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LEVEL 1:
FINANCIAL REPORTING & ANALYSIS

Reading 20 (6th out of 12): BASICS OF FINANCIAL ANALYSIS

Difficulty: **medium**

Benchmark Study Time: **4.75h**

2022

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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.

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.

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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.

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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 current situation, and make a prediction about the future of the company;
    b. remember about limitations that depend on factors like: hetero- vs homogeneity of operating activities; subjectivity → need to use judgment; are conclusions consistent?; 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.;

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ACTIVITY RATIOS

activity ratios = asset utilization ratios = operating efficiency ratios

What do they measure?

- How well a company manages various activities
- How effectively assets are used by the company

Inventory turnover

Measures: how well inventory is managed

Interpretation, relations, and usage:

- compare with norms for the industry
- the higher the inventory turnover →the shorter the time when resources are tied up in inventory

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

Write down the formula:

Days of inventory on hand (DOH)

Measures: how well inventory is managed

Interpretation, relations, and usage:

- compare with norms for the industry
- the higher the inventory turnover → the lower the DOH

$$\text{DOH} = \frac{\text{number of days in period}}{\text{inventory turnover}}$$

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Receivables turnover

Measures: how well receivables are managed

Interpretation, relations, and usage:

- compare with norms for the industry
- the higher the receivables turnover → the faster the company collects cash from credit sales
- too high receivables turnover →the company may lose customers to competitors that offer better credit terms
- low receivables turnover → are the company's credit and collection procedures effective?

$$\text{receivables turnover} = \frac{\text{revenue}}{\text{average receivables}}$$

Write down the formula:

Days of sales outstanding (DSO)

Measures: how fast the company collects cash from customers from credit sales (in days)

Interpretation, relations, and usage:

- compare with norms for the industry
- the higher the receivables turnover → the lower the DSO
- may be used for showing receivables aging

$$\text{DSO} = \frac{\text{number of days in period}}{\text{receivables turnover}}$$

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Payables turnover

Measures: how many times per year the company pays off its all creditors

Interpretation, relations, and usage:

- compare with norms for the industry
- if the value of purchases is not available → instead use: *COGS* + *ending inventory* – *beginning inventory*

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

Write down the formula:

Number of days of payables

Measures: how many days it takes the company to pay off its creditors

Interpretation, relations, and usage:

- compare with norms for the industry
- a high number of days of payables relative to the industry → the company is efficient in using credit facilities available **OR** the company has problems to fulfill its obligations on time

$$\text{number of days of payables} = \frac{\text{number of days in period}}{\text{payables turnover}}$$

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Working capital turnover

working capital = current assets – current liabilities

Measures: how much revenue is generated from working capital

Interpretation, relations, and usage:

- the higher the ratio → the more revenue is generated from working capital
- if working capital is close to 0 → the ratio skyrockets → it's hard to draw useful conclusions → use fixed asset turnover or total asset turnover instead

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

Write down the formula:

Fixed asset turnover

Measures: how much revenue is generated from the investment in fixed assets

Interpretation, relations, and usage:

- the higher the ratio → the more efficient usage of the company's fixed assets
- a low ratio → inefficiency **OR** capital-intensive business **OR** new business not operating at full capacity
- drawbacks: it depends on the age of assets (depreciation impacts the value of assets → impacts the ratio); it can change a lot from period to period because investments in fixed assets are usually not that smooth as changes in revenue.

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

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Total asset turnover

Measures: how much revenue is generated from a given level of total assets

Interpretation, relations, and usage:

- the higher the ratio → the more efficient usage of the company's total assets
- if low → the reason might be e.g. inefficient management of working capital
- it's affected by whether the management opted for a more capital-intensive or labor-intensive strategy

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

Write down the formula:

LIQUIDITY RATIOS

What do they measure?

Liquidity ratios measure the company's ability to meet short-term obligations.

They also help us assess how quickly the company can convert assets into cash.

Current ratio

Interpretation, relations, and usage:

- the higher the ratio → the higher the liquidity
- this ratio is misleading if receivables and inventories are illiquid (= cannot be easily converted into cash)

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

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Quick ratio

Interpretation, relations, and usage:

- the higher the ratio → the higher the liquidity
- more conservative than the current ratio (includes only the so-called 'quick assets', excludes e.g. inventories and current assets like prepaid expenses, etc.)
- this ratio is misleading if receivables are illiquid (= cannot be easily converted into cash)

$$\text{quick ratio} = \frac{\text{cash} + \text{short-term marketable investments} + \text{accounts receivable}}{\text{current liabilities}}$$

Write down the formula:

Cash ratio

Interpretation, relations, and usage:

- the higher the ratio → the higher the liquidity
- more conservative than the quick ratio and current ratio (includes only cash and highly liquid short-term marketable investments)
- be aware: during a huge market crisis → short-term marketable securities may decrease in value very quickly

$$\text{cash ratio} = \frac{\text{cash} + \text{short-term marketable investments}}{\text{current liabilities}}$$

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Defensive interval ratio

Measures: for how many days the company can pay its daily cash expenditures using only its liquid assets

Interpretation, relations, and usage:

- the higher the ratio → the higher the liquidity
- if very low → is there enough cash inflow expected in the upcoming future to meet the obligations?

$$\text{defensive interval ratio} = \frac{\text{cash} + \text{short-term marketable investments} + \text{account receivable}}{\text{daily cash expenditures}}$$

Write down the formula:

Cash conversion cycle (net operating cycle)

Measures: the time from paying suppliers for materials (or inventory) to collecting the cash from the sale of goods produced from these materials (or inventory).

Interpretation, relations, and usage:

- the higher the cash conversion cycle → the more time it takes to get back the cash used for funding the operations
- it's not a ratio
- it's presented as number of days
- DOH = days of inventory on hand; DSO = days of sales outstanding

$$\text{cash conversion cycle} = \text{DOH} + \text{DSO} - \text{number of days of payables}$$

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SOLVENCY RATIOS

What do they measure?

Solvency ratios measure the company's ability to meet long-term debt obligations.

In other words, they tell us how much of assets is financed by debt and to what extent earnings and cash flows can cover interest expenses, lease payments, rental payments, etc.

Debt-to-assets ratio

Measures: what percentage of assets is financed with debt

Interpretation, relations, and usage:

- the higher the ratio → the higher the financial risk → the weaker the solvency
- 'total debt' is defined as interest-bearing short-term debt + interest-bearing long-term debt

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

Write down the formula:

Debt-to-capital ratio

Measures: what percentage of the company's capital is financed with debt

Interpretation, relations, and usage:

- the higher the ratio → the higher the financial risk → the weaker the solvency
- 'total debt' is defined as interest-bearing short-term debt + interest-bearing long-term debt

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

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Debt-to-equity ratio

Measures: the relation between debt capital and equity capital

Interpretation, relations, and usage:

- the higher the ratio → the higher the financial risk → the weaker the solvency
- 'total debt' is defined as interest-bearing short-term debt + interest-bearing long-term debt
- If the ratio is equal to e.g. 1, then total debt = total shareholders' equity; if it is equal to e.g. 2, then debt capital is two times higher than equity capital, etc.

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

Write down the formula:

Financial leverage ratio

Measures: what value of assets is supported by USD 1 of equity

Interpretation, relations, and usage:

- the higher the ratio → the company is more leveraged (share of debt financing in total financing is higher)
- often, instead of <u>average</u> total assets and equity, we use <u>end-of-period</u> values of total assets and equity

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

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Debt-to-EBITDA

Measures: how many years it would take to repay total debt using EBITDA

Interpretation, relations, and usage:

- EBITDA = earnings before interest, taxes, depreciation, and amortization
- EBITDA can be used as an approximation of operating cash flow

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

Write down the formula:

Interest coverage

Measures: how many times EBIT is higher than interest payments

Interpretation, relations, and usage:

- the higher the ratio → the higher the solvency
- the higher the ratio → the easier for the company to service its debt from its operating earnings

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

Write down the formula:

Fixed charge coverage

Measures: how many times earnings before interest, taxes, and lease payments are higher than interest payments and lease payments

Interpretation, relations, and usage:

- the higher the ratio → the higher the solvency
- the higher the ratio → the easier for the company to service its debt from its normal earnings

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

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PROFITABILITY RATIOS

What do they measure?

Profitability ratios tell us what is the profitability of the company measured by different categories of profit and in relation to different measures like revenue, total assets, equity, etc. We can use the profitability ratios:

- for trend analysis,
- to compare the analyzed company to other companies,
- to compare ratios across the same company, e.g. gross profit margin vs operating profit margin,
- to assess future prospects, etc.

