

Data Visualization

MGMT 675: AI-Assisted Financial Analysis



- Illustrate AI + python visualization by an example: try to understand PE ratios
 - How they depend on financial ratios and growth rates
 - How the dependence may vary by sector and size
- Next week: prediction by neural networks

Data

- Download financials.xlsx from the schedule page.
- Filtered to net income ≥ 0 . 1300+ firms
- $PE = \text{price} / \text{EPS}$. Price is closing price on 4/7/2025. EPS is most recent annual.
- Various financial ratios from most recent annual report and some one-year growth rates
- Other categorical and continuous variables

Ratios and Growth Rates

- DuPont factors:
 - $\text{lv}g = \text{assets} / \text{equity}$
 - $\text{assetturnover} = \text{revenue} / \text{assets}$
 - $\text{grossmargin} = \text{gross profit} / \text{revenue}$
 - $\text{netinc_grprof} = \text{net income} / \text{gross profit}$
- Other ratios:
 - $\text{roe, roa, netmargin} = \text{net income} / (\text{equity, assets, or revenue})$
 - $\text{ebitmargin, ebitdamargin} = (\text{EBIT or EBITDA}) / \text{revenue}$
 - $\text{de} = \text{liabilities} / \text{equity}$
 - $\text{currentratio} = \text{current assets} / \text{current liabilities}$
 - $\text{payoutratio} = \text{dividends} / \text{net income}$
- Growth rates: $\text{eps_gr, asset_gr, revenue_gr} = \text{eps, assets, or revenue growth}$

Other Categorical and Continuous Variables

- Categorical: sector, scale revenue
- Continuous: assets, equity, revenue
- Can create our own categories from continuous variables

- The data has already been filtered to $\text{EPS} > 0$
- PE is heavily right-skewed. You will probably want to ask Julius to filter the right tail, e.g., $\text{PE} < 100$.
- You may also want to filter to subsets of sector and scalerevenue
- We can create your own categorical variables. E.g., ask Julius to create a variable equal to the leverage quintile.

Plots

Plot Features You can Control

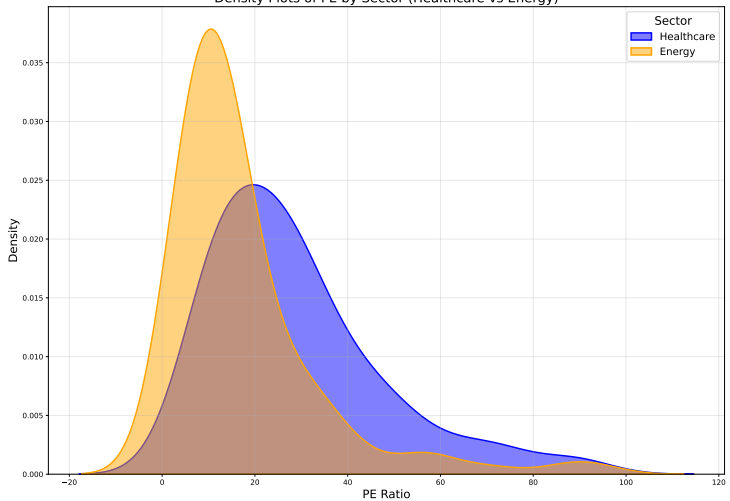
- Font sizes
- Background color
- Color templates
- Gridlines or not
- Legend or not and where to locate it
- Figure title and axis labels
- Multiple plots in a figure (e.g, 2x2 layout)
- Annotate points with text and arrows
- Add regression lines
- Really, anything you can think of.

