LEVEL 1:
FINANCIAL REPORTING & ANALYSIS

Reading 26 (12th out of 12): ADVANCED FINANCIAL ANALYSIS

Difficulty: **medium**   Benchmark Study Time: **3.45h**

INTENTIONALLY EMPTY

THIS E-BOOK:

❖ is a selective summary of the corresponding Reading in your CFA® Program Curriculum,

❖ provides place for your own notes,

❖ helps you structure your study and revision time!

How to use this e-book to maximize your knowledge retention:

1. **Print** the e-book in <u>duplex</u> and bind it to keep all important info for this Reading **in one place.**

2. **Read** this e-book, best twice, to grasp the idea of what this Reading is about.

3. **Study** the Reading from your curriculum. **Here add** your notes, examples, formulas, definitions, etc.

4. **Review** the Reading using this e-book, e.g. write your summary of key concepts or revise the formulas at the end of this e-book (if applicable).

5. **Done?** Go to <u>your study plan</u> and change the Reading's status to green :
   (it will make your Chance-to-Pass-Score™ grow ☺).

6. **Come back** to this e-book from time to time to **regularly review for knowledge retention!**

   NOTE: While studying or reviewing this Reading, you can use the tables at the end of this e-book and mark your study/review sessions to hold yourself accountable.

The last FRA Reading deals with the application of financial statement analysis. It's a relatively short reading that uses the knowledge you acquired earlier such as the knowledge of financial reporting ratios (Reading 24) or differences between U.S. GAAP and IFRS, especially as related to inventories, PP&E, and goodwill.

In this e-book, we will focus on 5 topics:

- evaluation of past performance and how the performance derives from the company's strategy,
- forecasting net income and cash flows,
- credit quality of debt investments,
- screening for equity investments,
- comparison of financial statements and necessary adjustments.

FINANCIAL STATEMENT ANALYSIS FRAMEWORK – RECAP

Stages of analysis

Stages of analysis:

1. State the purpose of analysis.

2. Gather input data.

3. Process data.

4. Interpret and analyze the processed data.

5. State findings and recommendations.

6. Review findings periodically (follow-up).

Stage 1: State the purpose of analysis

The source of information is determined by:

- the nature of the analyst's task and responsibilities,
- the client's or supervisor's needs and expectations,
- norms and guidelines developed to regulate the specific product of the analysis.

The output:

- defining the purpose,
- wording specific questions to be answered by the analysis,
- schedule and resources for carrying out the analysis.

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

Stage 2: Gather input data

The sources of information:

- financial statements and other financial data,
- results of conversations with management, suppliers, customers, and competitors,
- results of visits to the company site.

The output:

- financial statements in an organized form,
- tabulated data.

Stage 3: Process data

The source of information:

- the data from the previous phase.

The output:

- adjusted financial statements,
- common-size financial statements,
- ratios and rates,
- graphs and charts,
- forecasts.

Stage 4: Interpret and analyze the processed data

The source of information:

- the input data,
- the processed data.

The output:

- analytical results.

Stage 5: State findings and recommendations

The source of information:

- obtained analytical results,
- guidelines and regulations for publishing reports.

The output:

- a report giving answers to the earlier posed questions,
- the recommendation relating to the previously defined purpose of analysis.

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

Stage 6: Review findings periodically (follow-up)

The source of information:

- information obtained as a result of periodic reviews.

The output:

- updated reports,
- updated recommendations.

