MGT 6203 Team #42 Group Project Proposal

Team Members:

1. Name: Xi Lu; GTId: xlu355 --> This is my 5th course in the program, and recently I have worked on a project predicting wildfire spread using SMOTE and XGBoost models for CSE 6242. My undergrade degree is in Public Planning.
2. Name: Ligeng Peng; GTId: lpeng61 --> I have a bachelor's degree in engineering from the University of Calgary. I am a Project Manager in BI and Data Service, and my current working project is Vision AI to detect movement from Crane in construction site.
3. Name: Daniel Tong; GT Id: dtong31 --> I am an aspiring data analyst, recently graduating from UCSD with a Bachelor's in Data Science. This will be my 3rd course of the program.
4. Name: Guchuan Gao; GT Id: ggao43 --> I am a data scientist/mechanical engineer working in Canadian oil sands, with a primary focus on developing autonomous haulage technology in the mining industry. I am passionate about exploring AI applications in image recognition and natural language processing.
5. Name: Isabelle Victoria Zelazny; GT Id: izelazny3 --> I am a geologist working in the Canadian oil and gas industry with a specialty in unconventional geochemistry. My goal is to develop analytical skills so I can improve how exploration and development is done in the industry.

Project Title: Understanding effects of financial ratios on stock performance

Background: A company's stock price fluctuates every day by market forces, but it is also strongly influenced by its financial fundamentals. Financial ratios provide investors with opportunities to evaluate a company's true performance as they are often considered as fundamentals in stock analysis.

Problem Statement: The key objective of this project is to analyze financial ratios' correlations with stock prices among Dow 30 stocks and use factor driven analysis to understand how financial ratios drive stock performance in different industries.

Primary Research Question: Which of the financial ratios (Dependent Variable) best predicts the returns (Independent Variables) of a stock from the Dow 30?

Supporting Research Questions:

1. Which combinations (interaction terms) of financial ratios best predicts the return of a stock from the Dow 30?
2. Which combinations of financial ratios suggest poor performer/good performer for a stock in the next 3 months?
3. Different industries have different financial ratios as their predictors?

Business Justification: Understanding how to make successful investments is important for both investment businesses and individuals. The reason for this is because the allocation of cash greatly impacts the outcome of an investment company as their success is dependent on this and for an individual it has impacts on their financial health. Therefore, by understanding which financial ratios best predict the returns of a stock, the investor can make a data driven decision on their investments.

Dataset:

- Wharton Research Data Services: https://wrds-www.wharton.upenn.edu/
- Yahoo Finance via R tidyquant

public_date	TICKER	CAPEI	bm	evm	pe_op_	pe_op_	pe_exi	pe_inc
20100131	MSFT	17.445	0.181	9.091	17.835	17.949	18.299	18.299
20100228	MSFT	17.365	0.166	9.138	15.332	15.582	15.84	15.84
20100331	MSFT	17.722	0.166	9.138	15.662	15.917	16.181	16.181
20100430	MSFT	18.48	0.166	9.138	16.329	16.595	16.87	16.87
20100531	MSFT	15.296	0.181	9.939	13.163	13.368	13.368	13.368

- Dow 30 stock prices by month from Jan 2010 to Dec 2022 from Yahoo Finance
- Dow 30 stocks' 75 Financial ratios by month from Jan 2010 to Dec 2022 from Wharton Research Data Services

Key Variables: Dependent variable: Stock Price, Independent variables: 75 different Financial Ratios

Project Timeline/Mention key dates you hope to achieve certain milestones by:

Task	Task Details	Assigned To	Progress	Start	End
Topic & Proposal	Topic Research and Selection	Everyone	100%	2-16-23	3-02-23
	Dataset Research and Selection	Everyone	100%	2-16-23	3-02-23
	Proposal	Everyone	100%	3-02-23	3-12-23
	Proposal Presentation	Everyone	0%	3-12-23	3-26-23
Data	Data Collection, Cleaning and Prep.	Everyone	0%	3-12-23	3-19-23
	Data Exploration/ Variables Selection	Everyone	0%	3-12-23	3-19-23
	Analysis/Modeling	Everyone	0%	3-19-23	4-02-23
	Progress Report	Everyone	0%	3-26-23	4-02-23
Evaluation & Visualization	Experiment and Evaluation	Everyone	0%	4-02-23	4-09-23
	Final Report	Everyone	0%	4-09-23	4-16-23
	Final Presentation	Everyone	0%	4-09-23	4-19-23

This project will take roughly 2 months to complete. We will review project milestones such as data collection, cleaning, variable selection, modeling, visualization, and completion of the progress report as part of our "midterm exam." As part of our final deliverables, our "final exam" will focus on finishing the final report, creating a solid model to categorize financial ratios into 5 factors and determine which factor plays the most significant role in stock performance. The project activities and progress are tracked using a Gantt chart and Azure DevOps. We also have weekly meetings to show the progress to the team members.

Planned Approach

- The main technologies we would use for data analysis, visualization, and model predication are R
- Understand potential multicollinearity between financial ratios
- Potentially use PCA to reduce financial ratios dimensionality to identify key financial ratios that have major impact on stock price
- Create training, validation, and test datasets to aid with selecting best model
- Create multi linear regression models to establish correlations between financial ratios and stock prices
- Create clusters among Dow 30 stocks to understand patterns
- Use back-testing to assess the viability of a trading strategy or pricing model by discovering how it would have played out retrospectively using historical data.

Expected Outcomes

- We will have a better understanding of the relationship between financial ratios and stock prices: for example, by analyzing the correlation between financial ratios and stock prices, we can gain insights into how changes in a company's financial performance impact its stock price.

- Through factor analysis, we will have identification of key factors that drive stock performance, and this information can be used to predict how stocks might perform in the future and to make investment decisions.
- By implementing factor analysis to predict future stock performance, we can make more informed investment decisions and potentially generate higher returns on our investments.

Anticipated Conclusions/Hypothesis:

The following 6 financial ratios are typically expected to influence stock prices: working capital ratio, the quick ratio, earnings per share (EPS), price-earnings (P/E), debt-to-equity, and return on equity (ROE) [1]

What business decisions will be impacted by the results of your analysis? What could be some benefits?

- Businesses seeking investors may tailor company financial ratios to align with ones that predict better performance
- Provide references to future personal/investment company stock investment decisions

Reference:

[1] Glenn Wilkins. 6 Basic Financial Ratios and What They Reveal. Investopedia. 2022. https://www.investopedia.com/financial-edge/0910/6-basic-financial-ratios-and-what-they-tell-you.aspx#:~:text=There%20are%20six%20basic%20ratios,return%20on%20equity%20(ROE).