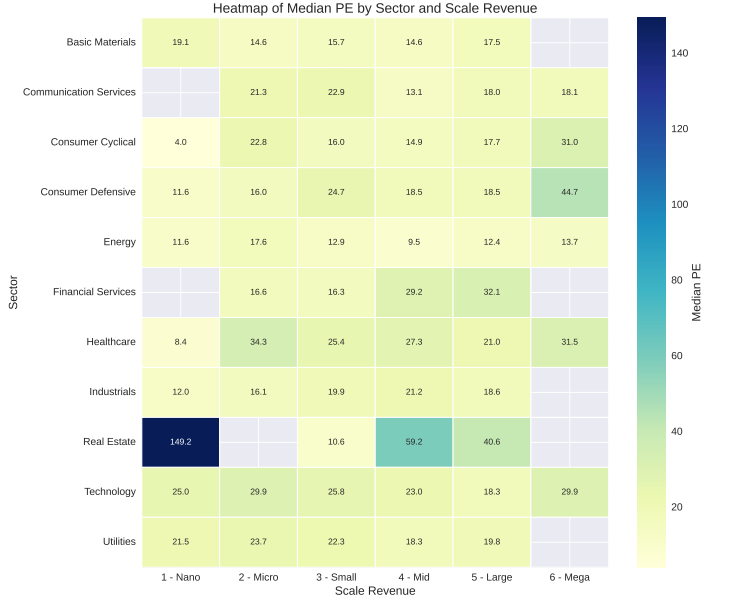
Output Types

- jpeg, png, pdf
- Word doc or PowerPoint deck
- interactive html

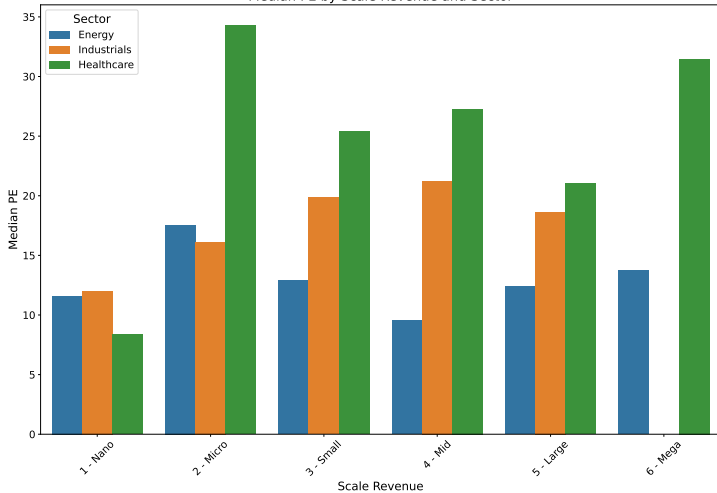
Examples

Density Plots of PE by Sector (Healthcare vs Energy)