There are 2 categories of profitability ratios:

- return on investment: operating ROA, ROA, return on total capital, ROE, return on common equity
- return on sales: gross profit margin, operating profit margin, pretax margin, net profit margin

if "margin" → in denominator use **revenue**

Gross profit margin

Interpretation, relations, and usage:

- the higher the ratio → the higher the profitability
- gross profit = revenue - COGS

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

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Operating profit margin

Interpretation, relations, and usage:

- the higher the ratio → the higher the profitability
- operating income = gross profit – operating costs
- instead of operating income, EBIT can be used (remember: be consistent)

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

Write down the formula:

Pretax margin

Interpretation, relations, and usage:

- the higher the ratio → the higher the profitability
- pretax income = EBT = earnings before taxes
- pretax income = operating income – interest – non-operating expenses + non-operating income

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

Write down the formula:

Net profit margin

Interpretation, relations, and usage:

- the higher the ratio → the higher the profitability
- net income = revenue – all expenses
- when calculating the ratio, adjust net income for non-recurring items

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

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ROA (return on assets)

Interpretation, relations, and usage:

- the higher the ratio → the more net income is generated by a given level of assets
- some analysts use net income + interest x (1 – tax rate) in the numerator → the reason for the adjustment is because the total assets are financed by equity and debt and net income relates to equity holders only

$$\text{ROA} = \frac{\text{net income}}{\text{average total assets}}$$

Write down the formula:

Operating ROA (operating return on assets)

Interpretation, relations, and usage:

- the higher the ratio → the higher the profitability
- operating income = gross profit – operating costs
- instead of operating income, EBIT can be used (remember: be consistent)

$$\text{operating ROA} = \frac{\text{operating profit}}{\text{average total assets}}$$

Write down the formula:

Return on total capital

Interpretation, relations, and usage:

- the higher the ratio → the higher the profitability
- instead of EBIT, operating income can be used (remember: be consistent)

$$\text{return on total capital} = \frac{\text{EBIT}}{\text{average short- \& long-term debt and equity}}$$

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ROE (return on equity)

Interpretation, relations, and usage:

- the higher the ratio → the more net income is generated by a given level of equity
- total equity = common equity + preferred equity + minority equity

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

Write down the formula:

Return on common equity

Interpretation, relations, and usage:

- the higher the ratio → the more net income is generated by a given level of equity
- it's the return made only by common equity

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

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DUPONT ANALYSIS

DuPont analysis is about the decomposition of ROE into its components. It gives us the answer to the following question: **What factors drive the changes in the ROE?**

$$\text{ROE} = \text{tax burden} \times \text{interest burder} \times \text{EBIT margin} \times \text{total asset turnover} \times \text{leverage}$$

$$\frac{\text{net income}}{\text{equity}} = \frac{\text{net income}}{\text{EBT}} \times \frac{\text{EBT}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{revenue}} \times \frac{\text{revenue}}{\text{assets}} \times \frac{\text{assets}}{\text{equity}}$$

net profit margin

ROA

Where:

- equity = average shareholders' equity
- assets = average total assets
- EBT = earnings before taxes
- EBIT = earnings before interest and taxes

Write down the formula:

Is it correct?

Yes, because fractions shorten:

$$\frac{\text{net income}}{\text{equity}} = \frac{\text{net income}}{\cancel{\text{EBT}}} \times \frac{\cancel{\text{EBT}}}{\cancel{\text{EBIT}}} \times \frac{\cancel{\text{EBIT}}}{\cancel{\text{revenue}}} \times \frac{\cancel{\text{revenue}}}{\cancel{\text{assets}}} \times \frac{\cancel{\text{assets}}}{\text{equity}}$$

Another perspective:

ROE is a function of:

$$\text{ROE} = \text{F}(\text{tax rate};\ \text{interest burden};\ \text{operating profitability};\ \text{efficiency};\ \text{leverage})$$

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VALUATION RATIOS

Why do analysts use them?

Valuation ratios are used in the valuation process to value the equity of the company.

Valuation ratios

Interpretation, relations, and usage:

- P/E tells us how much we pay for USD 1 of net income
- because P/E uses net income, it's sensitive to non-recurring items and the risk of manipulation is the highest from all valuation ratios enumerated below (it's easier to manipulate net profit than e.g. cash flows or sales)
- low quality of earning → use P/CF instead of P/E
- loss instead of a positive net income → use P/S instead of P/E

$$\text{P/E} = \frac{\text{price per share}}{\text{earnings per share}}$$

$$\text{P/CF} = \frac{\text{price per share}}{\text{cash flow per share}}$$

$$\text{P/S} = \frac{\text{price per share}}{\text{sales per share}}$$

$$\text{P/BV} = \frac{\text{price per share}}{\text{book value per share}}$$

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Per-share quantities

Interpretation, relations, and usage:

- EPS = how much net income is attributable to 1 common share
- because the so-called antidilutive securities are not taken into account when calculating diluted EPS → diluted EPS is always lower or equal to basic EPS
- use EBITDA per share when comparing companies with materially different levels of fixed assets → because EBITDA = earnings before (*subtracting*) interest, taxes, amortization, and depreciation

$$\text{basic EPS} = \frac{\text{net income} - \text{preferred dividends}}{\text{weighted average number of common shares outstanding}}$$

$$\text{diluted EPS} = \frac{\text{adjusted net income (taking into account potentially dilutive securities)}}{\text{weighted average number of common \& potentially common shares outstanding}}$$

$$\text{cash flow per share} = \frac{\text{cash flow from operations}}{\text{weighted average number of shares outstanding}}$$

$$\text{EBITDA per share} = \frac{\text{EBITDA}}{\text{weighted average number of shares outstanding}}$$

$$\text{dividends per share} = \frac{\text{common dividends declared}}{\text{weighted average number of shares outstanding}}$$

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Dividends-related quantities

$$\text{dividend payout ratio} = \frac{\text{common share dividends}}{\text{net income attributable to common shares}}$$

$$\text{retention rate} = \frac{\text{net income attributable to common shares} - \text{common share dividends}}{\text{net income attributable to common shares}}$$

$$\text{sustainable growth rate} = \text{retention rate} \times \text{ROE}$$

Write down the formulas:

INDUSTRY-SPECIFIC & TASK-SPECIFIC RATIOS

In different industries, we may use different ratios to compare companies from the same industry. The role of industry-specific ratios & task-specific ratios is to cover issues and characteristics typical of a given industry.

Examples: capital adequacy, coefficient of variation of operating income, net interest margin, sales per square meter, etc.

CREDIT ANALYSIS

credit risk = the risk of incurring a loss as a result of the counterparty not being able to make full and timely payments

credit analysis = the evaluation of credit risk

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.

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Credit ratios

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

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

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

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

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

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

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

Where:

- EBITDA = earnings before interest, taxes, depreciation, & amortization
- EBIT = earnings before interest and taxes
- FFO = funds from operations = EBITDA – net interest expense – current tax expense
- CFO = cash flow from operations
- capital = debt + noncurrent deferred taxes + equity

Write down the formulas:

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SEGMENT REPORTING

According to IFRS 8, an operating segment is a component of the company:

1. that engages in activities that may generate revenue and create expenses, and
2. whose results are regularly supervised by the company senior management, and
3. for which discrete financial information is available.

Examples of the segment: subsidiaries, operating units, operations in different countries, etc.

A company discloses separate information about the segment if it constitutes at least 10% of total revenue, assets, or profit.

Disclosures related to segments:

- factors used to identify segments,
- types of products and services sold in each segment,
- profit and loss,
- total assets and total liabilities,
- segment revenue,
- interest revenue and interest expense,
- cost of PP&E and intangible assets acquired,
- depreciation and amortization expense,
- other non-cash expenses,
- income tax expense and income tax income,
- share of the net profit or loss of an investment accounted for under the equity method.

Segment ratios

The same as for the company, we can compute ratios for segments. They will help analyze performance, efficiency, etc. for segments.

Example of ratios: segment margin, segment turnover, segment ROA, etc.

Note: The construction of segment ratios is the same as in the case of ratios for the whole company with the exception that we choose data for a segment, e.g. in the case of segment margin, we use segment profit in the numerator and segment revenue in the denominator.

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EARNINGS FORECASTING & MODELING

We use the results of financial analysis when forecasting and modeling future earnings and cash flows of the company. The outputs can be used to value the company.

When preparing a financial model, we should remember to check the sensitivity of the result on the inputs. We can use 3 techniques here:

- sensitivity analysis (aka. 'what if' analysis),
- scenario analysis,
- simulation.

Sensitivity analysis answers the question of how a change in our assumptions concerning particular inputs may affect the outputs of the model.

In the case of **scenario analysis**, we simultaneously change several inputs to get a range of possible outputs.

Simulation is a computer technique based on probability models that helps us conduct either sensitivity analysis or scenario analysis.

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Summarizing key concepts:

☐ Financial statement analysis framework

My summary:

☐ Analytical tools & techniques

My summary:

☐ Activity ratios

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☐ Liquidity ratios

My summary:

☐ Solvency ratios

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☐ Profitability ratios

My summary:

☐ Valuation ratios & Equity analysis

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☐ DuPont analysis

My summary:

☐ Credit analysis

My summary:

☐ Segment reporting

My summary:

☐ Earnings forecasting & modeling

My summary:

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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')													
date		date		date		date		date		date		date	
25'		25'		25'		25'		25'		25'		25'	
5'		5'		5'		5'		5'		5'		5'	
25'		25'		25'		25'		25'		25'		25'	
5'		5'		5'		5'		5'		5'		5'	
25'		25'		25'		25'		25'		25'		25'	
5'		5'		5'		5'		5'		5'		5'	
25'		25'		25'		25'		25'		25'		25'	
5'		5'		5'		5'		5'		5'		5'	

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	

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