Analytical tools & techniques:

- ratio analysis:
    a. can be used to evaluate past performance, assess the current situation, and make a prediction about the company's future,
    b. remember about limitations that depend on factors such as: (i) hetero- vs homogeneity of operating activities; (ii) subjectivity → need to use judgment, are the conclusions consistent?; (iii) differences resulting from accounting standards, methods, and rules used;
- common-size analysis:
    a. vertical common-size balance sheet → used for a single period; each balance sheet item is divided by total assets from the same period; tells us what is the composition of the balance sheet in a given moment;
    b. horizontal common-size balance sheet → used to compare changes in balance sheet items from period to period; each item is divided by the corresponding item from the base year; we can observe the changes in a given item across multiple periods;
    c. vertical common-size income statement → each income statement item is divided by revenue (sometimes by total assets, e.g. for financial institutions) from the same period; it can tell us e.g. what are the shares of different sources of revenue in total revenue, etc.;
    d. cross-sectional analysis (relative analysis) – comparing metrics (e.g. ratios) between companies;
    e. trend analysis;
- graphs, e.g. line graphs, pie charts, stacked column graphs, etc.;
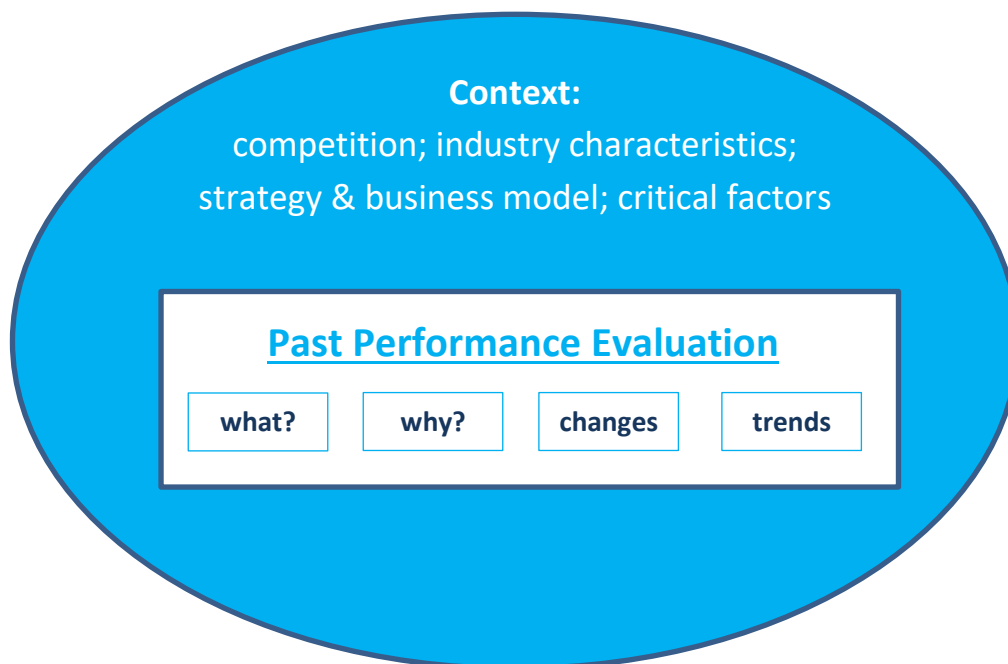- regression analysis used to find correlation and relation between e.g. GDP and company sales, etc.;

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

EVALUATION OF PAST PERFORMANCE & HOW THE PERFORMANCE DERIVES FROM COMPANY STRATEGY

Key takeaways:

- Evaluation of the past performance of a company is not only about the effect but also about the cause. So, we are interested not only in raw facts and data (e.g. net income = USD 146 million) but also in what caused them.
- What are the company's strategy and business model? And how did the company's strategy and business model impact the output?
- What are the trends and changes to financial data and what caused them?
- How were the results achieved compared to other companies in the industry?
- What are the critical aspects that influence growth?

Context:
competition; industry characteristics;
strategy & business model; critical factors

