the bond is not converted.

There are other types of bonded debt with equity features attached. An exchangeable bond can be transferred from a bond of one company to a bond of another business. Tax impacts are thus avoided, and the recognition of a gain is thereby delayed. Bonds with warrants also exist. The fair value of the bond is a liability, while the fair value of the warrant is equity. Upon exercise of the warrant, additional cash is recorded as equity. The recorded liability is for the bond value, and it would be lower than a convertible bond because a warranty bond is issued at a discount, but then interest expense is higher. Commodity Bonds have their value tied to the price of a commodity (ala hedging). Interest is charged as a variable cost and not a fixed cost, since interest can increase with the hedging activity. Perpetual Bonds have no stated maturity or possibly very long maturities of 100 years or so. So, they represent permanent capital and should be treated as equity for purposes of the D/E ratio. The concept comes from the perpetuity bond of England.

Another debt with equity feature is the preferred stock. This is stock in a firm, but it has priority over common on dividends and liquidation (but is inferior to creditors in a bankruptcy). Usually, there is a cumulative right to the preferred status. The net worth of the firm = worth – liquidation value of preferred (and not stated value) – any dividends in arrears. Some preferred have variable interest notes, and could then be seen as ST debt. Sinking fund preferred with a callable right should also be treated as debt and not equity. SEC requires redeemable preferred to be excluded from equity, but does not require the classification of preferred as debt. Only when the preferred has conversion rights with into voting common shares does the preferred actually looks like equity, according to some studies.

Changes in Interest rates. The debt on balance sheets is = PV of future cash payments discounted at market rate on date of issuance. An increase in the market rate may increase the effective rate of the debt, but is not reflected in the balance sheets. An analyst can measure the market value of debt and restate the balance sheet.

The Retirement of Debt before Maturity. The difference between book value of the liability and the amount paid at retirement of the debt is an extraordinary gain or loss. This was a tax law change in both 1980 and 1984 to prevent debt to equity swaps.

Leases and Off Balance Sheet Debt. There are incentives for leases. The ST operating leases allow lessee to use leased property for only a portion of the economic life. Lessor retains all risk of ownership, so the property remains on the lessor's balance sheet and is depreciated over the economic life. LT leases may transfer all risks and rewards of the lessee, and this amounts to a capital type of transaction. It is the equivalent of sales for accounting purposes. The lesser records a gain on the sale at inception of the lease, and then the lessee depreciates the asset over its life. The operating leases allow lessee to report higher operating profit, then, while the lesser want to report as capital leases, along with higher profitability reporting.

Capital leases. This transfers substantially all of the risks and rewards of the leased property and should therefore be capitalized. So the question becomes whether the lease is operating versus capital in nature. The lease should be capitalized where 1) ownership is transferred at the end of the lease; or 2) lease contains a purchase option; or lease is for greater than 75% of the estimated economic life; or 4) PV of the lease payments is for greater than 90% of the fair value of the leased property to the lesser. All other leases are considered operating, in nature and are not capitalized. The payments are then reported as rental expense. At the inception of a capital lease, the asset and liability equal to the PV of the lease payment is recognized. Over the lease's economic life, the annual rental income is allocated between interest and principal. The cost of the lease is charged to operations using a straight-line method. Capitalizing increases the asset balances resulting in a lower turnover and lower ROA. It impacts the leverage ratios the most, and decreases the working capital and increases D/E ratios. Capitalization decreases the operating CF while increasing the financing CF. The operating leases report higher profit and higher interest coverage, ROE, and ROA.

Lease disclosures. A noncallable lease = debt + the right to use an asset with an operating lease. So, disclosure is required for future lease payments in each of 5 future years, typically.

Off Balance sheet activities. Take or pay contracts ensure LT availability of raw materials or other inputs. Paper, natural; gas, metal, chemical are examples. These items are often used as collateral for banks. The firm agrees to buy a minimum Q of items over a specified period of time. This effectively keeps assets and liabilities off of a balance sheet until the items are actually purchased. An analyst should add the PV of future contracts back into the balance sheet. Sales of receivables are regarded as revenues to the selling firm, under GAAP. This decreases the accounts receivables and increases CFO.

An analyst should adjust for this by increasing the amount of receivables not yet collected. For analysis purposes, the sales should be escrowed and paid out as income once the receivables are collected. Finance subsidiaries are used by many holding company types of firms to borrow money from. This allows the parent to generate sales by providing credit to dealers and customers for retail sales by the parent. SFAS 94 requires all firms to consolidate assets and liabilities of the controlled finance subs. So, in response, some firms have reduced ownership of the finance subs to less than 50% to eliminate this consolidation. The net investment in the sub is then just reported as income to the parent, and the parent's financial statements do not end up reporting its share of debt of the sub. The analysts should recompile the numbers for the D/E and turnover ratios by adding the parent's proportional share of assets and liabilities of the sub to that of the parent.

There are other kinds of off budget activities, too. Joint Ventures are separately reported in many instances, as they are a stand-alone operation jointly controlled by 2 or more parent firms. The analyst should add the proportionate share of the affiliate's debt, equity, and income back to the parents. Commodity linked bonds will be used by many companies to finance operations with a commodity indexed debt, and the repayments then will depend on the prices of the commodities. So, an analyst should monitor the changing prices to determine the impact on D/E ratios. Convertible Bonds tied to investments are LT debt interchangeable for common stock of another publicly traded firm. This lowers the borrowing costs and defers the capital gains tax, as well. The analyst should consider this impact. Sales lease backs are offered on customer leases for the marketing of products. This is a sales type of lease whereby a sale of property occurs by the owner who then leases it back from the buyer-lessor. The analysts should consider the impact on the various ratios.