Financial Ratios

MGMT 675: AI-Assisted Financial Analysis

Outline

- Data sources
- Key financial ratios
- Julius workflow

Data Sources

SEC EDGAR

- All financial statement data ultimately comesfrom the SEC
- SEC EDGAR (Electronic Data Gathering, Analysis, and Retrieval) is the SEC's online database where companies submit filings and the public can download filings.
- We can search it in a browser
- We can do a bulk download
- We can scrape it

Yahoo Finance

- The easiest way to get financial statement data is to use yfinance.
- You'll get a summary of the statements. Various items are lumped into standard categories.
- The SEC provides more granular data.
- Example: ask Julius to use yfinance 0.2.54 to get financial statements for Tesla

Key Financial Ratios

Categories of Ratios

- Profitability
- Liquidity
- Solvency
- Efficiency
- Valuation

Liquidity Ratios

- Current Ratio:

$$\frac{\text{Current Assets}}{\text{Current Liabilities}}$$

- Quick (Acid-Test) Ratio:

$$\frac{\text{Current Assets} - \text{Inventories}}{\text{Current Liabilities}}$$

- Cash Ratio:

$$\frac{\text{Cash \& Cash Equivalents}}{\text{Current Liabilities}}$$

- Operating Cash Flow Ratio:

$$\frac{\text{Operating Cash Flow}}{\text{Current Liabilities}}$$

Solvency (Leverage) Ratios

- Debt Ratio:

$$\frac{\text{Total Liabilities}}{\text{Total Assets}}$$

- Debt-to-Equity (D/E) Ratio:

$$\frac{\text{Total Liabilities}}{\text{Shareholders' Equity}}$$

- Interest Coverage Ratio:

$$\frac{\text{EBIT}}{\text{Interest Expense}}$$

- Debt Service Coverage Ratio (DSCR):

$$\frac{\text{Operating Income}}{\text{Total Debt Service}}$$

Profitability Ratios

- Gross Profit Margin:

$$\frac{\text{Gross Profit}}{\text{Revenue}}$$

- Operating Profit Margin:

$$\frac{\text{Operating Profit}}{\text{Revenue}}$$

- Net Profit Margin:

$$\frac{\text{Net Income}}{\text{Revenue}}$$

- Return on Assets (ROA):

$$\frac{\text{Net Income}}{\text{Total Assets}}$$

- Return on Equity (ROE):

$$\frac{\text{Net Income}}{\text{Shareholders' Equity}}$$

Efficiency (Activity) Ratios

- Asset Turnover Ratio:

$$\frac{\text{Net Sales}}{\text{Average Total Assets}}$$

- Inventory Turnover Ratio:

$$\frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$$

- Days Inventory Outstanding (DIO):

$$365 \div \text{Inventory Turnover}$$

- Accounts Receivable Turnover:

$$\frac{\text{Net Credit Sales}}{\text{Average Accounts Receivable}}$$

- Days Sales Outstanding (DSO):

$$\left(\frac{\text{Accounts Receivable}}{\text{Total Credit Sales}}\right) \times 365$$

More Efficiency (Activity) Ratios

- Days Payables Outstanding (DPO):

$$\left(\frac{\text{Accounts Payable}}{\text{Cost of Goods Sold}} \right) \times 365$$

- Cash Conversion Cycle (CCC):

$$\text{DSO} + \text{DIO} - \text{DPO}$$

Investment & Valuation Ratios

- Price-to-Earnings (P/E) Ratio:

$$\frac{\text{Market Share Price}}{\text{Earnings Per Share}}$$

- Price-to-Book (P/B) Ratio:

$$\frac{\text{Market Price per Share}}{\text{Book Value per Share}}$$

- Price-to-Sales (P/S) Ratio:

$$\frac{\text{Market Capitalization}}{\text{Annual Sales}}$$

- Price-to-Cash Flow (P/CF) Ratio:

$$\frac{\text{Market Price per Share}}{\text{Cash Flow per Share}}$$

- Enterprise Value to EBITDA (EV/EBITDA):

$$\frac{\text{Enterprise Value}}{\text{EBITDA}}$$

More Investment & Valuation Ratios

- PEG Ratio:

$$\frac{\text{P/E}}{\text{Annual EPS Growth Rate}}$$

- Dividend Yield:

$$\frac{\text{Annual Dividends per Share}}{\text{Share Price}}$$

- Dividend Payout Ratio:

$$\frac{\text{Annual Dividends per Share}}{\text{Earnings per Share}}$$

Julius Workflow

Julius Workflow

- User prompt: input ticker symbol
- Julius prompt:
  - Get several years of statements
  - Calculate ratios each year (can skip Investment & Valuation)
  - Plot ratios over time
    - Maybe one figure for each category?
    - Subplot for each ratio?
  - Describe the trends in each category
  - Save as a Word doc?

More on EDGAR

Scraping EDGAR

- We can retrieve all of the filings of a company by
  - Find the company's CIK (web search)
  - Add zeros to the beginning of the CIK until it is 10 digits
  - Paste the 10-digit CIK into https://data.sec.gov/api/xbrl/companyfacts/CIK{cik_goes_here}.json without the braces and visit the URL
- Ask Julius to do this. We will want the us-gaap data. Filter to 10Ks or 10Qs or by year and create a dataframe from the data.