Past Performance Evaluation

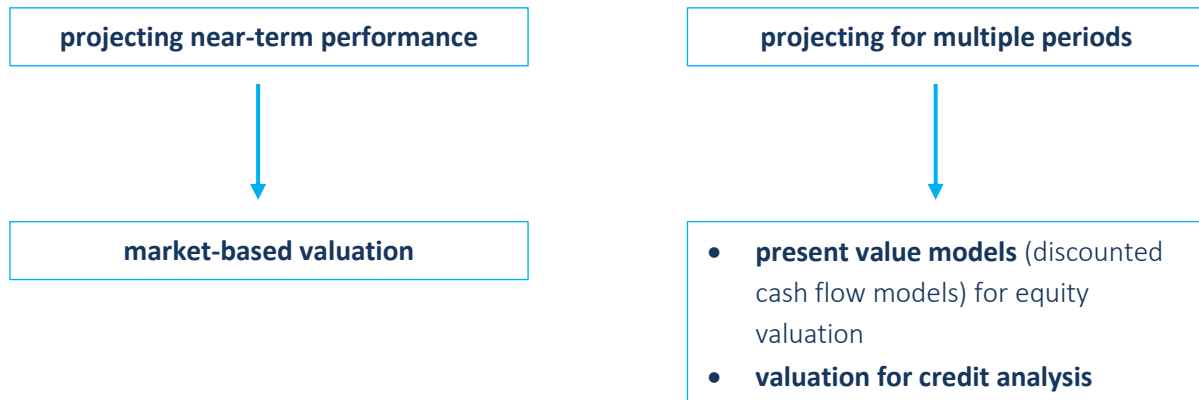| what? | why? | changes | trends |

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

PROJECTING NET INCOME AND CASH FLOWS

projecting near-term performance

↓

market-based valuation

projecting for multiple periods

↓

- **present value models** (discounted cash flow models) for equity valuation
- **valuation for credit analysis**

Projecting near-term performance

We project near-term performance to obtain inputs for market-based valuation, e.g. if a forward P/E ratio ("forward P/E" taking into account the forecasted next year's net income and the current price) for an industry is 30, then if we project the next year's income for a company (e.g. USD 40 million), we will be able to estimate its current market value and value per share (assuming 50 million shares):

$$\text{estimated current market value} = \text{forward}\frac{P}{E} \times \text{estimated net income} = 30 \times \text{USD 40 million} = \text{USD 1.2 billion}$$

$$\text{value per share} = \frac{\text{estimated current market value}}{\text{no. of shares outstanding}} = \frac{\text{USD 1.2 billion}}{\text{50 million shares}} = \text{USD 24/share}$$

Note: There are different kinds of multiples used in market-based valuation but generally they are categorized into 2 groups:

- Price multiples, e.g. P/E ratio,
- Enterprise value (EV) multiples, e.g. EV/EBITDA.

How can we project the net income or some other type of income that we would like to use in our market-based valuation?

If we are dealing with a stable, diversified business, we can use past performance. However, in the case of startups and companies that operate in a more volatile environment, we should use it with caution.

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

Very often a **top-down approach** to projecting the company's sales is used:

We start with the whole economy (expected changes in GDP, cycle, etc.) → then we project sales for the industry the company operates in (often using regression analysis and historical data) → then we project the company's market share using historical data and growth prospects for the company → finally we estimate the company's sales as industry sales multiplied by the company's market share (in %).

Remember that the depth of the analysis may vary. For example, it can be very complex and we can project the sales for each product line, or geographical or business segments, and so on.

After we get the projection for sales, we can project income by:

- either forecasting expenses (aggregate or not) in nominal values and then subtracting them from the sales, or
- using common-size income statements (all data presented as a percentage of sales) and forecasted profit margins.

Side note: Net profit margin takes financial leverage and taxes into account, so pay attention not only to data related to operations (like in the case of gross profit margin or operating margin) but also to expected future decisions by management (related to financial leverage) and regulatory authorities (related to tax rates).

It is harder to forecast sales and profits for:

- new companies (because of the scarcity of valid data),
- companies with volatile income (because it's harder to forecast when the volatility is high),
- companies with large fixed costs (because if the company has large fixed operating costs related to variable costs, the operating leverage is high, which means that a slight change in sales can have a large impact on operating income. We can extend this analysis even further. If fixed financial costs are large, the financial leverage is high, which means that a small change in operating income will have a great impact on net income.)

During analysis remember to:

- remove non-recurring items to clear the results from any distortions and one-time events,
- always conduct sensitivity analysis, to check the impact of a change in inputs on the output of the analysis.