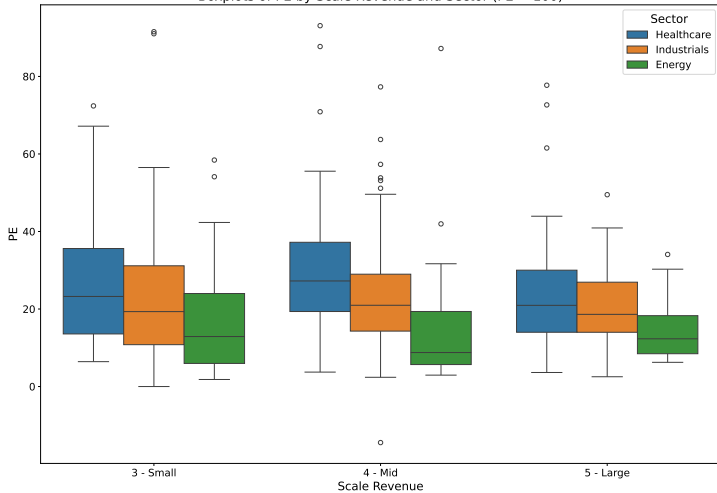




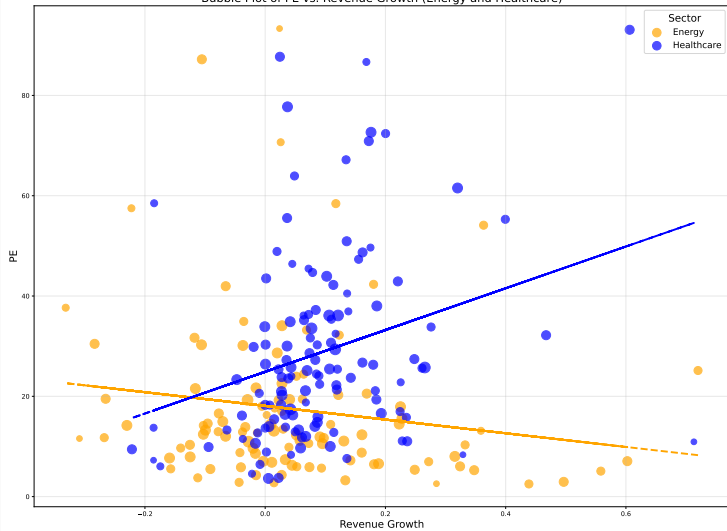
Median PE by Scale Revenue and Sector

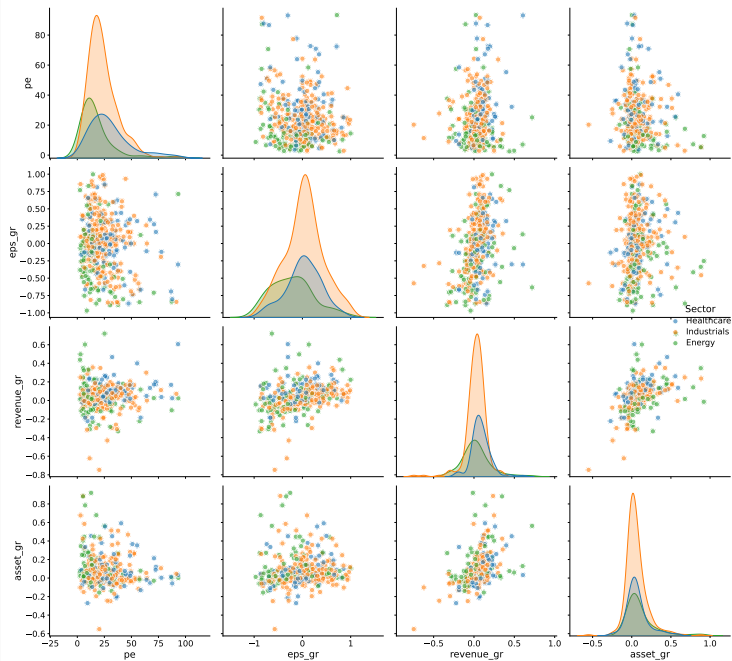


Boxplots of PE by Scale Revenue and Sector (PE < 100)

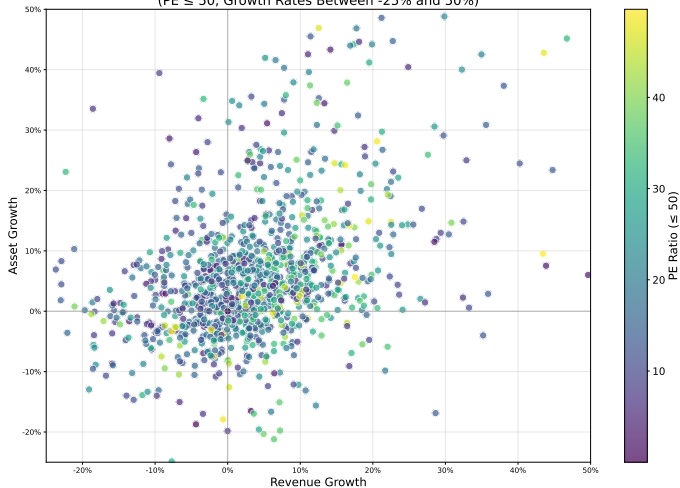


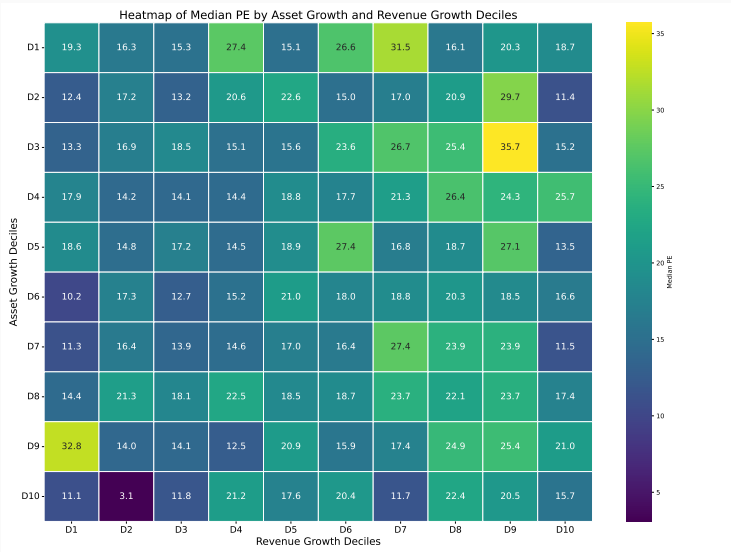
Bubble Plot of PE vs. Revenue Growth (Energy and Healthcare)





Revenue Growth vs. Asset Growth, Colored by PE Ratio
($PE \leq 50$, Growth Rates Between -25% and 50%)





Prompts

Example Prompts

- Create filled density plots of PE by sector in [healthcare, energy].
- Create a heatmap of median PE by group with scalerevenue in columns and sector in rows. Order scalerevenue as nano, micro, small, mid, large, mega.
- Filter to sector in [healthcare, industrials, energy]. Create a bar chart of median PE by group with scalerevenue on the x-axis and sector as hue.
- Filter further to scalerevenue in [small, mid, large] and to pej100. Create boxplots of PE with scalerevenue on the x-axis and sector as hue.
- Create a bubble plot of PE vs. revenue_gr with scalerevenue as size and sector as color. Add a regression line for each sector using the sector color.

More Example Prompts

- Create a pairplot of [pe, eps_gr, revenue_gr, asset_gr] with sector in [healthcare, industrials, energy] as hue.
- Create a scatter plot of asset_gr against revenue_gr with pe as the color. Use only observations for which pe > 50 and asset_gr and revenue_gr are between -25% and 50%.
- Define categorical variables for deciles of asset_gr and revenue_gr. Create a heatmap of median pe by group with asset_gr on the y-axis and revenue_gr on the x-axis.