

FE5214 Assignment 1, Due: Thursday, 6 February 2025

Submit your answers to Canvas. Word and PDF files are acceptable. Please include your name (family name first) at the beginning of the filename

1. **Obtain the number of stocks in each of the GICS sectors and industries** (the GICS sector is defined using the first 2 digits of the GICS code and the GICS industry is defined using the first 6 digits of the GICS code) for the S&P 500 universe at the beginning of 2014 and 2024 respectively. Calculate the total market cap of each sector and industry. **What are the top three sectors and the top three industries in terms of total market cap at the beginning of 2014 and at the beginning of 2024?** You only need to give the first 2 and 6 digits of the GICS as the label of the sector and industry.
2. **List the stocks in the 2024 universe that are also in the industry NVDA belongs to.**
3. Calculate the returns of the stocks in the list from Question 2 (the stocks that are in the 2024 universe and in the industry that NVDA belongs to) for the past five years (return time series, from 2020 to 2024). Use the adjusted prices to calculate the returns (you might use log-return, $r_i(t) = \ln(\frac{P_i(t)}{P_i(t-1)})$). Calculate the industry return, by simply average over all the stock returns in the industry, $r_I(t) = \frac{1}{n} \sum_{i=1}^n r_i(t)$, where n is the number of stocks in that industry. Do the time-series regression
$$r = \alpha + \beta r_I + \epsilon,$$
where r is the return of NVDA.**Obtain the values of α and β . What's the R^2 of the regression?**
4. If the industry return, in Question 3, is calculated using the market-cap weighted average (instead of the simple average), **what will be your answers?** Here, the market-cap weighted average of the industry return is defined as,
$$r_I(t) = \frac{\sum_{i=1}^n c_i(t) r_i(t)}{\sum_{i=1}^n c_i(t)},$$
where $c_i(t)$ is the market cap of the stock i at date t.

You will need to briefly describe how you obtained the answers to the above questions.