Projecting for multiple periods

We project for more periods:

- when using present value models, like the dividend discount model (DDM), free cash flow to firm model (FCFF), or free cash flow to equity model (FCFE), to value the company.
- or for credit analysis purposes.

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

> **Important:** Usually we make detailed projections for at least 5 years.

In a simplified version, when the company is financed only by equity, which is used to finance the working capital at time 0, there are no dividends, there are no non-cash items, and we have the following data:

- sales forecast for Year 1 based on e.g. historical data, management forecasts, industry studies, macroeconomics forecasts,
- growth of sales (from year to year),
- COGS/sales ratio for each year,
- operating expenses/sales ratio for each year,
- interest income rate (i),
- tax rate (t),
- working capital/sales ratio for each year,
- investments in fixed assets (CAPEX, taking depreciation into account).

We can compute the net income for each year 1-5 using the following formula:

$$\text{net income} = \left(\text{sales} \times \left(1 - \frac{\text{COGS}}{\text{sales}} - \frac{\text{operating expenses}}{\text{sales}} \right) + i \times \text{beginning cash} \right) \times (1 - t)$$

We can compute ending cash for each year 1-5 using the following formula:

$$\text{ending cash} = \text{beginning cash} + \text{net income} - \text{change in working capital} -$$
$$- \text{change in investment in fixed capital}$$

Important:

- Data should be mutually consistent.
- We can use the scenario analysis or Monte Carlo simulation to assess risks.

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

CREDIT QUALITY OF DEBT INVESTMENTS

credit risk = the risk of incurring a loss as a result of the issuer not being able to make full and timely payments of interest and/or principal

credit analysis = the evaluation of credit risk

The **issue credit rating** (aka. CCR = corporate credit rating) doesn't have to be exactly the same as the **issuer credit rating** (aka. CFR = corporate family rating). The issuer credit rating usually applies to the issuer's senior unsecured debt, whereas the issue credit rating depends on the terms like the priority of payments, etc. for a given issue.

When doing the credit analysis focus on:

- adverse events that might occur and impact the company,
- cash flows rather than income,
- operating cash flows because they stem from the company's operations,

Risks to take into account

When conducting a **non-investment bond analysis**:

- focus on the issuer's liquidity and cash flows,
- prepare detailed financial projections,
- analyze debt covenants thoroughly,
- pay special attention to the corporate structure, capital structure, and debt structure,
- apply the equity-like approach.

When doing a **non-sovereign bond analysis**:

- if dealing with **general obligation (GO) bonds**, focus on employment rate, per capita income, per capita debt, demographics, the tax base, volatility of revenues, etc.
- if dealing with **revenue bonds** (used to finance specific projects), focus on financial aspects of the investment financed, its expected revenues, cash flows, costs, liquidity, etc.

Z-score by Altman for predicting bankruptcy

$$Z = 1.2 \times \frac{\text{current assets} - \text{current liabilities}}{\text{total assets}} + 1.4 \times \frac{\text{retained earnings}}{\text{total assets}} + 3.3 \times \frac{\text{EBIT}}{\text{total assets}} +$$
$$+ 0.6 \times \frac{\text{market value of stock}}{\text{book value of liabilities}} + 1.0 \times \frac{\text{sales}}{\text{total assets}}$$

Z-score lower than **1.81** indicates possible failure.

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

Leverage ratios

$$\text{debt/capital} = \frac{\text{debt}}{\text{debt} + \text{shareholders equity}}$$

$$\text{debt to EBITDA} = \frac{\text{total debt}}{\text{EBITDA}}$$

$$\text{FFO/debt} = \frac{\text{(net income from continuing operations} + \text{depreciation} + \text{amortization} + \text{deferred income from taxes} + \text{other non-cash items)}}{\text{debt}}$$

$$\text{FCF after dividends/debt} = \frac{\text{(net income from continuing operations} + \text{depreciation} + \text{amortization} - \text{change in non-cash working capital} - \text{capital expenditures)} - \text{dividends}}{\text{debt}}$$

$$\text{Free operating cash flow to debt} = \frac{\text{CFO} - \text{capital expenditures}}{\text{total debt}}$$

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

$$\text{EBITDA interest coverage} = \frac{\text{EBITDA}}{\text{interest expense (including non-cash interest on conventional debt instruments)}}$$

$$\text{EBIT margin} = \frac{\text{EBIT}}{\text{total revenues}}$$

$$\text{EBITDA margin} = \frac{\text{EBITDA}}{\text{total revenues}}$$

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

Note: FFO stands for funds from operations; FCF stands for free cash flow; CFO stands for cash flow from operations.
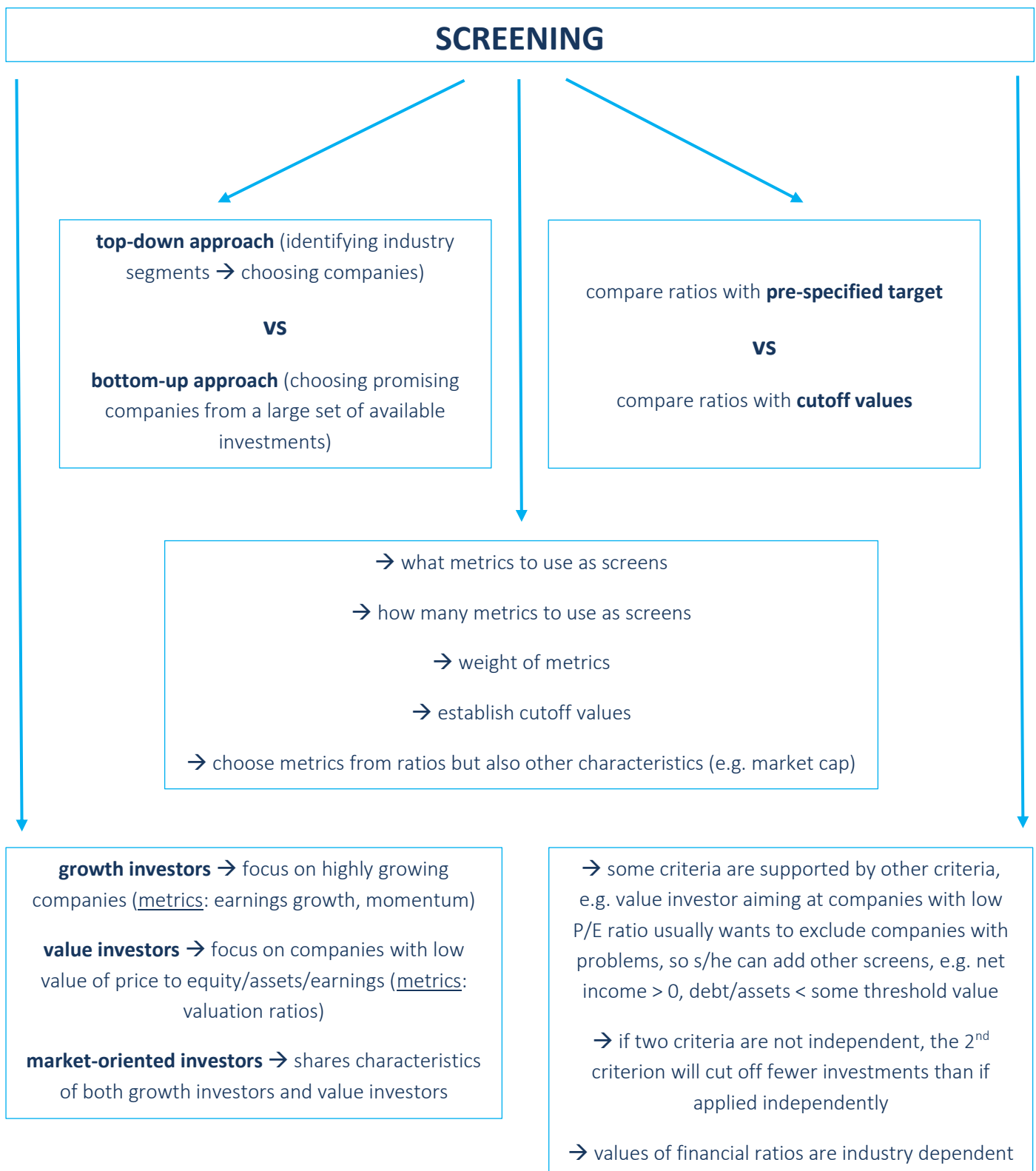
HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

SCREENING FOR EQUITY INVESTMENTS

screening for equity investments = reducing the spectrum of equity investments using different tools and ratios, so we can focus on the most promising investments that are in line with some predefined criteria

SCREENING

top-down approach (identifying industry segments → choosing companies)

VS

bottom-up approach (choosing promising companies from a large set of available investments)

compare ratios with **pre-specified target**

VS

compare ratios with **cutoff values**

→ what metrics to use as screens

→ how many metrics to use as screens

→ weight of metrics

→ establish cutoff values

→ choose metrics from ratios but also other characteristics (e.g. market cap)

growth investors → focus on highly growing companies (metrics: earnings growth, momentum)

value investors → focus on companies with low value of price to equity/assets/earnings (metrics: valuation ratios)

market-oriented investors → shares characteristics of both growth investors and value investors

→ some criteria are supported by other criteria, e.g. value investor aiming at companies with low P/E ratio usually wants to exclude companies with problems, so s/he can add other screens, e.g. net income > 0, debt/assets < some threshold value

→ if two criteria are not independent, the 2nd criterion will cut off fewer investments than if applied independently

→ values of financial ratios are industry dependent

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

Back-testing and its limitations (biases)

Very often, after preparing a model, we **back-test** it using historical data to check what returns it would have offered back then. However, back-testing has some limitations in the form of the following types of biases:

- **data-snooping bias** – occurs if the analysis is based on the same data as used in the analysis by other researchers and taking into account their findings (in this case, we can prove the statistical significance of almost any pattern; in other words, we find patterns that don't exist in the data),
- **survivorship bias** – we analyze only the current, most up to date data (e.g. exclude companies that ceased to exist and estimate the average return of an industry),
- **look-ahead bias** – when we have to process data that aren't available on the test day.

COMPARISON OF FINANCIAL STATEMENTS & ADJUSTMENTS

Investments

When comparing two companies with substantial investments in their books, check whether they treat investments similarly. If one of the companies classified financial assets as measured at fair value through profit & loss and the other as measured at fair value through other comprehensive income, you might have to adjust numbers for one company, so that they are corresponding to each other. It is because:

- for financial assets measured at <u>fair value through profit & loss</u> – the unrealized gains and losses are included in <u>net income in the profit & loss statement</u>,
- for financial assets measured at <u>fair value through other comprehensive income</u> – the unrealized gains and losses go <u>directly to equity</u> omitting the profit & loss statement.

Inventory & COGS

The basic difference for inventory and COGS may occur when one company uses the LIFO method (allowed only under U.S. GAAP) and the other uses the FIFO method. Fortunately, U.S. GAAP requires that companies using the LIFO method present the so-called LIFO reserve. LIFO reserve can easily be used to adjust both inventory and COGS from LIFO to FIFO:

$$\text{inventory}_{\text{FIFO}} = \text{inventory}_{\text{LIFO}} + \text{LIFO}_{\text{reserve}}$$

$$\text{COGS}_{\text{FIFO}} = \text{COGS}_{\text{LIFO}} - \Delta\text{LIFO}_{\text{reserve}}$$

where:

- $\Delta\text{LIFO}_{\text{reserve}}$ – change in the LIFO reserve in the period

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

PP&E

Differences between companies may arise from choices made by their managements and are related to:

- method of depreciation (the straight-line method vs accelerated methods vs the units of production method),
- estimation of salvage values and expected useful lives of the assets.

Note: Based on financial statements and information they provide, only general information about PP&E-related subjects can be deduced. It's because the disclosure required by accounting standards is not very broad. However, even with only some basic data, we are still able to draw interesting conclusions:

Example 1:

We have the following data from the balance sheet and income statement:

gross PP&E	10
accumulated depreciation	6
depreciation expense	2
CAPEX	2.5

Conclusions:

$$\frac{\text{gross PP\&E}}{\text{depreciation expense}} = \frac{10}{2} = 5 = \text{average depreciable life of the assets is 5 years}$$

$$\frac{\text{accumulated depreciation}}{\text{depreciation expense}} = \frac{6}{2} = 3 = \text{average age of the assets is 3 years}$$

$$\frac{\text{gross PP\&E} - \text{accumulated depreciation}}{\text{depreciation expense}} = \frac{10 - 6}{2} = 2 = \text{average remaining useful life of the assets is 2 years}$$

$$\frac{\text{accumulated depreciation}}{\text{gross PP\&E}} = \frac{6}{10} = 60\% \left(3 \text{ years}\right) \text{of the useful life of the company's assets has passed}$$

$$\frac{\text{gross PP\&E} - \text{accumulated depreciation}}{\text{gross PP\&E}} = \frac{10 - 6}{10}$$

$$= 40\% \left(2 \text{ years}\right) \text{of the useful life of the company's assets remains}$$

$$\frac{\text{CAPEX}}{\text{gross PP\&E} + \text{CAPEX}} = \frac{2.5}{10 + 2.5} = 20\% \text{ of the assets base has been renewed in the period}$$

If we conducted a similar analysis for another company, we could spot e.g. that one of the companies is more aggressive in its accounting than the other.

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

Goodwill

$$goodwill = purchase\ price - total\ fair\ value\ of\ acquired\ identified\ assets$$

Under IFRS, an asset will be included in goodwill if it cannot be recognized as:

- a tangible asset, or
- an identifiable intangible asset.

According to U.S. GAAP, an intangible asset will be included in goodwill if it:

- doesn't arise from contractual or legal rights, and if it
- cannot be separated from the acquired company.

Important: Goodwill is not amortized but it should be tested for impairment at least annually.

Example 2:

We are comparing P/BV (price to book value) for two companies. In the balance sheet of the 1st company, there is no goodwill at all and the 2nd company has a substantial amount of goodwill that is a result of acquiring other companies in the past. In such a case, it might be a smart choice to compute the ratio for the second company using in the denominator the so-called tangible book value that excludes goodwill and other intangible assets.

Example 3:

We would use the same adjustment when comparing a company that develops internally with a company that grows mainly through acquisitions. Holding other things constant, the first company is characterized by a smaller value of intangible assets because most of its costs were expensed as incurred. The second company will have the costs capitalized in acquired assets. In this case, the companies may substantially differ in ratios related to assets and profitability even if they generate similar revenues.

HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.

Summarizing key concepts:

☐ Evaluation of past performance & how the performance derives from company strategy

My summary:

☐ Forecasting net income & cash flows

My summary:

☐ Credit quality of debt investments

My summary:

☐ Screening for equity investments

My summary:

☐ Comparison of financial statements & necessary adjustments

My summary:

Keeping myself accountable:

TABLE 1 | STUDY

When you sit down to study, you may want to **try the Pomodoro Technique** to handle your study sessions: study for 25 minutes, then take a 5-minute break. Repeat this 25+5 study-break sequence all throughout your daily study session.

Tick off as you proceed.

POMODORO TIMETABLE: study-break sequences (25' + 5')													
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TABLE 2 | REVIEW

Never ever neglect revision! Though it's not the most popular thing among CFA candidates, regular revision is what makes the difference. If you want to pass your exam, **schedule & do your review sessions.**

REVIEW TIMETABLE: When did I review this Reading?													
date		date		date		date		date		date		date	
date		date		date		date		date		date		date	